

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

AMENDMENT NO. 2
TO
FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

PQ GROUP HOLDINGS INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

2800
(Primary Standard Industrial
Classification Code Number)

81-3406833
(I.R.S. Employer
Identification Number)

**300 Lindenwood Drive
Valleybrooke Corporate Center
Malvern, Pennsylvania 19355
(610) 651-4400**

(Address, including zip code, and telephone number, including
area code, of registrant's principal executive offices)

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**300 Lindenwood Drive
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Approximate date of commencement of proposed sale to public: As soon as practicable after this Registration Statement is declared effective.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box.

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer
Non-accelerated filer (Do not check if a smaller reporting company) Smaller reporting company
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided to Section 7(a)(2)(B) of the Securities Act.

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Proposed Maximum Aggregate Offering Price(1)(2)	Amount of Registration Fee(1)(3)
Common stock, par value \$0.01 per share	\$100,000,000	\$11,590

- (1) Estimated solely for the purpose of calculating the registration fee in accordance with Rule 457(o) of the Securities Act of 1933, as amended, based upon an estimate of the maximum offering price.
(2) Includes the offering price of additional shares of common stock that may be purchased by the underwriters.
(3) Previously paid.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the Registration Statement shall become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

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The information in this preliminary prospectus is not complete and may be changed. These securities may not be sold until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities nor does it seek an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to Completion, dated August 14, 2017
PROSPECTUS



Shares

PQ Group Holdings Inc.

Common Stock

This is the initial public offering of the common stock of PQ Group Holdings Inc., a Delaware corporation. PQ Group Holdings Inc. is offering _____ shares of common stock to be sold in the offering.

Prior to this offering, there has been no public market for our common stock. The initial public offering price is expected to be between \$ _____ and \$ _____ per share. We intend to apply to list our common stock on the New York Stock Exchange under the symbol "PQG."

See "[Risk Factors](#)" beginning on page 27 to read about factors you should consider before buying shares of our common stock.

	<u>Per Share</u>	<u>Total</u>
Initial public offering price	\$ _____	\$ _____
Underwriting discounts and commissions (1)	\$ _____	\$ _____
Proceeds, before expenses, to us	\$ _____	\$ _____

(1) See "Underwriters" for additional information regarding underwriter compensation.

To the extent that the underwriters sell more than _____ shares of our common stock, the underwriters have the option for a period of 30 days from the date of this prospectus to purchase up to an additional _____ shares of our common stock from us at the initial public offering price less the underwriting discount.

Neither the Securities and Exchange Commission nor any other regulatory body has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of our common stock on or about _____, 2017.

Morgan Stanley
J.P. Morgan

Goldman Sachs & Co. LLC
Jefferies
Deutsche Bank Securities
Evercore ISI

Citigroup

Credit Suisse
KeyBanc Capital Markets

Nomura

, 2017



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We have not authorized any person to provide you with any information or represent anything about us or this offering that is not contained in this prospectus or in any free writing prospectus we have prepared. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. This prospectus is an offer to sell only the shares offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus is current only as of its date.

SUPPLY SHARE AND INDUSTRY INFORMATION

Certain statistical information used throughout this prospectus is based on independent industry publications, reports by research firms or other published independent sources. Some statistical information is also based on our good faith estimates, which are derived from management's knowledge of our industry and such independent sources referred to above. Certain supply share statistics, ranking and industry information included in this prospectus, including the size of certain markets and our estimated supply share position and the supply share positions of our competitors, are based on management estimates. These estimates have been derived from our management's knowledge and experience in the industry and end uses into which we sell our products, as well as information obtained from surveys, reports by research firms, our customers, distributors, suppliers, trade and business organizations and other contacts in the industries into which we sell our products. We believe these data to be accurate as of the date of this prospectus. However, this information may prove to be inaccurate because this information cannot always be verified with complete certainty due to the limitations on the availability and reliability of raw data, the voluntary nature of the data gathering process and other limitations and uncertainties. Unless otherwise noted, all of our supply share position information presented in this prospectus is an approximation based on management's knowledge and is based on our, or, in the case of our zeolite catalysts product group, our Zeolite Joint Venture's, sales volumes relative to the estimated sales volumes for the year ended December 31, 2016 in relevant products or end uses into which we sell our products. In the case of our refining services product group, including the products and services thereof, such supply share position information excludes volume attributable to manufacturers who produce primarily for their own consumption. References to our being a leader in a supply share position or product group refer to our belief that we have one of the leading supply share positions, unless otherwise indicated or the context otherwise requires. In addition, references to various end uses into which we sell our products are based on how we define the end uses for our products.

Certain monetary amounts, percentages and other figures included in this prospectus have been subject to rounding adjustments. Accordingly, numerical figures shown as totals in certain tables or charts may not be the arithmetic aggregation of the figures that precede them. In addition, we round certain percentages presented in this prospectus to the nearest whole number. As a result, figures expressed as percentages in the text may not total 100% or, as applicable, when aggregated may not be the arithmetic aggregation of the percentages that precede them.

TRADEMARKS AND TRADENAMES

We own or have rights to trademarks or trade names that we use in conjunction with the operation of our business. In addition, our name, logo and website name and address are our service marks or trademarks. Each trademark, trade name or service mark by any other company appearing in this prospectus belongs to its holder. Some of the more important trade names and trademarks that we use include Potters, PQ, Zeolyst, Zeolyst International and EcoServices. We also own or have the rights to copyrights that protect the content of our products. Solely for convenience, the trademarks, service marks, trade names and copyrights referred to in this prospectus are listed without the TM, SM, [®] and [©] symbols, but we will assert, to the fullest extent under applicable law, our rights to these trademarks, service marks, trade names and copyrights.

THE BUSINESS COMBINATION

On May 4, 2016, we consummated a series of transactions (the "Business Combination") to reorganize and combine the businesses of PQ Holdings Inc. ("PQ Holdings") and Eco Services Operations LLC ("Eco") under a new holding company, PQ Group Holdings Inc. ("PQ Group Holdings" or the "company"), pursuant to a reorganization and transaction agreement, dated August 17, 2015, as amended, by and among PQ Group Holdings, PQ Holdings, PQ Corporation, Eco, Eco Services Holdings LLC, Eco Services Group Holdings LLC and certain investment funds affiliated with CCMP Capital Advisors, LLC (now known as CCMP Capital Advisors, LP; "CCMP"). We refer to the business of PQ Holdings prior to the Business Combination as "legacy PQ" and the business of Eco prior to the Business Combination as "legacy Eco."

BASIS OF FINANCIAL PRESENTATION

Legacy Eco operated as a business unit of Solvay USA Inc. (“Solvay”) until the acquisition of substantially all of the assets of Solvay’s Eco Services business unit by Eco on December 1, 2014 (the “2014 Acquisition”). References in this prospectus to “Predecessor” include each of the periods from January 1, 2012 to November 30, 2014. For 2014, the results include 11 months of legacy Eco operating activity (January 1, 2014 to November 30, 2014) and include amounts that have been “carved out” from Solvay’s financial statements using assumptions and allocations made by Solvay to reflect Solvay’s Eco Services business unit on a stand-alone basis. References in this prospectus to “Successor” refer to the period from inception of Eco (July 30, 2014) to December 31, 2014, but only include one month of legacy Eco operating activity (December 1, 2014 to December 31, 2014), because there was no operating activity for the period from inception (July 30, 2014) to November 30, 2014, and reflect legacy Eco on a stand-alone basis.

On May 4, 2016, we consummated the Business Combination to reorganize and combine the businesses of PQ Holdings and Eco under a new holding company. In accordance with United States generally accepted accounting principles (“GAAP”), legacy Eco was the accounting acquirer in the Business Combination and, as such, legacy Eco is treated as our predecessor and therefore the financial information through May 3, 2016 only includes the results of legacy Eco. The financial information presented in this prospectus subsequent to May 3, 2016 is of PQ Group Holdings, which includes the operating results of legacy Eco and legacy PQ.

The following table summarizes, for each of the periods specified below and for which financial information is included for the issuer, PQ Group Holdings, in this prospectus, the portion, if any, of the financial results of legacy PQ and legacy Eco that is included in the financial results for such periods presented in accordance with GAAP.

	Six months ended June 30,		Pro forma year ended December 31, 2016	Years ended December 31,		Successor	Predecessor
	2017	2016		2016	2015	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014
Operations of legacy Eco	Included	Included	Included	Included	Included	Partially included (December 1 to December 31)	Included (January 1 to November 30)
Operations of legacy PQ	Included	Partially included (May 4 to June 30)	Included	Partially included (May 4 to December 31)	Not included	Not included	Not included

The financial statements of our accounting predecessor contained in this prospectus for periods prior to the 2014 Acquisition are not necessarily indicative of what legacy Eco’s financial position, results of operations and cash flows would have been had legacy Eco operated as a separate, standalone entity independent of Solvay.

Additional information regarding our financial performance and non-GAAP measures, including reconciliations of non-GAAP measures to their most directly comparable GAAP measure, is included in “Summary Historical and Unaudited Pro Forma Financial and Other Data.” In addition, such financial information should be read in conjunction with the disclosures set forth under “Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and related notes appearing elsewhere in this prospectus.

THE RECLASSIFICATION

In connection with this offering, on _____, 2017, we reclassified our Class A common stock into common stock and then effected a _____-for-1 split of our common stock. Immediately prior to this offering, we will convert each outstanding share of our Class B common stock into approximately _____ shares of our common stock plus an additional number of shares determined by dividing the unreturned paid-in capital amount of such share of Class B common stock, or \$ _____ per share, by the initial public offering price of a share of our common stock in this offering, rounded to the nearest whole share. Holders of our Class B common stock will not receive any cash payments from us in connection with the conversion of the Class B common stock. References to the “Reclassification” throughout this prospectus refer to the reclassification of our Class A common stock into our common stock, the _____-for-1 split of our common stock and the conversion of our Class B common stock into our common stock. Unless otherwise indicated, all share data gives effect to the Reclassification, including the conversion of all shares of our Class B common stock into shares of our common stock, based upon an estimated Class B conversion factor determined by reference to an assumed initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus. Such share data is subject to change based on the actual number of shares of our common stock issued in connection with the conversion of our Class B common stock into our common stock. See “The Reclassification.”

PROSPECTUS SUMMARY

This summary highlights information appearing elsewhere in this prospectus. This summary is not complete and does not contain all of the information that you should consider before investing in our common stock. You should carefully read the entire prospectus, including the historical financial statements and related notes and the pro forma condensed combined financial information and related notes included elsewhere in this prospectus and the sections entitled "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements," before deciding whether to invest in our common stock. Unless otherwise indicated or the context otherwise requires, references to "we," "us," "our," "PQ Group Holdings," or the "company" refer to PQ Group Holdings Inc. and its consolidated subsidiaries, including PQ Holdings Inc., Eco Services Operations Corp. and PQ Corporation, our primary operating company. We refer to the business of PQ Holdings Inc. prior to the Business Combination as "legacy PQ" and we refer to the business of Eco Services Operations LLC prior to the Business Combination as "legacy Eco." See "Basis of Financial Presentation." All information in this prospectus assumes no exercise of the underwriters' option to purchase additional shares, unless otherwise noted.

Our Company

We are a leading global provider of catalysts, specialty materials and chemicals, and services that enable environmental improvements, enhance consumer products, and increase personal safety. Our products and solutions help companies produce vehicles with improved fuel efficiency and cleaner emissions. Our materials are critical ingredients in consumer products that make teeth brighter, skin softer, and wounds heal faster. We produce highly engineered materials that make highways and airports safer for drivers and pilots. Because our products are predominantly inorganic and carbon-free, we believe we contribute to improving the sustainability of our planet.

We believe our products deliver significant value to our customers, as demonstrated by our profit margins. Our products, which are mostly additives, catalysts, and services, typically constitute a small portion of our customers' overall end-product costs yet are critical to product performance. For example, our catalysts are highly technical, customized products that require customer collaboration and significant lead time, resources, and intellectual property to develop. Through this collaborative innovation process, we have developed zeolite-based catalysts that are an effective and efficient method to reduce pollutants in diesel engines and enable our customers to meet increasingly stringent vehicle emission standards worldwide. In personal care applications, we have collaborated with leading consumer products companies over a number of years to develop a family of gentle silica-based dentifrice abrasives that produce more effective cleaning toothpastes. These collaborative efforts with our customers continue to drive our product innovation process.

Our value-added products seek to address global issues that are often either the subject of significant regulations or are driven by consumer preferences, which we believe positions us to grow in excess of gross domestic product growth rates. Consumer preferences and global regulations requiring environmentally friendlier products are at the core of many of our value-added products and, we believe, provide us with high-margin growth opportunities. For example, our products and services facilitate improvement in vehicle fuel efficiency and emissions, enable vehicles to be lighter, and allow tires to roll and engines to run with less friction. The production of higher octane gasoline, which is needed for certain smaller turbocharged engines, has generated additional demand for the alkylation units that use our refinery services.

For the year ended December 31, 2016, we generated sales of \$1,064.2 million and pro forma sales of \$1,403.0 million, a net loss of \$(79.7) million and a pro forma net loss of \$(57.7) million, and pro forma Adjusted EBITDA of \$420.8 million, which represented a pro forma Adjusted EBITDA margin of approximately 30%. In addition, our zeolite catalysts product group operates through Zeolyst International and Zeolyst C.V. (our 50% owned joint ventures that we refer to collectively as our "Zeolyst Joint Venture"). For the year ended December 31, 2016, 50% of the total net sales of our Zeolyst Joint Venture totaled \$131.3 million. Additional information regarding our financial performance and non-GAAP measures, including pro forma Adjusted EBITDA, together with a reconciliation of non-GAAP measures to their most directly comparable GAAP measure, is included in "Summary Historical and Unaudited Pro Forma Financial and Other Data." See footnote (4) to "Summary Historical and Unaudited Pro Forma Financial and Other Data" for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.

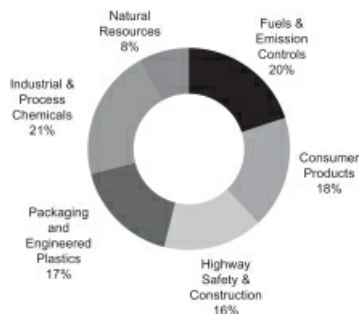
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We have two reporting segments: environmental catalysts and services and performance materials and chemicals. In our environmental catalysts and services segment, we have three product groups: silica catalysts, zeolite catalysts, and refining services. In our performance materials and chemicals segment, we have two product groups: performance materials and performance chemicals.

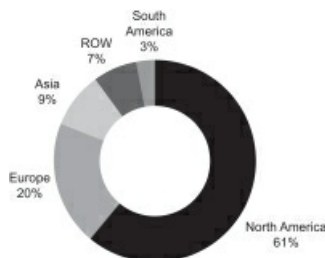
In 2016, we served over 4,000 customers globally across many end uses and, as of June 30, 2017, operated out of 72 manufacturing facilities, which are strategically located across six continents. We believe we are a leader in each of our product groups, holding what we estimate to be a number one or number two supply share position for products that generated more than 90% of our 2016 pro forma sales. We believe that our global footprint and efficient network of strategically located manufacturing facilities provide us with a strong competitive advantage in serving our customers. We serve these customers both regionally as well as globally. We believe that we hold our leading supply share positions in the key regions that we serve while also benefiting from leading global presence and capabilities. Within our performance chemicals product group, we estimate that we had approximately three times the sodium silicate supply share of our closest competitor based on 2016 sales volume. This product group, which is the backbone across our additives and catalyst platform, is highly regionalized because of the expense of shipping sodium silicates extended distances due to their water content. Our refining services product group is also a highly regionalized business due to shipping costs and customer integration requirements, and in 2016 we estimate that we had a regenerated sulfuric acid supply share in excess of 50% in the United States, which we believe is substantially larger than our closest competitor. We recently reorganized our business to be market-based rather than product-based in order to better align our product groups with similar end uses to meet our customers' needs.

We are highly diversified by business, geography, and end use, and in 2016 the majority of our pro forma sales were into applications that have historically had relatively predictable, consistent demand patterns driven by consumption or frequent replacement cycles.

**2016 Pro Forma Sales and Zeolyst Joint Venture
Total Net Sales by End Use (1)(2)**



**2016 Pro Forma Sales and Zeolyst Joint Venture
Total Net Sales by Geography (1)(2)(3)**



- (1) Pro forma information gives effect to the consummation of the Business Combination and the related financing transactions as if they occurred on January 1, 2015.
- (2) Percentage calculations include \$131.3 million of total net sales attributable to our Zeolyst Joint Venture, which represents 50% of its total net sales for the year ended December 31, 2016. See footnote (4) to "Summary Historical and Unaudited Pro Forma Financial and Other Data" for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.
- (3) Based on the delivery destination for products sold in 2016.

Our Industry

We compete in the specialty chemicals and materials industry. Our industry is characterized by constant development of new products and the need to support customers with new product innovation and technical services to meet their challenges. In addition, customers demand consistent product quality and a reliable source of supply. Products sold to our customers can be highly value-added even when they represent only a small portion of the overall end product costs, and success can be achieved by helping customers improve their product performance, value, and quality. As a result, operating margins in this sector have historically been high and generally stable through economic cycles. In addition, many products in the specialty chemicals and materials industry benefit from economics that favor incumbent producers because the capital cost to expand existing capacity is typically significantly less than the capital cost necessary to build a new plant. The combination of attractive operating margins and moderate and generally predictable maintenance capital expenditure requirements can produce attractive cash flows. Our industry is also characterized by the need to produce consistent quality in a safe and environmentally sustainable manner.

The table below summarizes our key end use applications and products as well as the significant growth drivers in those applications.

Key End Uses	2016 Pro Forma Sales and Zeolyst Joint Venture Total Net Sales(1)(2)	Significant Growth Drivers	Key PQ Products
Fuels & Emissions Controls	20%	<ul style="list-style-type: none"> • Global regulatory requirements to: <ul style="list-style-type: none"> • Remove nitrogen oxides from emissions • Remove sulfur from diesel and gasoline • Increase gasoline octane in order to improve fuel efficiency while lowering vapor pressure to regulated levels for premium fuels • Improve lubricant characteristics to improve fuel efficiencies 	<ul style="list-style-type: none"> • Refinery catalysts • Emissions control catalysts • Catalyst recycling services
Consumer Products	18%	<ul style="list-style-type: none"> • Substitution of silicate materials for less environmentally friendly chemical additives in detergent and cleaning end uses • Demand for improved quality and shelf life of beverages • Demand for improved oral hygiene and appearance 	<ul style="list-style-type: none"> • Silica gels for edible oil and beer clarification • Precipitated silicas and zeolites for the surface coating, dentifrice, and dishwasher and laundry detergent applications
Highway Safety & Construction	16%	<ul style="list-style-type: none"> • Demand for enhanced “dry and wet” visibility of road and airport markings to improve safety • Drive for weight reduction in cements 	<ul style="list-style-type: none"> • Reflective markings for roadways and airports • Hollow glass beads, or microspheres, for cement additives

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Key End Uses	2016 Pro Forma Sales and Zeolyst Joint Venture Total Net Sales(1)(2)	Significant Growth Drivers	Key PQ Products
Packaging & Engineered Plastics	17%	<ul style="list-style-type: none"> • Demand for increased process efficiency and reduction of by-products in production of chemicals • Demand for high-density polyethylene lightweighting of automotive components • Enhanced properties in plastic composites for the automotive and electronics industries 	<ul style="list-style-type: none"> • Catalysts for high-density polyethylene and chemicals syntheses • Antiblocks for film packaging • Solid and hollow microspheres for composite plastics
Industrial & Process Chemicals	21%	<ul style="list-style-type: none"> • Demand in the tire industry for reduced rolling resistance • Usage of silicate in municipal water treatment to inhibit corrosion in aging pipelines • Growth in manufacturing in North America driving demand for metal finishing 	<ul style="list-style-type: none"> • Silicate precursors for the tire industry • Silicate for water treatment • Glass beads, or microspheres, for metal finishing end uses
Natural Resources	8%	<ul style="list-style-type: none"> • More environmentally friendly drilling fluids for oil and gas production • Recovery in global oil drilling / U.S. copper production • Growing demand for lighter weight cements in oil and natural gas wells 	<ul style="list-style-type: none"> • Silicates for drilling muds • Hollow glass beads, or microspheres, for oil well cements • Sulfur derivatives for copper mining • Bleaching aids for paper

(1) Pro forma information gives effect to the consummation of the Business Combination and the related financing transactions as if they occurred on January 1, 2015.

(2) Percentage calculations include \$131.3 million of total net sales attributable to our Zeolyst Joint Venture, which represents 50% of its total net sales for the year ended December 31, 2016. See footnote (4) to “Summary Historical and Unaudited Pro Forma Financial and Other Data” for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.

Our Business

The table below summarizes certain information regarding our two reporting segments and our five product groups for the year ended December 31, 2016.

(Dollars in millions) Segments and Product Groups	Year ended December 31, 2016								Estimated Supply Share Position ⁽⁵⁾
	Sales	% of Total Sales	Pro Forma Sales ⁽¹⁾	Zeolyst Joint Venture Total Net Sales ⁽²⁾	% of Total Pro Forma Sales and Zeolyst Joint Venture Total Net Sales ^{(1) (2)(3)}	Net Loss	Pro Forma Adjusted EBITDA ⁽¹⁾⁽²⁾	% of Total Pro Forma Adjusted EBITDA ^{(1) (2)(4)}	
Environmental Catalysts and Services:									
Silica Catalysts	\$ 53.0	5.0%	\$ 84.2	\$ —	5.5%				#2
Zeolite Catalysts	—	—	—	131.3	8.5%				Primarily #1 or #2
Refining Services	373.7	35.0%	373.7	—	24.3%				#1
Subtotal	\$ 426.7	40.0%	\$ 457.9	\$131.3	38.3%		\$ 221.8	48.9%	
Performance Materials and Chemicals:									
Performance Chemicals	\$ 437.5	41.0%	\$ 663.9	\$ —	43.2%				Primarily #1 ⁽⁶⁾
Performance Materials	206.5	19.4%	291.3	—	19.0%				Primarily #1 ⁽⁷⁾
Sales Eliminations	(5.0)	(0.4%)	(8.0)	—	(0.5%)				
Subtotal	\$ 639.0	60.0%	\$ 947.2	\$ —	61.7%		\$ 231.8	51.1%	
Eliminations / Corporate	(1.5)	—	(2.1)	—	—		(32.8)	—	
Total	\$1,064.2	100.0%	\$1,403.0	\$131.3	100.0%	\$(79.7)	\$ 420.8	100.0%	

- (1) Pro forma information gives effect to the consummation of the Business Combination and the related financing transactions as if they occurred on January 1, 2015.
- (2) Percentage calculations include \$131.3 million of total net sales attributable to our Zeolyst Joint Venture, which represents 50% of its total net sales for the year ended December 31, 2016. See footnote (4) to “Summary Historical and Unaudited Pro Forma Financial and Other Data” for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.
- (3) Percentage calculations exclude \$2.1 million in intersegment sales eliminations.
- (4) Percentage calculations exclude \$32.8 million in corporate expenses.
- (5) Estimated supply share positions are based on management’s estimates based on 2016 sales volume and represent our estimated global supply share positions for each of our product groups, except that the estimated supply share position for our refining services product group reflects our estimate of only our supply share position in the United States and excludes volume attributable to manufacturers who produce primarily for their own consumption.
- (6) We believe we hold #1 supply share positions with respect to products that accounted for approximately 73% of our performance chemicals product group’s 2016 pro forma sales, and that we hold #2 supply share positions with respect to products that accounted for the remaining approximately 27% of our performance chemicals product group’s 2016 pro forma sales.
- (7) We believe we hold #1 supply share positions with respect to products that accounted for approximately 89% of our performance materials product group’s 2016 pro forma sales, and that we hold #2 supply share positions with respect to products that accounted for the remaining approximately 11% of our performance materials product group’s 2016 pro forma sales.

We are an integrated, global provider of catalysts, specialty materials and chemicals, and services that share common end uses, manufacturing techniques, and process technology. For example, all of our product groups address challenges faced by global automotive companies to meet increasingly strict fuel efficiency standards. Our manufacturing platform is based on furnace technology and proprietary knowledge developed from almost

two centuries of combined experience at legacy PQ and legacy Eco applying silicates chemistry production and the development of applications across a broadening set of end uses. All of our product groups produce materials through our furnace process, other than our silica catalysts and zeolite catalysts product groups, which are derivatives of our performance chemicals product group. We believe we have a differentiated capability around furnace operations that enables us to operate more efficiently than most of our competitors.

Environmental Catalysts and Services

Our environmental catalysts and services business is a leading global innovator and producer of catalysts for the refinery, emissions control, and petrochemical industries and is also a leading provider of catalyst recycling services to the North American refining industry. We believe our products are mission critical for our customers in these growing applications and impart essential functionality in chemical and refining production processes and in emissions control for engines. Our catalysts are highly technical and customized for our customers and can require up to ten years of development and collaboration with customers in order to commercialize. Catalyst specifications are constantly evolving in order to address changing customer demands and requirements for lower cost and improved quality. As a result, we must continuously collaborate with our customers to create new and more efficient pathways for the production of chemicals and fuels. Our environmental catalysts and services business consists of three product groups: silica catalysts, zeolite catalysts, and refining services.

Silica Catalysts. In our silica catalysts product group, we sell both the finished catalyst and catalyst supports, which are critical catalyst components, for the production of high-density polyethylene (“HDPE”), a high strength and high stiffness plastic used in packaging films, bottles and containers, and other molded applications. We also produce a catalyst that is used globally for the production of methyl methacrylate, the monomer for acrylic engineering resins, a clear scratch-resistant plastic used in sheet or molded form to replace glass and as a durable surface coating.

Zeolite Catalysts. Our zeolite catalysts product group is a leading global supplier of emissions control catalysts as well as a supplier of specialty catalysts, precursors, and formulations to refineries and downstream petrochemicals and chemical companies. We operate through our Zeolyst Joint Venture with CRI Zeolites Inc., which is an affiliate of Royal Dutch Shell (“CRI”). Our Zeolyst Joint Venture is a long-standing partnership dating back to 1988, which combines our expertise in zeolites supply and technology and our partner’s expertise in global refinery catalyst sales and technology. These specialty zeolite-based catalysts are sold to the emissions control industry for use in diesel emission control units in both on-road and non-road diesel engines. In addition, our zeolite catalysts product group is a leading supplier of hydrocracking catalysts as a direct seller and supplier to other catalyst suppliers. This product group also produces other specialty catalysts, including aromatic catalysts that upgrade aromatic by-product streams, dewaxing catalysts that improve lube oil performance and diesel cold flow performance, and paraffin isomerization catalysts that upgrade olefins to high octane gasoline blending components, for refinery and petrochemical customers. From 2015 to 2020, global heavy- and light-duty diesel vehicle production is expected to grow at a compound annual growth rate of 4.1% and 2.8%, respectively. We believe that this estimated vehicle production growth combined with the continuing evolution of governmental regulation and product innovation involving emissions control will afford us with opportunities for growth in our zeolite catalysts product group.

Refining Services. Sulfuric acid is the primary catalyst used in the production of alkylates for gasoline production at refineries. Alkylates are a critical additive that increase octane in gasoline at low vapor pressure, and currently are used in most gasoline in the United States. Alkylate demand is expected to grow because its benefits are needed in certain smaller turbocharged engines to meet increasingly stringent fuel efficiency standards. The number of these turbocharged light-duty vehicles in the United States is expected to make up approximately 83% of all light-duty vehicles by 2025, a significant increase from approximately 18% in 2014, which we believe will increase the demand for higher-octane gasoline. Premium gasoline production grew at a

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compound annual growth rate of 6.1% between 2011 and 2016 according to the United States Energy Information Administration. Our refining services product group provides recycling and end-to-end logistics for refiners who use sulfuric acid in their alkylation units. These recycling units also produce virgin sulfuric acid and sodium bisulfate, which we sell into the water treatment, mining, and general industrial and chemicals industries.

We estimate that we hold the number one supply share position in the United States for these sulfuric acid recycling services based upon our 2016 sales volume. Our refining services product group is highly regionalized due to shipping costs and customer integration requirements. Our facilities are located near or, in some cases, within our customers' refineries and our products are often supplied directly to our customers by pipeline. In addition, product can be shipped by barge, rail, and truck. As a result, we believe that our integrated and strategically located network of facilities and end-to-end logistics assets in the United States provides us with a significant competitive advantage and would be costly for our competitors to replicate.

Performance Materials and Chemicals

Our performance materials and chemicals business is a silicates and specialty materials producer with leading supply positions for the majority of our products sold in North America, Europe, South America, Australia and Asia (excluding China) serving diverse and growing end uses such as personal and industrial cleaning products, fuel efficient tires ("green tires"), surface coatings, and food and beverage products. Our products are essential additives, ingredients, and precursors that are critical to the performance characteristics of our customers' products, yet typically represent only a small portion of our customers' overall end-product costs. We believe that our global footprint enables us to compete more effectively on a global basis due to the costs associated with shipping these products over extended distances and that our network of strategically located manufacturing facilities allows us to serve our customers at a lower cost than our competitors and with quicker delivery times for our products. Our performance materials are also being used in some cases as a substitute for less environmentally friendly materials. For example, specialty silicates are displacing phosphates in dish detergents, precipitated silicas are displacing carbon black in tires, and hollow and solid microspheres are displacing plastic volumes in transportation lightweighting applications. Our performance materials and chemicals business consists of two product groups: performance chemicals and performance materials.

Performance Chemicals. Our performance chemicals product group includes silicate products and derivatives, which are used in a variety of applications such as adsorbents for surface coatings, clarifying agents for edible oils and beverages, precursors for green tires, and additives for cleaning and personal care products. Silicates are a family of products manufactured primarily from readily available materials, such as industrial sand and soda ash. These raw materials are typically fused in a furnace and then dissolved in water under pressure to form water-soluble silicates for use in our downstream products, such as precipitated silica and silica gels. We sell our performance chemicals products to customers who use silicates as precursors, such as sodium silicates that are used in the growing precipitated silica applications, as well as for downstream derivative products, such as silicas used as additives in toothpaste formulation and silica gels that are used as adsorbents in food and beverage manufacturing. Our network of regional silicate plants is strategically located to support the customers that we serve. In addition, we maintain a few larger dedicated facilities to service our derivative products. Our performance chemicals product technology requires significant know-how and scale in order to be able to operate in a cost effective manner. We believe that we are the only global silicates producer who can supply all of the major regions, and we estimate that we have three times the sodium silicates supply share as our nearest competitor based on 2016 sales volume. Key end uses for our performance chemicals products include catalyst precursors, food and beverage, personal care, cleaning products, coatings, tires, soil stabilization, paper de-inking, and sequestration. According to Notch Consulting, global demand for precipitated silica is estimated to grow at a compound annual growth rate of 5.8% between 2015 and 2020, driven primarily by expected increases in demand from tires, footwear and other rubber applications.

Performance Materials. Our performance materials product group includes specialty glass products, such as highly engineered microspheres made from either recycled glass or fresh batch material using our proprietary furnace operations. We believe that we are an industry leader in North America, Europe, South America, and Asia (excluding China) in microspheres. These products are used in the reflective markings used on roads and runways to enhance visibility at night and in poor weather to improve safety. Our microspheres, which can be solid or hollow, are also used as additives in plastics for lightweighting and as abrasive media, where they are used to clean, peen, and debur metal surfaces, such as for turbine blades used in aerospace and power generation industries.

Our Competitive Strengths

Leading Global and Regional Positions in Attractive End Uses

We believe that we maintain a leading supply position in each of our major product groups, holding what we estimate to be the number one or two supply share position in 2016 for products that generated more than 90% of our pro forma sales. We believe that our global footprint and efficient network of strategically located manufacturing facilities provides us with a strong competitive advantage in serving our customers both globally and regionally, and that it would be costly for our competitors to replicate our network.

In our environmental catalysts and services business, we primarily compete on a global basis, with the exception of our refining services product group, where we compete on a more regional basis due to the costs associated with shipping these products over extended distances. We are a leading supplier of refinery hydrocracking catalysts and emissions control catalysts that are used in the heavy- and light-duty diesel industries to reduce nitrogen oxides emissions. We are also a global leader in specialty catalysts, such as catalysts for methyl methacrylate and for lube oil and diesel fuel dewaxing. In these applications, we primarily compete with other global producers such as W.R. Grace, BASF, UOP, and Albemarle, as well as other niche competitors such as Tosoh, Axens, and Haldor Topsoe.

In our refining services product group, we compete in a number of regions where our facilities are required to be close to our refinery customers, and in some cases located within the refinery with a direct pipeline to deliver our product. We estimate that our refining services product group holds the number one supply share position in the United States in sulfuric acid regeneration based on 2016 sales volume with an estimated 53% supply share. We also estimate that we had a 64% supply share in each of the West Coast and Gulf Coast areas based on 2016 sales volume, which we believe was greater than three times the supply share of our largest competitor. In our performance chemicals product group, where we also compete primarily on a regional basis due to the costs associated with shipping sodium silicates, we estimate that we had approximately three times the sodium silicates supply share of our nearest competitor based on 2016 sales volume. We believe that we are the only global silicates producer with operations in North America, Europe, and Australia. We believe that we have technical, cost, and proximity advantages in all of these regions as compared to our competitors as a result of the scale and breadth of our product offerings and operations.

These leadership positions serve industries that are attractive due to the need for customized and innovative products, stability of demand, and growth potential driven by the regulatory environment and consumer preferences. Our products generally require close customer collaboration to address end use challenges that are constantly evolving. We produce value-added products that are critical to the performance characteristics of our customers' products. In addition, in 2016, a majority of our pro forma sales were to end uses such as fuels and emission controls, consumer products, and highway safety and construction that generally do not exhibit as pronounced cyclicality as other applications. Further, many of these end uses are growing due to increased global regulations, such as regulations regarding sulfur content in transportation fuel and particulate matter and nitrogen

oxides emissions from on-road and non-road diesel engines. Increasingly stringent automotive fuel efficiency standards are also expected to lead to an increase in the demand for higher-octane gasoline. While we believe increasing regulatory standards provide attractive growth opportunities, we may be required to develop new products in response to such regulations in order to fully capture such opportunities. In addition, our products are ingredients in consumer products, which includes personal care and consumer cleaning products, where customers are seeking more environmentally friendly products without loss of effectiveness or performance. We believe that our products have the environmental and safety profile to address these evolving customer demands.

Long-Term, High-Quality Customer Relationships and Innovation Track Record

Many of our products require close customer collaboration to address application challenges that are constantly evolving. As a result, we work with our customers over many years in order to develop products to meet customized specifications and performance characteristics while also maintaining strict quality standards. While we are unable to predict future shifts in customer demand, the long lead-time required for product development and commercialization, which can be up to ten years in our environmental catalysts and services business, provides the opportunity for us to build long-term relationships with customers.

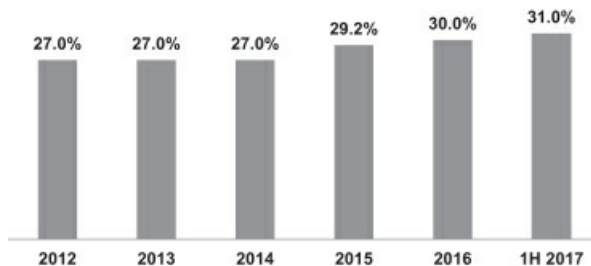
We collaborate with leading multinational companies that often seek global solutions. Our customers include large industrial companies such as BASF, Honeywell, and 3M, and global catalyst producers such as Albemarle and W.R. Grace. We also supply catalysts to leading chemical and petrochemical producers such as BASF, Dow Chemical, Lucite, LyondellBasell, and Shell. We supply personal care ingredients and additives to leading consumer products companies such as Unilever and Colgate-Palmolive. We have long-term relationships with our top ten customers, based on 2016 pro forma sales, that average more than 50 years. In addition, our customer base is diversified, with our top ten customers in 2016 representing approximately 24% of our pro forma sales for the year ended December 31, 2016 and no customer representing more than 4% of our pro forma sales during this period. However, the percentage of our sales generated by our top customers may increase in the future as a result of changes in industry dynamics, shifts in customer demands and contracts or other factors.

These long-term relationships have allowed us to innovate together with our customers to meet evolving demands. For example, we have developed zeolite-based catalysts that are an effective and efficient method to reduce pollutants from heavy- and light-duty diesel engines and enable our customers to meet increasingly stringent vehicle emission standards worldwide. In personal care applications, we have collaborated with leading consumer products companies over a number of years to develop a family of gentle silica-based dentifrice abrasives that produce more effective cleaning toothpastes. In addition, our proprietary silica catalyst has enabled development of a high strength HDPE resin that is used for making lightweight plastic gasoline tanks for automobiles. While we believe we are well positioned to capitalize on future innovation opportunities, the constantly evolving needs of our customers make it difficult to predict the pace or scope of future innovation opportunities.

Attractive and Stable Margins and Cash Flow

We have demonstrated the ability to maintain stable margins while continuing to grow our business in different macroeconomic environments. Our Adjusted EBITDA margins have averaged approximately 28% between 2012 and 2016. We believe that the stability of our margins and cash flows during this period is because our value-added products, which are critical to the performance of our customers' products, typically represent only a small portion of our customers' overall end-product costs.

Adjusted EBITDA Margin (1)



(1) Legacy Eco Adjusted EBITDA margin is presented for 2012 through 2014, pro forma Adjusted EBITDA margin is presented for 2015 and 2016 and Adjusted EBITDA margin is presented for the first half of 2017. As a result, Adjusted EBITDA margin for 2012 through 2014 consists only of the results of our accounting predecessor and may not be representative of margins for our entire business for such periods. See footnote (4) to “Summary Historical and Unaudited Pro Forma Financial and Other Data” for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.

Our products are predominantly inorganic and carbon-free, and are produced from readily available raw materials such as industrial sand and soda ash, which prices have historically been less volatile than oil. We also use natural gas in our furnaces where our North American facilities have benefited from the plentiful supplies of shale gas. In addition, we have long-term supply contracts with many of our key raw materials suppliers across our product groups. We have also been able to mitigate the impact of raw material or energy price volatility using a variety of mechanisms, including hedging and raw material cost pass-through clauses in our sales contracts and other adjustment provisions. For the year ended December 31, 2016, approximately 45% of our North American silicate pro forma sales, which is a significant portion of our performance chemicals product group sales, and approximately 94% of our refining services product group pro forma sales were sold under contracts that included raw material pass-through clauses.

Our cash flow generation is driven, in part, by our disciplined capital investment and tax attributes that may provide cash flow benefits in the future. We have invested in our infrastructure and growth over the last three years and we expect to realize returns on these investments in the future with limited additional investment requirements, although there is no assurance that we will be able to realize any returns on these investments or that significant additional investments will not be required. As of December 31, 2016, we had \$383.2 million of net operating losses for U.S. federal income tax purposes, along with related net operating losses for state tax purposes, and \$671.4 million of identified intangibles and goodwill from the Business Combination transaction, both of which may provide us with additional cash tax savings in future years in which we generate taxable income.

Strong Growth Potential Across the Portfolio

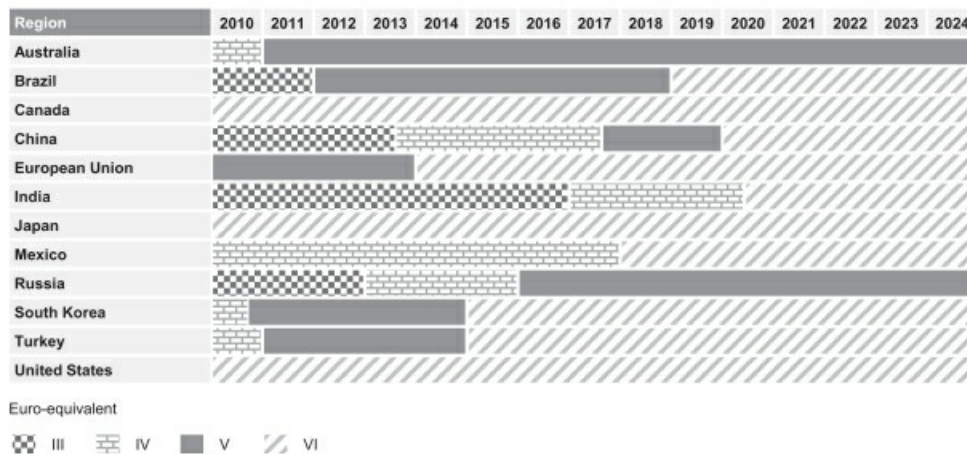
We focus on serving end use applications where we believe significant future growth potential exists. Our products address our customers’ needs, which are typically driven either by regulatory regimes or consumer preferences, on a global basis. In addition, our product sales and development efforts are driven by regional infrastructure and development trends. In vehicles, we address regulated heavy- and light-duty diesel emission standards and sulfur content and vapor pressure requirements in gasoline. We expect that these regulations will create growth opportunities in excess of gross domestic product growth rates due to the constantly evolving standards that our customers need to address with new and improved products.

Light- and heavy-duty diesel engines are subject to a broad set of regulatory requirements, and we expect that these increasingly stringent standards will offer opportunities for our Zeolyst Joint Venture to develop

products to assist our customers in meeting these standards. Countries typically adopt a set of standards that limit the amount of nitrogen oxides, carbon dioxide, and other emissions allowed for diesel engines. In many cases countries have established regulations that generally follow United States Environmental Protection Agency or European Union standards, but typically on a later implementation timeline. In addition, even more restrictive regulations are expected to be adopted in the future in many jurisdictions, such as EU VII, which would further reduce permitted emissions levels in the European Union. We believe that compliance with existing regulations as well as any future regulations provides us with opportunities to grow our sales of emissions control catalysts.

The following chart identifies the regulatory requirements for certain countries and regions in relation to the most comparable European Union standard for ease of comparability. See “Industry—Fuels & Emissions Controls” for more information regarding the European Union standards referred to in the chart below.

Timeline for Implementation of Regionwide Emissions Standards for Diesel Heavy-Duty Vehicles in European Union Equivalent Standards



Source: The International Council on Clean Transportation

Given the fuel efficiency standards that are driving the design of new engines and the resulting higher-octane gasoline requirements that can be achieved through alkylate blending, we believe that our refining services product group is well positioned to benefit from any related growth in demand for alkylates.

We produce catalysts for HDPE and methyl methacrylate production in the packaging and engineered plastics applications. According to an industry source, North American HDPE capacity is expected to grow at a compound annual growth rate of approximately 5.1% between 2016 and 2020, driven by North America’s global cost position in petrochemicals and increased use of these plastics as a substitute for heavier and less versatile materials such as glass and metal. Methyl methacrylate is the monomer for acrylic engineering resins, a clear scratch-resistant plastic used in sheet form to replace glass and as a surface coating. We believe that we have an opportunity to grow our methyl methacrylate catalysts sales in the future as methyl methacrylate production increases as a result of, in part, increased production efficiencies enabled by our catalysts.

We believe that additional demand for retroreflectivity (or visibility) for roadway and aviation markings could provide us with significant growth opportunities. We benefit from increased use and density per mile of

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road markings that include our products. The most recent innovation from our performance materials product group is our ThermoDrop product, which simplifies the road striping operations for our customers by using a new durable thermal plastic road marking material. We have also introduced a new faster-drying road marking system, Visilok, which can reduce traffic disruption during striping operations and improve road worker safety by reducing the amount of time needed to complete the road marking process.

We also expect to benefit from trends towards the use of more environmentally friendly products where we believe we have opportunities to displace other less environmentally friendly materials. While there is no assurance that such trends will continue in the future, we believe our product offerings position us to capitalize on this growth opportunity. For example, our Ambosol magnesium silicate is used to eliminate color and odors in polyols, which are used in the production of polyurethane for, among other things, household products such as scratch-resistant coatings and foam insulation. In addition, our specialty silicates are displacing phosphates in dish detergents, precipitated silicas are displacing carbon black in tires, and solid and hollow microspheres are displacing plastic volumes in lightweighting applications. Most of our products are manufactured from commonly found materials such as industrial sand and soda ash, which are more environmentally friendly than carbon-based products. We have also developed a family of gentle silica-based dentifrice abrasives that produce more effective cleaning toothpastes and we have developed a product family, Britesil silicates, which improves convenience while eliminating phosphates in automatic dishwashing applications.

Experienced Management Team

Our senior management team has substantial industry experience and a proven track record. They average over 30 years of experience in our product groups, and their cumulative industry experience extends to a broad range of execution capabilities, including acquisition integration, strategic management, operations, sales and marketing, and new product and application development. In 2016, our management team integrated legacy Eco into our environmental catalysts and services business while also growing the business and successfully implementing cost initiatives. Our senior management team has also reorganized our company from a products-based business to a markets-based business to better align our offerings with the needs of our customers. There is a renewed focus on serving our customers by developing solutions through technical sales, services, and product development, and we have added additional management personnel experienced in innovation and market driven organizations. Our management owns approximately 11% of our outstanding common stock immediately prior to this offering, which we believe creates an alignment of interest with our shareholders.

Our Business Strategy

Our business strategy is to capitalize on our strong foundation, market-based approach, and management team to grow sales profitably, deploy capital efficiently, and generate free cash flow in order to create shareholder value. We believe that our history of operational excellence, technology leadership, and strong business execution developed from our almost two centuries of combined industry experience at legacy PQ and legacy Eco positions us well to execute on our business strategy. In the last two years, we have added senior executives to our management team, including our chief executive officer, Jim Gentilcore, and chief financial officer, Mike Crews, who bring significant public company leadership experience and a track record of customer-focused innovation and disciplined capital allocation to our business. We believe that Mr. Gentilcore's experience in the electronics industry is particularly relevant to our innovation efforts as we pursue new product innovation across our product groups. In addition, we believe that our recent reorganization better aligns our management structure with our customer needs to enable us to make more focused sales and product innovation

investments. We believe there are significant opportunities to profitably grow our business, generate free cash flow and deliver shareholder value by executing on the following strategies:

Shift from a Products-based to a Markets-based Company

Our reorganization from a products-based to a markets-based company is fundamental to our growth strategy. Following the consummation of the Business Combination in May 2016, we have further realigned our product groups around critical markets that we serve. The combination of the legacy Eco and legacy PQ businesses expanded our presence in the refinery industry and provided us with valuable insight into key success factors for serving our refining and petrochemical customers. We have undertaken a similar approach in other important end uses that we serve such as personal care, highway safety, oil and gas, surface coatings, and electronics.

Our solution-oriented process starts with our customer's specific needs, which are then identified as a product or service opportunity that is defined, sized, and evaluated to determine if it is within the core strength of our global development team. If not within our core capabilities, but determined to be a strategically important opportunity, we initiate a search for outside technology, partnerships, or acquisition targets that can deliver a cost-effective and profitable solution. This approach is in contrast to our prior approach developing products or new formulations first and then seeking to identify applications into which to sell that product or new formulation. We believe that our markets-based approach will result in product innovation that better meets our customers' needs and supports our profitable growth.

Our sales and marketing organization has a broad base of customer and marketing experience. Since our business reorganization, we believe each of our operating segments has simplified its customer contact points and increased knowledge about the industries we serve. We have been able to eliminate duplicate sales calls that would occur among our previous business divisions and can prioritize our efforts around our most influential customer contacts. We have also removed the silos that previously impeded our ability to share important customer information within our organization. This integrated marketing effort allows for more rapid analysis and decision-making for our major strategic customers who are often served by multiple product groups. We believe these operational improvements will enable us to reduce product commercialization time and increase our return on marketing investment.

Prioritize Investment and Development to Innovate and Profitably Grow Sales

We have been able to successfully grow our sales into new applications through our innovation and development of new products to address evolving customer needs. For example, our zeolite catalysts product group developed new products to address new regulatory standards regarding vehicle emissions, and our performance chemicals product group collaborated with our customers to develop precipitated silica products to address their demands for more green tires. We will continue to focus on collaboration with our customers through our technical sales and research and development teams to better understand and address our customers' evolving needs and invest in our growth by prioritizing innovation driven by these identified needs.

Within our innovation and product development process, our technology teams work closely with our customer facing teams to identify compelling customer needs that can be addressed through innovation or new product development. We seek to assess technology and commercialization hurdles early on in the development process so that we can quickly and efficiently evaluate our opportunity and, where appropriate, deprioritize, or abandon projects before expending significant resources. We are improving the way our research and development team shares information by removing silos and holding regular senior-level project reviews to ensure best practices are shared and consistent metrics are used to determine a project's merit and the size of the potential opportunity. We have already begun to see the benefits of our new processes with the successful

commercialization of ThermoDrop, which we launched in February 2017. We collaborated with key customers to develop the ThermoDrop technology, which uses our highway safety microspheres and a proprietary striping application technology to enable our customers to more efficiently stripe highways. This technology has received strong customer acceptance since launch, and we are increasing our production to meet anticipated demand.

We will also selectively consider acquisitions as part of our growth strategy. We believe that our integration of legacy Eco demonstrates our ability to successfully execute on acquisitions and realize available synergies and other benefits. We have identified a number of potential acquisition targets with complementary fits across both of our operating segments and, consistent with our markets-based focus, these targets also include downstream-focused businesses. We will seek to use acquisitions to increase our geographic presence, diversify our product offerings, and further secure our leadership positions with our customer base. We intend to focus our acquisition efforts on opportunities in our higher value-added solutions within or adjacent to our current product offerings. We intend to pursue these transactions in a disciplined manner by rigorously evaluating return on capital against our cost of capital in addition to the potential strategic benefits. However, as of June 30, 2017, we had cash and cash equivalents of \$50.5 million and total outstanding indebtedness of approximately \$2,728.4 million, which may limit our ability to pursue acquisition transactions or other aspects of our growth strategy.

Maintain Strong Margins and Cash Flow with Continuous Improvement Initiatives

Our margins historically have been stable due to our strong and long-standing value proposition to our customers and our strong technological, operational, and product capabilities. We intend to maintain and improve upon these margins by leveraging our operational excellence and continuing our approach to raw material cost pass-through and other appropriate cost sharing arrangements with our customers. We believe that our new organizational structure will allow us to better leverage distribution channels across our products in order to address end uses such as paints and coatings, personal care, and oil and gas, and we have also integrated our continuous improvement teams across our operating segments. For example, we have established a new global furnace operations team, a global engineering team, and a global sales and operations planning team to share best practices across all of our product groups. We have also formalized our sharing of best practices across many functional disciplines, such as supply chain, technology, working capital, and capital expenditure management. From these efforts, we expect to be able to reduce costs in our operations in order to increase our cash flow.

Recent Developments

On August 7, 2017, PQ Corporation repriced its existing senior secured term loan facility, which consists of a \$927.8 million U.S. dollar-denominated tranche and a €283.3 million Euro-denominated tranche, to reduce the applicable interest rates. The repriced term loan facility has substantially identical terms to the prior facility, except that (a) U.S. dollar-denominated borrowings bear interest at the rate equal to, at our option (1) a margin of 2.25% plus a base rate or (2) a margin of 3.25% plus a LIBOR rate (subject to a floor of 0%) determined by reference to the cost of funds for U.S. dollar deposits, subject to certain adjustments and other events, and (b) Euro-denominated borrowings bear interest at a rate equal to, at our option (1) a margin of 2.25% plus a base rate or (2) a margin of 3.25% plus a EURIBOR rate (subject to a floor of 0.75%) determined by reference to the cost of funds for Euro deposits, subject to certain adjustments and other events. The repriced term loan facility is expected to reduce our annual interest expense by approximately \$12.5 million. See “Description of Certain Indebtedness—Senior Secured Credit Facilities” for additional information regarding the senior secured term loan facility.

Risk Factors

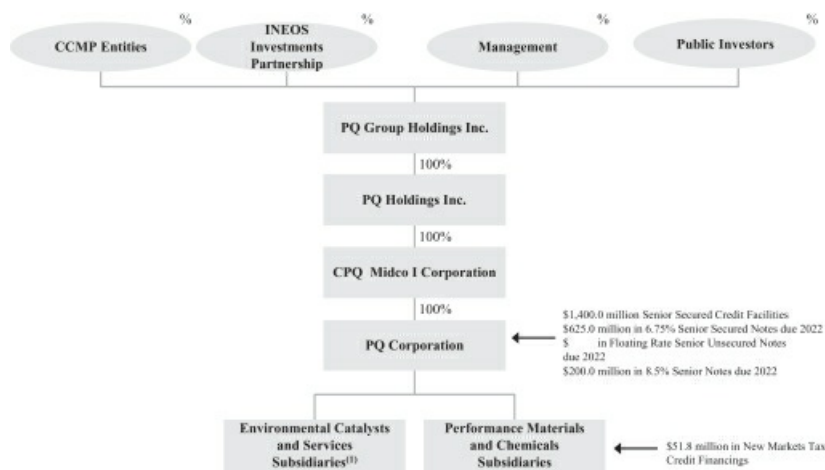
An investment in our common stock involves a high degree of risk. Any of the factors set forth under “Risk Factors” may limit our ability to successfully execute on our business strategy. You should carefully consider all of

the information set forth in this prospectus and, in particular, should evaluate the specific factors set forth under “Risk Factors” in deciding whether to invest in our common stock. Among these important risks are the following:

- as a global business, we are exposed to local business risks in different countries, which could have a material adverse effect on our financial condition, results of operations and cash flows;
- as of June 30, 2017, we had total outstanding indebtedness of approximately \$2,728.4 million and our substantial debt could adversely affect our liquidity and ability to raise additional capital to fund our operations and limit our ability to pursue our growth strategy or react to changes in the economy or our industry;
- we are affected by general economic conditions and an economic downturn could adversely affect our operations and financial results;
- alternative technology or other changes in our customers’ products may reduce or eliminate the need for certain of our products and limit our ability to capitalize on our long-term customer relationships;
- if we are unable to pass on increases in raw material prices, including natural gas, to our customers or to retain or replace key suppliers, our business strategy to maintain and improve upon our margins as well as our results of operations and cash flows may be negatively affected;
- certain of our product groups are subject to government regulation and future government regulation could limit our growth potential; and
- upon completion of this offering, CCMP and INEOS will continue to have significant influence over us, which could limit your ability to influence the outcome of key transactions, including a change of control.

Our Corporate Structure

The following chart illustrates our ownership structure as of June 30, 2017 after giving effect to this offering:



(1) Our zeolite catalysts product group within our environmental catalysts and services reporting segment operates through our Zeolyst Joint Venture.

Our Principal Stockholders

Investment funds affiliated with CCMP, INEOS Investments Partnership (“INEOS”) and members of management and our board of directors acquired their respective ownership of PQ Group Holdings as a result of the following series of transactions:

- In December 2014, investment funds affiliated with CCMP acquired an approximate 49% equity interest in PQ Holdings. INEOS and members of management owned the remaining approximate 51% equity interest in PQ Holdings.
- Also in December 2014, investment funds affiliated with CCMP acquired an approximate 95% equity interest in Eco Services Group Holdings LLC, the indirect parent of Eco. Members of Eco’s management owned the remaining approximate 5% equity interest in Eco Services Group Holdings LLC.
- In May 2016, we completed the Business Combination, in which the equity interests of PQ Holdings and Eco Services Group Holdings LLC were converted into equity interests in PQ Group Holdings.

As of June 30, 2017, and prior to giving effect to this offering and the Reclassification, investment funds affiliated with CCMP, INEOS, and members of management and our board of directors owned equity securities representing approximately 58%, 31%, and 11%, respectively, of our voting power. Investment funds affiliated with CCMP and INEOS will continue to have significant influence over us and decisions made by our stockholders upon completion of this offering and may have interests that differ from yours. See “Risk Factors—Risks Related to this Offering and to our Common Stock.”

CCMP is a leading global private equity firm specializing in buyouts and growth equity investments in companies ranging from \$250 million to more than \$3 billion in assets. CCMP’s founders have invested over \$16 billion since 1984, which includes their activities at J.P. Morgan Partners, LLC (a private equity division of JPMorgan Chase & Co.) and its predecessor firms. CCMP was formed in August 2006 when the buyout and growth equity investment professionals of J.P. Morgan Partners, LLC separated from JPMorgan Chase & Co. to commence operations as an independent firm. The foundation of CCMP’s investment approach is to leverage the combined strengths of its deep industry expertise and proprietary operating resources to create value by investing in three targeted industries—Industrial, Consumer and Healthcare.

INEOS is a leading manufacturer of petrochemicals, specialty chemicals and oil products. Comprising 18 businesses, with a production network spanning 105 manufacturing facilities in 22 countries, it produces more than 60 million tonnes of petrochemicals, 20 million tons per annum of crude oil refined products (fuels) and in 2016 it had sales of approximately \$40 billion. Worldwide, INEOS employs 18,500 people. Its management philosophy is to operate a simple and decentralized organizational structure.

Additional Information

PQ Group Holdings Inc. was incorporated in Delaware on August 7, 2015. PQ Holdings Inc., a manufacturer of catalysts, specialty materials and chemicals, was incorporated in Delaware on June 22, 2007. Eco Services Operations LLC, which acquired substantially all of the assets of Solvay USA Inc.’s sulfuric acid refining services business unit on December 1, 2014, was incorporated in Delaware on July 30, 2014. On May 4, 2016, we consummated the Business Combination to reorganize and combine the businesses of PQ Holdings Inc. and Eco Services Operations LLC under a new holding company, PQ Group Holdings Inc. We refer to the business of PQ Holdings Inc. prior to the Business Combination as “legacy PQ” and we refer to the business of Eco Services Operations LLC prior to the Business Combination as “legacy Eco.”

Our principal executive offices are located at 300 Lindenwood Drive, Valleybrooke Corporate Center, Malvern, Pennsylvania 19355, and our telephone number is (610) 651-4400. Our website address is www.pqcorp.com. The information that appears on, or that can be accessed through, our website is not part of, and is not incorporated into, this prospectus, and you should not rely on any such information in making the decision whether to purchase our common stock.

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The Offering	
Common stock offered by us	shares (or shares if the underwriters exercise their option to purchase additional shares in full).
Underwriters' option to purchase additional shares	We have granted the underwriters a 30-day option from the date of this prospectus to purchase up to an additional shares.
Common stock to be outstanding after this offering	shares (or shares if the underwriters exercise the option to purchase additional shares in full). See "Description of Capital Stock." For additional information regarding the impact of a change in the initial public offering price on the number of shares outstanding after completion of this offering related to the conversion of our Class B common stock, see "The Reclassification."
Use of proceeds	<p>We expect to receive net proceeds, after deducting underwriting discounts and commissions and estimated expenses payable by us, of approximately \$ million (or approximately \$ million if the underwriters exercise their option to purchase additional shares in full), based on an assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus.</p> <p>We intend to use the net proceeds from the sale of our common stock in this offering to redeem approximately \$ million in aggregate principal amount of PQ Corporation's Floating Rate Senior Unsecured Notes due 2022, including accrued and unpaid interest, and applicable redemption premiums, and the remaining net proceeds, if any, for general corporate purposes. See "Use of Proceeds."</p>
Dividend policy	Our board of directors does not currently intend to pay dividends on our common stock. See "Dividend Policy."
Risk factors	Investing in our common stock involves a high degree of risk. You should read carefully the "Risk Factors" section of this prospectus, beginning on page 27, for a discussion of factors that you should consider before deciding to invest in our common stock.
Proposed stock exchange symbol	"PQG."

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Except as otherwise indicated, the number of shares of our common stock to be outstanding after this offering is based on _____ shares outstanding as of _____, 2017 after giving effect to the Reclassification, assuming an initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus. Because the number of shares of our common stock into which a share of our Class B common stock is convertible will be determined by reference to the initial public offering price in this offering, a change in the initial public offering price would have a corresponding impact on the number of outstanding shares of our common stock presented in this prospectus after giving effect to this offering. See “The Reclassification.” Except as otherwise indicated, the number of shares of our common stock to be outstanding after this offering excludes:

- _____ shares of our common stock issuable upon exercise of stock options issued and outstanding as of June 30, 2017 under the PQ Group Holdings Inc. Stock Incentive Plan at a weighted average exercise price of \$ _____ per share; and
- _____ shares of our common stock reserved for issuance under our 2017 Omnibus Incentive Plan (the “2017 Plan”).

**SUMMARY HISTORICAL AND UNAUDITED PRO FORMA
FINANCIAL AND OTHER DATA**

The following tables set forth our summary historical and unaudited pro forma financial and other data as of the dates and for the periods indicated. The statement of operations data and cash flows data for the six month periods ended June 30, 2017 and 2016 and the historical balance sheet data as of June 30, 2017 presented below have been derived from our unaudited consolidated financial statements included elsewhere in this prospectus. The statement of operations data and cash flows data for the years ended December 31, 2016 and 2015 and the balance sheet data as of December 31, 2016 and 2015 presented below have been derived from our audited consolidated financial statements included elsewhere in this prospectus. The statement of operations data and cash flows data for the period from inception (July 30, 2014) to December 31, 2014 have been derived from our Successor period financial statements included elsewhere in this prospectus. The balance sheet data as of December 31, 2014 has been derived from our Successor period financial statements not included in this prospectus. The statement of operations data and cash flows data for the period from January 1, 2014 to November 30, 2014 have been derived from our Predecessor period financial statements included elsewhere in this prospectus. The historical financial data of legacy PQ for the years ended December 31, 2015, 2014 and 2013 has been derived from legacy PQ's audited consolidated financial statements included elsewhere in this prospectus. The historical financial data of legacy PQ for the period from January 1, 2016 through May 3, 2016 and for the year ended December 31, 2012 has been derived from legacy PQ's consolidated financial statements not included in this prospectus. See "Basis of Financial Presentation."

The unaudited pro forma statement of operations data for the years ended December 31, 2016 and 2015 gives effect to the Business Combination and the related financing transactions as if they occurred on January 1, 2015 and is derived from our historical consolidated financial statements and legacy PQ consolidated financial statements included elsewhere in this prospectus. Unaudited pro forma balance sheet data as of June 30, 2017 and statement of operations data for the six months ended June 30, 2017 is not presented because the Business Combination and related financing transactions are included in our consolidated financial results as of such date and for such periods. The unaudited pro forma statement of operations data is illustrative and not intended to represent what our results of operations would have been had the Business Combination and related financing transactions occurred on January 1, 2015 or to project our results of operations for any future period. The unaudited pro forma statement of operations data may not be comparable to, or indicative of, future performance.

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This summary historical and unaudited pro forma financial and other data should be read in conjunction with the disclosures set forth under “Capitalization,” “Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and the related notes thereto appearing elsewhere in this prospectus.

	Six months ended June 30,		Pro forma years ended December 31,		Years ended December 31,		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014	Legacy PQ year ended December 31, 2014
	2017	2016	2016	2015	2016	2015			
	Unaudited		Unaudited						
(Dollars in thousands)									
Statement of operations data:									
Sales	\$ 722,198	\$ 371,467	\$ 1,403,041	\$ 1,413,201	\$ 1,064,177	\$ 388,875	\$ 35,539	\$ 361,823	\$ 1,114,904
Cost of goods sold	532,072	283,068	1,037,109	1,048,739	810,085	278,791	30,160	265,829	818,483
Gross profit	190,126	88,399	365,932	364,462	254,092	110,084	5,379	95,994	296,421
Selling, general and administrative expenses	69,378	38,014	145,041	140,891	107,601	34,613	2,623	45,168	110,886
Other operating expense, net	27,324	25,588	74,972	67,666	62,301	19,696	16,347	5,593	71,148
Operating income (loss)	93,064	24,797	145,919	155,905	84,190	55,775	(13,591)	45,233	114,387
Equity in net (income) loss from affiliated companies	(14,622)	4,693	(35,210)	(41,078)	2,612	—	—	—	29,359
Interest expense, net	94,961	45,752	187,945	199,614	140,315	44,348	8,470	86	111,553
Debt extinguishment costs	—	11,858	1,793	—	13,782	—	—	—	2,476
Other (income) expense, net	16,613	3,024	(8,869)	21,383	(3,402)	—	—	—	23,886
(Loss) income before income taxes and noncontrolling interest	(3,888)	(40,530)	260	(24,014)	(69,117)	11,427	(22,061)	45,147	5,831
(Benefit) provision for income taxes	97	39,549	57,967	1,157	10,041	—	—	14,602	7,548
Net (loss) income	(3,985)	(80,079)	(57,707)	(25,171)	(79,158)	11,427	(22,061)	30,545	(1,717)
Less: Net income attributable to the noncontrolling interest	78	314	1,225	1,771	588	—	—	—	1,894
Net (loss) income attributable to PQ Group Holdings Inc.	\$ (4,063)	\$ (80,393)	\$ (58,932)	\$ (26,942)	\$ (79,746)	\$ 11,427	\$ (22,061)	\$ 30,545	
Net (loss) income attributable to legacy PQ									\$ (3,611)

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(Dollars in thousands)	Six months ended		Pro forma year ended		Year ended		Successor	Predecessor	
	June 30,		December 31,		December 31,		Period from	Period from	Legacy PQ
	2017	2016	2016	2015	2016	2015	(July 30, 2014) to December 31, 2014	January 1, 2014 to November 30, 2014	year ended December 31, 2014
Unaudited									
Non-GAAP and other financial and operating data(1):									
Sales:									
Sales	\$ 722,198	\$ 371,467	\$ 1,403,041	\$ 1,413,201	\$ 1,064,177	\$ 388,875	\$ 35,539	\$ 361,823	\$ 1,114,904
Constant currency sales(2)	722,198	367,517	1,392,655	1,375,230	1,057,714	388,875	35,539	361,823	973,943
Adjusted EBITDA(3):									
Adjusted EBITDA	\$ 223,945	\$ 118,653	\$ 420,746	\$ 413,145	\$ 331,533	\$ 117,704	\$ 9,122	\$ 98,075	\$ 288,101
Constant currency Adjusted EBITDA	223,945	117,666	417,762	404,728	329,694	117,704	9,122	98,075	258,522

(Dollars in thousands)	Six months ended		Year ended	
	June 30,		December 31,	
	2017	2016	2016	2015
Unaudited				
Zeolyst Joint Venture operating data:				
Total net sales(4)	\$ 63,369	\$ 20,276	\$ 131,265	\$ 159,818
			\$ 106,734	

(1) To supplement our financial information presented in accordance with GAAP, we use the following non-GAAP financial measures to clarify and enhance an understanding of the historical results of our entire business: constant currency sales, Adjusted EBITDA, pro forma Adjusted EBITDA, constant currency Adjusted EBITDA, constant currency pro forma Adjusted EBITDA, Adjusted EBITDA margin and pro forma Adjusted EBITDA margin (collectively, the “Non-GAAP Financial Measures”). We believe that the presentation of these Non-GAAP Financial Measures enhances an investor’s understanding of our financial performance. We further believe that these Non-GAAP Financial Measures are useful financial metrics to assess our operating performance from period-to-period by excluding certain items that we believe are not representative of our core business. We also believe that these financial measures provide investors with a useful tool for assessing the comparability between periods as a result of the 2014 Acquisition and the Business Combination. We use these Non-GAAP Financial Measures for business planning purposes and in measuring our performance relative to that of our competitors. Each of the Adjusted EBITDA Non-GAAP Financial Measures presented in this prospectus includes an adjustment for depreciation, amortization and interest of our 50% share of our Zeolyst Joint Venture, which is accounted for under the equity method of accounting.

We believe these Non-GAAP Financial Measures are commonly used by investors to evaluate our performance and that of our competitors. However, our use of such Non-GAAP Financial Measures may vary from that of others in our industry. These Non-GAAP Financial Measures should not be considered as alternatives to sales, operating income (loss), net income (loss), earnings per share, cash flows data or any other performance measures derived in accordance with GAAP as measures of operating performance or operating cash flows or as measures of liquidity.

EBITDA consists of net (loss) income attributable to us before interest, taxes, depreciation and amortization. Adjusted EBITDA consists of EBITDA adjusted for (i) non-operating income or expense, (ii) the impact of certain non-cash, nonrecurring or other items that are included in net income and EBITDA that we do not consider indicative of our ongoing operating performance, and (iii) depreciation, amortization and interest of our Zeolyst Joint Venture as described above. In the case of Adjusted EBITDA, we believe that making such adjustments provides investors meaningful information to understand our operating results and analyze financial and business trends on a period-to-period basis.

EBITDA and Adjusted EBITDA have important limitations as analytical tools and you should not consider them in isolation or as substitutes for analysis of our results as reported under GAAP. Some of these limitations are:

- EBITDA and Adjusted EBITDA:
 - do not reflect the significant interest expense on our debt;
 - exclude impairments and adjustments for step-up amortization; and
 - do not reflect our cash expenditures, or future requirements, for capital expenditures or contractual commitments;
- although depreciation and amortization are non-cash charges, the assets being depreciated and amortized will often have to be replaced in the future, and EBITDA and Adjusted EBITDA do not reflect any cash requirements for such replacements; and
- other companies in our industry may calculate EBITDA and Adjusted EBITDA differently than we do, limiting their usefulness as comparative measures.

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Because of these limitations, EBITDA and Adjusted EBITDA should not be considered as measures of discretionary cash available to us to invest in the growth of our business. We compensate for these limitations by relying primarily on our GAAP results and using these Non-GAAP Financial Measures only supplementally.

In calculating EBITDA and Adjusted EBITDA, we add back certain non-cash, nonrecurring and other items and make certain adjustments that are based on assumptions and estimates. In addition, in evaluating these Non-GAAP Financial Measures, you should be aware that in the future we may incur expenses similar to those eliminated in this presentation. Our presentation of EBITDA and Adjusted EBITDA should not be construed as an inference that our future results will be unaffected by unusual or nonrecurring items.

Constant currency information reflects comparative local currency financial information at the average foreign exchange rates for the six months ended June 30, 2017 for all historical periods. This measure provides information on sales and Adjusted EBITDA assuming that foreign currency exchange rates had not changed between current and historical periods. The company believes such Non-GAAP Financial Measures, when used in conjunction with the GAAP measures of sales and net income (loss) at actual currency rates, provides additional insight into the company's operations, particularly in evaluating performance from one period to another without the impact of foreign currency changes.

- (2) The following table reconciles sales to constant currency sales for the periods presented.

(Dollars in thousands)	Six months ended June 30,		Pro forma year ended December 31,		Year ended December 31,		Successor Period from inception (July 30, 2014) to December 31,	Predecessor Period from January 1, 2014 to November 30,	Legacy PQ year ended December 31,
	2017	2016	2016	2015	2016	2015	2014	2014	2014
	Unaudited								
Sales:									
Sales	\$ 722,198	\$ 371,467	\$ 1,403,041	\$ 1,413,201	\$ 1,064,177	\$ 388,875	\$ 35,539	\$ 361,823	\$ 1,114,904
Foreign currency impact ^(a)	—	(3,950)	(10,386)	(37,971)	(6,463)	—	—	—	(140,961)
Constant currency sales	<u>\$ 722,198</u>	<u>\$ 367,517</u>	<u>\$ 1,392,655</u>	<u>\$ 1,375,230</u>	<u>\$ 1,057,714</u>	<u>\$ 388,875</u>	<u>\$ 35,539</u>	<u>\$ 361,823</u>	<u>\$ 973,943</u>

- (a) Represents the foreign currency impact on sales applying the average exchange rates in effect for the six months ended June 30, 2017. The foreign currency impact attributable to our environmental catalysts and services segment was \$(357) for the six months ended June 30, 2016, \$(1,256) and \$(3,943) for the pro forma years ended December 31, 2016 and 2015, respectively, \$(530) for the year ended December 31, 2016 and \$(6,732) for legacy PQ's year ended December 31, 2014. The foreign currency impact attributable to our performance materials and chemicals segment was \$(3,593) for the six months ended June 30, 2016, \$(9,130) and \$(34,028) for the pro forma years ended December 31, 2016 and 2015, respectively, \$(5,933) for the year ended December 31, 2016 and \$(134,229) for legacy PQ's year ended December 31, 2014.

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(3) The following tables reconcile net income (loss) to EBITDA, Adjusted EBITDA and constant currency Adjusted EBITDA for the periods and for the entities presented.

	Six months ended June 30,		Pro forma year ended December 31,		Year ended December 31,		Successor	Predecessor
	2017	2016	2016	2015	2016	2015	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014
(Dollars in thousands)								
Reconciliation of net income (loss) attributable to PQ Group Holdings Inc. to Adjusted EBITDA								
Net income (loss) attributable to PQ Group Holdings Inc.	\$ (4,063)	\$ (80,393)	\$ (58,932)	\$ (26,942)	\$ (79,746)	\$ 11,427	\$ (22,061)	\$ 30,545
Provision (benefit) for income taxes	97	39,549	57,967	1,157	10,041	—	—	14,602
Interest expense, net	94,961	45,752	187,945	199,614	140,315	44,348	8,470	86
Depreciation and amortization	83,206	41,991	165,843	152,172	128,288	38,999	2,955	42,458
EBITDA	\$ 174,201	\$ 46,899	\$ 352,823	\$ 326,001	\$ 198,898	\$ 94,774	\$ (10,636)	\$ 87,691
Joint venture depreciation, amortization and interest(a)	5,510	1,844	10,263	7,928	6,920	—	—	—
Amortization of investment in affiliate step-up(b)	5,282	12,315	5,838	6,634	34,786	—	—	—
Amortization of inventory step-up(c)	871	17,714	4,912	—	30,596	—	3,511	—
Impairment of long-lived and intangible assets	—	—	6,873	425	6,873	—	—	—
Debt extinguishment costs	—	11,858	1,793	—	13,782	—	—	—
Net loss (gain) on asset disposal(d)	2,925	1,661	4,805	5,459	4,216	3,911	—	—
Foreign currency exchange loss (gain)(e)	16,356	3,090	(8,975)	21,058	(3,558)	—	—	—
Non-cash revaluation of inventory, including LIFO	2,479	446	1,343	(2,088)	1,310	—	—	—
Management advisory fees(f)	2,500	1,083	5,250	5,590	3,583	590	42	—
Transaction and other related costs(g)	4,334	4,544	2,648	13,219	4,664	4,241	15,506	—
Equity-based and other non-cash compensation	2,828	3,779	6,487	4,155	7,042	2,256	—	535
Restructuring, integration and business optimization expense(h)	3,052	11,728	17,857	8,644	16,258	4,147	247	—
Defined benefit plan pension cost(i)	1,409	1,398	2,752	6,116	1,375	2,903	—	—
Transition services(j)	—	—	—	4,882	—	4,882	—	—
Other legacy Eco adjustment(k)	—	—	—	—	—	—	—	9,849
Other(l)	2,198	294	6,077	5,122	4,788	—	452	—
Adjusted EBITDA	\$ 223,945	\$ 118,653	\$ 420,746	\$ 413,145	\$ 331,533	\$ 117,704	\$ 9,122	\$ 98,075
Foreign currency impact(m)	—	(987)	(2,984)	(8,417)	(1,839)	—	—	—
Constant currency Adjusted EBITDA	\$ 223,945	\$ 117,666	\$ 417,762	\$ 404,728	\$ 329,694	\$ 117,704	\$ 9,122	\$ 98,075

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	Three months ended March 31, 2016	Period from January 1, 2016 through May 3, 2016	Year ended December 31,			
			Unaudited			
	2015	2014	2013	2012		
(Dollars in thousands)						
Reconciliation of legacy PQ net income (loss) to legacy PQ Adjusted EBITDA						
Net income (loss) attributable to legacy PQ	\$ 1,102	\$ (38,337)	\$ 7,851	\$ (3,611)	\$ 26,730	\$ 5,184
Provision (benefit) for income taxes	3,904	11,391	22,902	7,548	10,608	18,918
Interest expense, net	26,413	37,310	108,375	111,553	120,347	111,228
Depreciation and amortization	23,621	32,052	93,122	91,342	89,306	93,416
EBITDA	\$ 55,040	\$ 42,416	\$ 232,250	\$ 206,832	\$ 246,991	\$ 228,746
Joint venture depreciation, amortization and interest(a)	2,476	3,343	7,928	6,941	6,128	3,348
Amortization of investment in affiliate step-up(b)	597	796	2,387	2,387	2,387	2,593
Impairment of long-lived and intangible assets	—	—	425	—	948	—
Debt extinguishment costs	—	40,153	—	2,476	20,287	20,063
Net loss (gain) on asset disposals(d)	301	589	1,548	694	653	787
Foreign currency exchange loss (gain)(e)	(3,206)	(5,247)	21,059	23,387	4,414	(1,850)
Non-cash revaluation of inventory, including LIFO	714	33	(2,088)	846	1,152	287
Management advisory fees(f)	1,250	1,667	5,000	5,000	5,000	7,500
Transaction and other related costs(g)	299	(221)	10,742	24,405	5,594	533
Equity-based and other non-cash compensation	1,194	1,590	3,358	—	1,011	—
Restructuring, integration and business optimization expense(h)	1,563	1,599	4,496	4,572	5,449	5,644
Defined benefit plan pension cost(i)	1,025	1,377	3,213	1,832	3,581	486
Other(l)	517	1,118	5,123	8,729	3,200	547
Legacy PQ Adjusted EBITDA	\$ 61,770	\$ 89,213	\$ 295,441	\$ 288,101	\$ 306,795	\$ 268,684
Foreign currency impact(m)	(574)	(1,145)	(8,417)	(29,579)	—	—
Constant currency legacy PQ Adjusted EBITDA	\$ 61,196	\$ 88,068	\$ 287,024	\$ 258,522		

- (a) We use Adjusted EBITDA as a performance measure to evaluate our financial results. Because our environmental catalysts and services segment includes our 50% interest in our Zeolyst Joint Venture, we include an adjustment for our 50% proportionate share of depreciation, amortization and interest expense of our Zeolyst Joint Venture.
- (b) Represents the amortization of the fair value adjustments associated with the equity affiliate investment in our Zeolyst Joint Venture as a result of the Business Combination. We determined the fair value of the equity affiliate investment and the fair value step-up was then attributed to the underlying assets of our Zeolyst Joint Venture. Amortization is primarily related to the fair value adjustments associated with inventory, fixed assets and intangible assets, such as customer relationships, formulations and product technology.
- (c) As a result of the Business Combination, there was a step-up in the fair value of inventory at PQ Holdings, which is amortized through cost of goods sold in the income statement. Similarly, for the year ended December 31, 2014, there was a step-up in the fair value of inventory that occurred as part of the 2014 Acquisition, which was amortized through cost of goods sold in the income statement.
- (d) We do not have a history of significant asset disposals. However, when asset disposals occur, we remove the impact of net gain/loss of the disposed asset because such impact primarily reflects the non-cash write-off of long-lived assets no longer in use.
- (e) Reflects the exclusion of the negative or positive transaction gains and losses of foreign currency in the income statement primarily related to the non-permanent intercompany debt denominated in local currency translated to U.S. dollars.
- (f) Reflects consulting fees paid to CCMP and affiliates of INEOS for consulting services that include certain financial advisory and management services. These payments will cease as of the effective date of our initial public offering.
- (g) Relates to certain transaction costs described elsewhere in our consolidated financial statements included in this prospectus as well as other costs related to several transactions that are either completed, pending or abandoned and that we believe are not representative of our ongoing business operations.
- (h) Includes the impact of restructuring, integration and business optimization expenses that are related to specific, one-time items, including severance for a reduction in force and post-merger integration costs that are not expected to recur.
- (i) Represents adjustments for defined benefit pension plan costs in our income statement. More than two-thirds of our defined benefit pension plan obligations are under defined benefit pension plans that are frozen and the remaining obligations primarily relate to plans operated in certain of our non-U.S. locations that, pursuant to jurisdictional requirements, cannot be frozen. As such, we do not view such expenses as core to our ongoing business operations.
- (j) Represents costs under a transition services agreement with Solvay that provided certain transition services to legacy Eco by Solvay following the 2014 Acquisition. The transition services agreement ended in 2015.

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- (k) Includes \$12.9 million of corporate allocations and \$(3.1) million of abatement revenue related to the 2014 Acquisition and resulting from legacy Eco historical financial statements being a carve-out from Solvay's financial statements.
 - (l) Other costs consist of certain expenses that are not core to our ongoing business operations and are generally related to specific, one-time items, including environmental remediation-related costs associated with the legacy operations of our business prior to the Business Combination, capital and franchise taxes, non-cash asset retirement obligation accretion and the initial implementation of procedures to comply with Section 404 of the Sarbanes-Oxley Act.
 - (m) Represents the foreign currency impact on Adjusted EBITDA applying the average exchange rates in effect for the six months ended June 30, 2017. The foreign currency impact attributable to our environmental catalysts and services segment was \$(106) for the six months ended June 30, 2016, \$(366) and \$(1,291) for the pro forma years ended December 31, 2016 and 2015, respectively, \$(184) for the year ended December 31, 2016, \$(142) for legacy PQ's three months ended March 31, 2016, \$(183) for legacy PQ's stub period from January 1, 2016 through May 3, 2016 and \$(1,291) and \$(2,215) for legacy PQ's years ended December 31, 2015 and 2014, respectively. The foreign currency impact attributable to our performance materials and chemicals segment was \$(881) for the six months ended June 30, 2016, \$(2,618) and \$(7,126) for the pro forma years ended December 31, 2016 and 2015, respectively, \$(1,655) for the year ended December 31, 2016, \$(432) for legacy PQ's three months ended March 31, 2016, \$(962) for legacy PQ's stub period from January 1, 2016 through May 3, 2016 and \$(7,126) and \$(27,364) for legacy PQ's years ended December 31, 2015 and 2014, respectively.
- (4) Our zeolite catalysts product group operates through our Zeolyst Joint Venture, which we account for as an equity method investment in accordance with GAAP. Total net sales represents 50% of the total net sales of our Zeolyst Joint Venture. We do not record sales by our Zeolyst Joint Venture as revenue and such sales are not consolidated within our results of operations. However, Adjusted EBITDA for the pro forma years ended December 31, 2016 and 2015 and for the six months ended June 30, 2017 reflects our share of the earnings of our Zeolyst Joint Venture that have been recorded as equity in net income from affiliated companies in our consolidated statements of operations for such periods and includes Zeolyst Joint Venture adjustments on a proportionate basis based on our 50% ownership interest. As a result, our Adjusted EBITDA margin for the pro forma years ended December 31, 2016 and 2015 and for the six months ended June 30, 2017, which was 30.0%, 29.2% and 31.0%, respectively, benefits from our share of the equity-method earnings of our Zeolyst Joint Venture in addition to certain adjustments, but does not reflect the sales of our Zeolyst Joint Venture for the respective periods. For the pro forma years ended December 31, 2016 and 2015 and for the six months ended June 30, 2017, our Adjusted EBITDA margin, including 50% of our Zeolyst Joint Venture's total net sales for such periods in the denominator, would have been 27.4%, 26.3% and 28.5%, respectively.

RISK FACTORS

An investment in our common stock involves risks. You should consider carefully the following risks and all of the other information contained in this prospectus before investing in our common stock. The risks described below are those that we believe are the material risks that we face. The trading price of our common stock could decline due to any of these risks, and you may lose all or part of your investment in our common stock. See "Cautionary Note Regarding Forward-Looking Statements" elsewhere in this prospectus.

Risks Related to Our Business

As a global business, we are exposed to local business risks in different countries, which could have a material adverse effect on our financial condition, results of operations and cash flows.

We have significant operations in many countries, including manufacturing sites, research and development facilities, sales personnel and customer support operations. As of June 30, 2017, we operated 72 manufacturing facilities across six continents. For the year ended December 31, 2016, our foreign subsidiaries accounted for 39% of our pro forma sales. Our operations are affected directly and indirectly by global regulatory, economic and political conditions, including:

- new and different legal and regulatory requirements in local jurisdictions;
- export duties or import quotas;
- domestic and foreign customs and tariffs or other trade barriers;
- potential difficulties in staffing and labor disputes;
- potential difficulties in managing and obtaining support and distribution for local operations;
- increased costs of, and availability of, raw materials, transportation or shipping;
- credit risk and financial condition of local customers and distributors;
- potential difficulties in protecting intellectual property rights;
- risk of nationalization of private enterprises by foreign governments;
- potential imposition of restrictions on investments;
- the imposition of withholding taxes or other taxes or royalties on our income, or the adoption of other restrictions on foreign trade or investment, including currency exchange controls;
- capital controls;
- potential difficulties in obtaining and enforcing legal judgments in jurisdictions outside the United States;
- potential difficulties in obtaining and enforcing relief in the United States against parties located outside the United States;
- potential difficulties in enforcing agreements and collecting receivables;
- risks relating to environmental, health and safety matters; and
- local political, economic and social conditions, including the possibility of hyperinflationary conditions and political instability in certain countries.

We may not be successful in developing and implementing policies and strategies to address the foregoing factors in a timely and effective manner at each location where we do business. Consequently, the occurrence of one or more of the foregoing factors could have a material adverse effect on our international operations or upon our financial condition, results of operations and cash flows.

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We are affected by general economic conditions and an economic downturn could adversely affect our operations and financial results.

We sell performance chemicals, performance materials and catalysts that are used in manufacturing processes and as components of, or ingredients in, other products and, as a result, our sales are correlated with and affected by fluctuations in the level of industrial production and manufacturing output and by fluctuations in general economic activity, including, for example, any potential impact of the vote by the United Kingdom to exit the European Union, commonly referred to as “Brexit.” Producers of performance chemicals, in particular, are likely to reduce their output in periods of significant contraction in industrial and consumer demand, while demand for the products we manufacture often depends on trends in demand in the end uses our customers serve. Our profit margins, as well as overall demand for our products, could decline as a result of factors outside our control, including economic recessions, changes in industrial production processes or consumer preferences, changes in laws and regulations affecting our industry and the manner in which they are enforced, inflation, fluctuations in interest and currency exchange rates and changes in the fiscal or monetary policies of governments in the regions in which we operate.

General economic conditions and macroeconomic trends could affect overall demand for our products and any overall decline in such demand could significantly reduce our sales and profitability. In addition, volatility and disruption in financial markets could adversely affect our sales and results of operations by limiting our customers’ ability to obtain the financing necessary to maintain or expand their own operations.

Exchange rate fluctuations could adversely affect our financial condition, results of operations and cash flows.

As a result of our international operations, for the year ended December 31, 2016, we generated 39% of our pro forma sales and incurred a significant portion of our expenses in currencies other than U.S. dollars. We incur currency transaction risk whenever we enter into either a purchase or sale transaction using a currency other than the local currency of the transacting entity. The main currencies to which we are exposed, besides the U.S. dollar, are the Euro, the British pound, the Canadian dollar, the Mexican peso and the Brazilian real. The exchange rates between these currencies and the U.S. dollar have fluctuated significantly in recent years and may continue to do so in the future. In many cases, we sell exclusively in those jurisdictions and do not have the ability to mitigate our exposure to currency fluctuations through our operations. Accordingly, to the extent that we are unable to match sales made in such foreign currencies with costs paid in the same currency, exchange rate fluctuations could adversely affect our financial condition, results of operations and cash flows. In the past, we have experienced economic loss and a negative impact on earnings as a result of foreign currency exchange rate fluctuations and any future fluctuations may have similar or greater impacts. We expect that the amount of our sales denominated in non-dollar currencies may increase in future periods. Given the volatility of exchange rates, there can be no assurance that we will be able to effectively manage our currency transaction risks or that any volatility in currency exchange rates will not have a material adverse effect on our financial condition or results of operations. See “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Quantitative and Qualitative Disclosures about Market Risk.”

Additionally, because our consolidated financial results are reported in U.S. dollars, the translation of sales or earnings generated in other currencies into U.S. dollars can result in a significant increase or decrease in the amount of those sales or earnings in our financial statements, which also affects the comparability of our results of operations and cash flows between financial periods. Further, currency fluctuations may negatively impact our debt service requirements, which are primarily in U.S. dollars.

Our international operations require us to comply with anti-corruption laws, trade and export controls and regulations of the U.S. government and various international jurisdictions in which we do business.

Doing business on a worldwide basis requires us and our subsidiaries to comply with the laws and regulations of the U.S. government and various international jurisdictions, and our failure to successfully comply

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with these laws and regulations may expose us to liabilities. Such laws and regulations apply to companies, individual directors, officers, employees and agents, and may restrict our operations, trade practices, investment decisions and partnering activities.

In particular, our international operations are subject to U.S. and foreign anti-corruption laws and regulations, such as the Foreign Corrupt Practices Act (“FCPA”) and the U.K. Bribery Act (“UKBA”). The FCPA prohibits us from providing anything of value to foreign officials for the purposes of influencing official decisions or obtaining or retaining business or otherwise obtaining favorable treatment, and requires us to maintain adequate record-keeping and internal accounting practices to accurately reflect our transactions. As part of our business, we may deal with state-owned business enterprises, the employees and representatives of which may be considered foreign officials for purposes of the FCPA and UKBA. In addition, some of the international locations in which we operate lack a developed legal system and have elevated levels of corruption. As a result of our international operations, we are exposed to the risk of violating anti-corruption laws.

In addition, we are subject to applicable export controls and economic sanctions laws and regulations imposed by the U.S. government and other countries. Changes in such laws and regulations may restrict our business practices, including cessation of business activities in sanctioned countries or regions or with sanctioned entities or individuals, and may result in modifications to compliance programs. Violations of these legal requirements are punishable by criminal fines and imprisonment, civil penalties, disgorgement of profits, injunctions, debarment from government contracts, loss of export privileges and other remedial measures.

We have established policies and procedures designed to assist us and our personnel in complying with applicable U.S. and international laws and regulations. These policies and procedures are codified in our Code of Conduct and other various policies. However, there can be no assurance that our policies and procedures will effectively prevent us from violating these laws and regulations in every transaction in which we may engage, and such a violation could subject us to governmental investigations and adversely affect our reputation, business, financial condition and results of operations.

Alternative technology or other changes in our customers’ products may reduce or eliminate the need for certain of our products.

Many of the products that we sell are used in manufacturing processes and as components of or ingredients in other products and, as a result, changes in our customers’ end products or processes or alternative technology may enable our customers to reduce or eliminate consumption or use of our products. For example, over the last seven years, customers in the detergent industry have significantly reduced their use of zeolites. Additionally, shifting consumer preference could result in a significant reduction in the future use of fossil fuels, which would have a negative impact on our zeolite catalysts and refining services. If we are unable to respond appropriately to such new developments, such changes could seriously impair our ability to profitably market certain of our products.

Our new product development and research and development efforts may not succeed and our competitors may develop more effective or successful products.

The industries in which we operate are subject to periodic technological changes and ongoing product improvements. In order to maintain our margins and remain competitive, we must successfully develop, manufacture and market new or improved products. As a result, we must commit substantial resources each year to new product research and development. Ongoing investments in new product research and development could result in higher costs without a proportional increase in revenues. Additionally, for any new product program, there is a risk of technical or market failure, in which case we may need to commit additional resources to the program and may not be able to develop the new products needed to maintain our competitive position. Moreover, new products may have lower margins than the products they replace or may not successfully attract end users.

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We also expect competition to increase as our competitors develop and introduce new and enhanced products. As such products are introduced, our products may become obsolete or our competitors' products may be marketed more effectively. If we fail to develop new products, maintain or improve our margins with our new products or keep pace with technological developments, our business, financial condition, results of operations and cash flows will suffer.

Our substantial level of indebtedness could adversely affect our financial condition.

We have substantial indebtedness, which, as of June 30, 2017, totaled approximately \$2,728.4 million. We intend to use the net proceeds from this offering primarily to repay a portion of our indebtedness. See "Use of Proceeds." Our substantial indebtedness, combined with our other financial obligations and contractual commitments, could have important consequences, including:

- requiring us to dedicate a substantial portion of our cash flows from operations to payments on our indebtedness, thereby reducing funds available for working capital, capital expenditures, acquisitions, selling and marketing efforts, product development and other purposes;
- increasing our vulnerability to adverse economic and industry conditions, which could place us at a competitive disadvantage compared to our competitors that have relatively less indebtedness;
- limiting our flexibility in planning for, or reacting to, changes in our business and the industries in which we operate;
- increasing our exposure to rising interest rates because certain of our borrowings are at variable interest rates;
- restricting us from making strategic acquisitions or causing us to make non-strategic divestitures; and
- limiting our ability to borrow additional funds, or to dispose of assets to raise funds, if needed, for working capital, capital expenditures, acquisitions, product development and other corporate purposes.

Although the terms of the agreements governing our outstanding indebtedness contain restrictions on the incurrence of additional indebtedness, such restrictions are subject to a number of important exceptions and indebtedness incurred in compliance with such restrictions could be substantial. If we and our restricted subsidiaries incur significant additional indebtedness, the related risks that we face could increase.

If we are unable to pass on increases in raw material prices, including natural gas, to our customers or to retain or replace our key suppliers, our results of operations and cash flows may be negatively affected.

We purchase significant amounts of raw materials, including soda ash, cullet, industrial sand, aluminum trihydrate, sodium hydroxide (commonly known as caustic soda) and sulfur (including hydrogen sulfite), in our performance chemicals, performance materials and refining services product groups, and we purchase significant amounts of natural gas to supply the energy required in our production process. The cost of these raw materials represents a substantial portion of our operating expenses and our results of operations have been, and could in the future be, significantly affected by increases in the costs of such raw materials. In addition, we obtain a significant portion of our raw materials from certain key suppliers. If any of those suppliers is unable to meet its obligations under current supply agreements, we may be forced to pay higher prices to obtain the necessary raw materials. Furthermore, if any of the raw materials that we use become unavailable within the geographic area from which we currently source them, we may not be able to obtain suitable and cost-effective substitutes. Any interruption of supply or any price increase of raw materials could adversely affect our profitability.

While we attempt to match raw material price increases with corresponding product price increases, our ability to pass on increases in the cost of raw materials to our customers is, to a large extent, dependent upon our contractual arrangements and market conditions. There may be periods of time during which we are not able to recover increases in the cost of raw materials due to our contractual arrangements or weakness in demand for, or

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oversupply of, our products. Specifically, timing differences between price adjustments of raw materials, which may occur daily, and adjustments to our product prices, which in many cases are adjusted quarterly or less often, have had and may continue to have a negative effect on our profitability. Even in periods during which raw material prices decline, we may suffer decreasing profits if customers seek relief in the form of lower sales prices or if the raw material price reductions occur at a slower rate than decreases in the selling prices of our products. Furthermore, some of our performance chemicals customers may take advantage of fluctuating prices by building inventories when they expect product prices to increase and reducing inventories when they expect product prices to decrease. Such volatility can result in commercial disputes with customers and suppliers with respect to interpretations of complex contractual arrangements, the adverse resolution of which could reduce our profitability.

In the past, we have entered into long-term supply contracts for certain of our raw materials, including for certain of our North American soda ash. As these contracts expire, we may not be able to renegotiate or enter into new long-term supply contracts that will offer similar protection from price increases and other fluctuations on terms that are satisfactory to us or at all.

In addition, we have attempted to mitigate our exposure to the significant price volatility of natural gas, which has historically had a negative impact on our results of operations, by implementing a hedging program in the United States and entering into forward purchases in the United States, Canada, Europe and other parts of the world. Our hedging strategy may not be successful and if energy prices rise, our profitability could be adversely affected. With the exception of such natural gas contracts, we typically do not enter into long-term forward contracts to hedge against raw material price volatility.

We face substantial competition in the industries in which we operate.

The industries in which we operate are highly competitive and we face significant competition from large international producers and, particularly in Europe and certain Asia-Pacific regions, smaller regional competitors. Our silica catalysts and zeolite catalysts primarily compete with other global producers in the petrochemicals and refining industries such as W.R. Grace, BASF, UOP, and Albemarle, as well as other niche competitors such as Tosoh, Axens, and Haldor Topsoe. We compete in the North American refining services industry with competitors such as Chemtrade and Veolia through our refining services product group. Additionally, our performance materials and chemicals business primarily competes with other global producers such as OxyChem, PPG and Evonik. We believe that we typically compete on the basis of performance, product consistency, quality, reliability, and ability to innovate in response to customer demands.

Our competitors may improve their competitive position in our core end use applications by successfully introducing new products, improving their manufacturing processes, expanding their capacity or manufacturing facilities or responding more effectively than us to new or emerging technologies and changes in customer requirements. Some of our competitors may be able to lower prices for our products if their costs are lower. In addition, consolidation among our competitors or customers may result in reduced demand for our products or make it more difficult for us to compete. Some of our competitors' financial, technological and other resources may be greater than ours or they may have less debt than we do and, as a result, may be better able to withstand changes to industry conditions. The occurrence of any of these events could materially adversely affect our financial condition and results of operations.

We are subject to the risk of loss resulting from non-payment or non-performance by our customers.

Our credit procedures and policies may not be adequate to minimize or mitigate customer credit risk. Our customers may experience financial difficulties, including bankruptcies, restructurings and liquidations. These and other financial problems our customers may experience, as well as potential financial weakness in the industries in which we operate, may increase our risk in extending trade credit to customers. A significant adverse change in a customer's financial position could cause us to limit or discontinue business with such

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customer, require us to assume more credit risk relating to such customer's receivables or limit our ability to collect accounts receivable from such customer, any of which could have a material adverse effect on our business, results of operations, financial condition and liquidity.

We rely on a limited number of customers for a meaningful portion of our business. A loss of one or more of these customers could adversely impact our profitability.

A loss of any significant customer, including a pipeline customer, or a decrease in the provision of products to any significant customer could have an adverse effect on our business until alternative arrangements are secured. Any alternative arrangement to replace the loss of a customer would result in increased variable costs relating to product shipment. In addition, any new customer agreement entered into by us may not have terms as favorable as those contained in our current customer agreements, which could have a material adverse effect on our business, financial condition and results of operations. For the year ended December 31, 2016 our top 10 customers represented approximately 24% of our pro forma sales and no single customer represented more than 4% of our pro forma sales.

Refineries, which represent a sizeable subset of our environmental catalysts and services business customers, have undergone significant consolidation and additional consolidation is possible in the future. Such consolidation could further increase our reliance on a small number of customers and further increase our customers' leverage over us, resulting in downward pressure on prices and an adverse effect on our profitability.

Multi-year customer contracts in our refining services product group are subject to potential early termination and such contracts may not be renewed at the end of their respective terms.

Many of the customer contracts in our refining services product group are multi-year agreements. Sulfuric acid regeneration customer contracts are typically on five- to ten-year terms and virgin sulfuric acid customer contracts are typically on one- to five-year terms, with larger customers typically favoring longer terms. Excluding contracts with automatic evergreen provisions, approximately 60% of our sulfuric acid volume for the year ended December 31, 2016 was under contracts expiring at the end of 2019 or beyond. In addition, our sulfuric acid regeneration contracts with major refinery customers typically allow for termination with advance notice of one to two years. We cannot provide assurance that our existing contracts will not be subjected to early terminations or that our expiring contracts will be renewed at the end of their terms. If we receive a significant number of such contract terminations or experience non-renewals from key customers in our refining services product group, our results of operations, financial condition and cash flows may be materially adversely affected.

Reductions in highway safety spending or taxes earmarked for highway safety spending could result in a decline in our sales.

Approximately 13% of our pro forma sales for the year ended December 31, 2016 were derived from products sold into highway safety applications. Sales of our performance materials products for highway safety uses are in part dependent upon federal, state, local and foreign government budgets. A decrease in, or termination of, governmental budgeting for new highway safety programs or a significant decrease in the use of our performance materials products in any new highway safety projects could have an adverse effect on our business, financial condition, results of operations or cash flows by decreasing the profitability of our performance materials product group.

Our quarterly results of operations are subject to fluctuations because the demand for some of our products is seasonal.

Seasonal changes and weather conditions typically affect our performance materials and refining services product groups. In particular, our performance materials product group generally experiences lower sales and profit in the first and fourth quarters of the year because highway striping projects typically occur during warmer

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weather months. Additionally, our refining services product group typically experiences similar seasonal fluctuations as a result of higher demand for gasoline products in the summer months. As a result, our working capital requirements tend to be higher in the first and fourth quarters of the year, which can adversely affect our liquidity and cash flows. Because of this seasonality associated with certain of our product groups, results for any one quarter are not necessarily indicative of the results that may be achieved for any other quarter or for the full year.

If we lose certain key personnel or are unable to hire additional qualified personnel, we may not be able to execute our business strategy and our business could be adversely affected.

Our success depends, in part, upon the continued services of our highly skilled personnel involved in management, research, production and distribution and, in particular, upon the efforts and abilities of our key officers. Although we believe that we are adequately staffed in key positions, we may not be able to retain such personnel on acceptable terms or at all, and such personnel may seek to compete with us in the future. If we lose the service of any of our key personnel, we may not be able to hire replacements with the same level of industry experience and knowledge necessary to execute our business strategy, which in turn could have a material adverse effect on our business, financial condition, results of operations or cash flows.

Our expansion projects may result in significant expenditures before generating revenues, if any, which may materially and adversely affect our ability to implement our business strategy.

We have made and continue to make significant investments in each of our businesses. These projects require us to commit significant capital to, among other things, implement engineering plans and obtain the necessary permits before we generate revenues related to our investments in these businesses. Such projects may take longer to complete or require additional unanticipated expenditures and may never generate profits. If we fail to recover our investment, or these projects never become profitable, our ability to implement our business strategy may be materially and adversely affected.

We may be liable for damages based on product liability claims brought against us or our customers for costs associated with recalls of our or our customers' products.

Even though we are generally a materials and services supplier rather than a manufacturer of finished goods, the sale of our products involves the risk of product liability claims and voluntary or government-ordered product recalls. For example, certain of the products that we manufacture provide critical performance functions to our customers' end products, are used in and around other chemical manufacturing facilities, highways, airports and other locations where personal injury or property damage may occur or are used in certain consumer goods such as beverages, personal care products and medicinal applications. While we attempt to protect ourselves from product liability claims and exposures through our adherence to standards and specifications and through contractual negotiations, there can be no assurance that our efforts will ultimately protect us from any such claims. A product liability claim or voluntary or government-ordered product recall could result in substantial and unexpected expenditures, affect consumer or customer confidence in our products and divert management's attention from other responsibilities. A product recall or successful product liability claim or series of claims against us in excess of our insurance coverage and for which we are not otherwise indemnified could have a material adverse effect on our business, financial condition, results of operations or cash flows.

We are required to comply with a wide variety of laws and regulations, and are subject to regulation by various federal, state and foreign agencies, and our failure to comply with existing and future regulatory requirements could adversely affect our financial condition, results of operations and cash flows.

We compete in industries in which we and our customers are subject to federal, state, local, international and transnational laws and regulations. Such laws and regulations are numerous and sometimes conflicting, and

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any future changes to such laws and regulations could adversely affect us. For example, our performance materials product group sells products used in highway safety applications, and such products are subject to laws and regulations that vary by state. If we fail to comply with applicable laws and regulations, we may be subject to civil remedies, including fines, injunctions, recalls or seizures, any of which could have an adverse effect on our business, financial condition and results of operations.

In order to obtain regulatory approval for certain of our new products, we must, among other things, demonstrate to the relevant authority that the product is safe and effective for its intended uses and that we are capable of manufacturing the product in accordance with current regulations. The process of seeking approvals can be costly, time-consuming and subject to unanticipated and significant delays. Any delay in obtaining, or any failure to obtain or maintain, these approvals would adversely affect our ability to introduce new products and to generate sales from those products, and could have an adverse effect on our business, financial condition, results of operations or cash flows.

Our products, including the raw materials we handle, are subject to rigorous chemical registration and industrial hygiene regulations and investigation. There is risk that a key raw material, chemical or substance, or one of the end products of which our products are a part, may be recharacterized as having a toxicological or health-related impact on the environment, our customers or our employees. Industrial hygiene regulations are continually strengthened and if such recharacterization occurred, the relevant raw material, chemical or product may be banned or we may incur increased costs in order to comply with new requirements. Changes in industrial hygiene regulations also affect the marketability of certain of our products, and future regulatory changes may have a material adverse effect on our business.

New laws and regulations, and changes in existing laws and regulations, may be introduced in the future and could prevent or inhibit the development, distribution and sale of our products, including as a result of additional compliance costs, seizures, confiscation, recall or monetary fines. For example, as discussed in more detail in “Business—Environmental Regulations” and “Business—Chemical Product Regulation,” we may be materially impacted by regulatory initiatives worldwide with respect to chemical product safety such as the 2016 amendments to the U.S. Toxic Substances Control Act, the E.U. regulation “Registration, Evaluation, Authorisation and Restriction of Chemical Substances” (“REACH”), or similar regulations being enacted in other countries (e.g., China REACH; Korea REACH). Additionally, the current U.S. administration may seek to reduce current environmental standards and regulations, such as the Corporate Average Fuel Economy standards, which could have a material adverse effect on our sales into the fuels and emissions controls industries.

We are subject to extensive environmental, health and safety regulations and face various risks associated with potential non-compliance or releases of hazardous materials.

Like other chemical companies, our operations and properties are subject to extensive and stringent federal, state, local and foreign environmental laws and regulations. U.S. federal environmental laws that affects us include the Resource Conservation and Recovery Act (“RCRA”), the Clean Air Act, the Clean Water Act and the Comprehensive Environmental Response Compensation and Liability Act (“CERCLA”). These laws govern, among other things, emissions to the air, discharges or releases of hazardous substances to land, surface, subsurface strata and water, wastewater discharges and the generation, handling, storage, transportation, treatment, disposal and remediation of hazardous materials and petroleum products. We are also subject to other federal, state, local and foreign laws and regulations regarding chemical and product safety as well as employee health and safety matters, including process safety requirements. These laws and regulations may become more stringent over time and the failure to comply with such laws and regulations can result in significant fines or penalties.

We have in the past been and currently are the subject of investigations and enforcement actions pursuant to environmental laws, including the Clean Air Act. Some of these matters were resolved through the payment of significant monetary penalties and a requirement to implement corrective actions at our facilities. For instance, in

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November 2015, the Pennsylvania Department of Environmental Protection issued a \$1.7 million fine against us for allegedly excessive emissions of carbon monoxide and nitrogen oxides from our Chester, Pennsylvania site. We have appealed the alleged violations and the associated fine. We also remain subject to a 2007 Consent Decree that resolves certain alleged Clean Air Act violations at our seven refining services operating locations involving New Source Review, Prevention of Significant Deterioration and New Source Performance Standard obligations under the U.S. federal rules for the pollutants sulfur dioxide and sulfuric acid mist. The Consent Decree required Solvay (the owner at the time) to pay a \$2 million penalty and spend approximately \$34 million on air pollution controls at our facilities, the majority of which was received from customers in contractual arrangements. Work under the Consent Decree has proceeded since 2007, and we believe that all of the significant capital improvements related to the Consent Decree have been completed. One of our operating locations has been released from the scope of the Consent Decree and we are seeking release of the other locations covered by the Consent Decree.

We are required by these environmental laws and regulations to obtain registrations, licenses, permits and other approvals in order to operate, to make disclosures to public authorities about our chemical handling and usage activities and to install expensive pollution control and spill containment equipment at our facilities, or to incur other capital expenditures aimed at achieving or maintaining compliance with such laws and regulations. We are preparing to implement a substantial environmentally-driven capital improvement project over the next three years and failure to complete this project or to timely identify and implement other capital projects required to achieve or maintain compliance could expose us to enforcement and penalty.

Under CERCLA and analogous statutes in local and foreign jurisdictions, current and former owners and operators of land impacted by releases of hazardous substances are strictly liable for the investigation and remediation of the contamination resulting from the release. Liability under CERCLA and analogous laws is strict, unlimited, joint, several and retroactive, may be imposed regardless of fault and may relate to historical activities or contamination not caused by the affected property's current owner or operator. We could be held responsible for all cleanup costs at a site, whether currently or formerly owned or operated, regardless of fault, knowledge, timing or cause of the contamination. Further, under CERCLA and analogous laws, we may be jointly and severally liable for contamination at third party sites where we or our predecessors in interest have sent waste for treatment or disposal, even if we complied with applicable laws. In addition, we may face liability for personal injury, property damage and natural resource damage resulting from environmental conditions attributable to hazardous substance releases at or from facilities we currently or formerly owned or operated or to which we sent waste. As such, a product spill or emission at one of our facilities or otherwise resulting from our operations could have adverse consequences on the environment and surrounding community and could result in significant liabilities with respect to investigation and remediation.

Our facilities have an extended history of industrial use, and soil and groundwater contamination exists at some of our sites. As of June 30, 2017, we had current investigation, remediation or monitoring obligations at several of our current or former sites, including Rahway, New Jersey; Dominguez, California; Martinez, California; and Tacoma, Washington. As of June 30, 2017, we had established reserves of approximately \$5.1 million to cover anticipated expenses at these sites, all of which have reached relatively mature stages of either the investigation, remediation or monitoring process. Actual costs to complete these projects may exceed our current estimates. In addition, we have unresolved liability at several sites to which we or our predecessors allegedly arranged for the disposal or treatment of hazardous wastes. For example, at the Boyertown Sanitary Disposal site in Gilbertsville, Pennsylvania, we are participating in a group of parties who disposed of materials at the site to fund investigatory and remedial work.

As of June 30, 2017, our total reserves associated with environmental remediation and enforcement matters were \$7.6 million. In addition to the ongoing remediation and monitoring activities discussed above, there is risk that the long-term industrial use at our facilities may have resulted in, or may in the future result in, contamination that has yet to be discovered, which could require additional, unplanned investigation and remediation efforts by us for which no reserves have been established, potentially without regard to whether we

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knew of, or caused, the release of such hazardous substances. Discovery of additional or unknown conditions at our facilities could have an adverse impact on our business by substantially increasing our capital expenditures, including compliance, investigation and remediation costs. Such environmental liabilities attached to our properties, or for properties that we are otherwise responsible for, could have a material adverse effect on our results of operations or financial condition.

Existing and proposed regulations to address climate change by limiting greenhouse gas emissions may cause us to incur significant additional operating and capital expenses.

Certain of our operations result in emissions of greenhouse gases (“GHGs”), such as carbon dioxide. Growing concern about the sources and impacts of global climate change has led to a number of domestic and foreign legislative and administrative measures, both proposed and enacted, to monitor, regulate and limit carbon dioxide and other GHG emissions. In the European Union, our emissions are regulated under the E.U. Emissions Trading System (the “E.U. ETS”), an E.U.-wide trading scheme for industrial GHG emissions. The E.U. ETS is anticipated to become progressively more stringent over time, including by reducing the number of allowances to emit GHGs that E.U. member states will allocate without charge to industrial facilities. In the United States, the EPA has promulgated federal GHG regulations under the Clean Air Act that affect certain sources. For example, the EPA has issued mandatory GHG reporting requirements, under which our Dominguez, California and Baton Rouge, Louisiana facilities currently report. Moreover, California has enacted the Global Warming Solutions Act of 2006 (“Assembly Bill 32”), a law that establishes a comprehensive program to reduce GHG emissions from all sources throughout the state and contains reporting requirements under which our Dominguez and Martinez facilities currently report. Our Dominguez facility also participates in the emissions trading market established under Assembly Bill 32. Although we believe it is likely that GHG emissions will continue to be regulated in at least some regions of the United States and in other countries (in addition to the European Union) in the future, we cannot yet predict the form such regulation will take (such as a cap-and-trade program, technology mandate, emissions tax or other regulatory mechanism) or, consequently, estimate any costs that we may be required to incur in respect of such requirements, which could, for example, require that we install emissions control equipment, purchase emissions allowances, administer and manage our GHG emissions program or address other regulatory obligations. Such requirements could also adversely affect our energy supply or the costs and types of raw materials that we use for fuel. Accordingly, regulations controlling or limiting GHG emissions could have a material adverse effect on our business, financial condition or results of operations, including by reducing demand for our products.

Production and distribution of our products could be disrupted for a variety of reasons, and such disruptions could expose us to significant losses or liabilities.

Certain of the hazards and risks associated with our manufacturing processes and the related storage and transportation of raw materials, products and wastes may disrupt production at our manufacturing facilities and the distribution of products to our customers. These potentially disruptive risks include, but are not limited to, the following:

- pipeline and storage tank leaks and ruptures;
- explosions and fires;
- inclement weather and natural disasters;
- terrorist attacks;
- failure of mechanical, process safety and pollution control equipment;
- chemical spills and other discharges or releases of toxic or hazardous substances or gases; and
- exposure to toxic chemicals.

These hazards could expose employees, customers, the community and others to toxic chemicals and other hazards, contaminate the environment, damage property, result in personal injury or death, lead to an interruption

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or suspension of operations, damage our reputation and adversely affect the productivity and profitability of a particular manufacturing facility or our business as a whole. Such hazards could also result in the need for remediation, governmental enforcement, regulatory shutdowns, the imposition of government fines and penalties and claims brought by governmental entities or third parties. Legal claims and regulatory actions could subject us to both civil and criminal penalties, which could affect our product sales, reputation and profitability.

If disruptions at our manufacturing facilities or in our distribution channels occur, alternative options with sufficient capacity or capabilities may not be available, may cost substantially more or may require significant time to start production or distribution. Any of these scenarios could negatively affect our business and financial performance. If one of our manufacturing facilities or distribution channels is unable to produce or distribute our products for an extended period of time, our sales may be reduced by the shortfall caused by the disruption and we may not be able to meet our customers' needs, which could cause them to seek other suppliers. Furthermore, to the extent a production disruption occurs at a manufacturing facility that has been operating at or near full capacity, the resulting shortage of our product could be particularly harmful because production at the manufacturing facility may not be able to reach levels achieved prior to the disruption. Such risks are heightened in our refining services product group, which has operations and customers primarily located in the Gulf Coast, which is susceptible to a heightened risk of hurricanes, and Northern California, which is susceptible to a heightened risk of earthquakes.

The insurance that we maintain may not fully cover all potential exposures.

We maintain property, business interruption, casualty and other types of insurance, but such insurance may not cover all risks associated with the operation of our business or our manufacturing process and the related use, storage and transportation of raw materials, products and wastes in or from our manufacturing sites or distribution centers. While we have purchased what we deem to be adequate limits of coverage and broadly worded policies, our coverage is subject to exclusions and limitations, including higher self-insured retentions or deductibles and maximum limits and liabilities covered. Notwithstanding diligent efforts to successfully procure specialty coverage for environmental liability and remediation, we may incur losses beyond the limits or outside the terms of coverage of our insurance policies, including liabilities for environmental remediation. In addition, from time to time, various types of insurance for companies in the industries in which we operate have not been available on commercially acceptable terms or, in some cases, at all. We are potentially at additional risk if one or more of our insurance carriers fail. Additionally, severe disruptions in the domestic and global financial markets could adversely impact the ratings and survival of some insurers. Future downgrades in the ratings of enough insurers could adversely impact both the availability of appropriate insurance coverage and its cost. In the future, we may not be able to obtain coverage at current levels, if at all, and our premiums may increase significantly on coverage that we maintain.

We could be subject to damages based on claims brought against us by our customers or lose customers as a result of the failure of our products to meet certain quality specifications.

Our products provide important performance attributes to our customers' products. If a product fails to perform in a manner consistent with quality specifications, or has a shorter useful life than that which was guaranteed, a customer could seek replacement of the product or damages for costs incurred as a result of the product failing to perform as guaranteed. A successful claim or series of claims against us could cause reputational harm and have a material adverse effect on our financial condition and results of operations and could result in a loss of one or more customers.

We may engage in strategic acquisitions or dispositions of certain assets or businesses that could affect our business, results of operations, financial condition and liquidity.

We may selectively pursue complementary acquisitions, such as the Business Combination, and joint ventures, such as our Zeolyst Joint Venture, each of which inherently involves a number of risks and presents financial, managerial and operational challenges, including:

- potential disruption of our ongoing business and distraction of management;

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- difficulty with integration of personnel and financial and other systems;
- hiring additional management and other critical personnel; and
- increasing the scope, geographic diversity and complexity of our operations.

In addition, we may encounter unforeseen obstacles or costs in the integration of acquired businesses. For example, the presence of one or more material liabilities of an acquired company that are unknown to us at the time of acquisition may have a material adverse effect on our business. Our acquisition and joint venture strategy may not be received positively by customers, and we may not realize any anticipated benefits from acquisitions or joint ventures.

We may also opportunistically pursue dispositions of certain assets and businesses, which may involve material amounts of assets or lines of business, and could adversely affect our results of operations, financial condition and liquidity. If any such dispositions were to occur, under the terms of the agreements governing our outstanding indebtedness, we may be required to apply the proceeds of the sale to repay such indebtedness.

The pro forma and non-GAAP financial information included in this prospectus is presented for informational purposes only and may not be an indication of our financial condition or results of operations in the future.

The unaudited pro forma combined financial information included in this prospectus is presented for informational purposes only and is not necessarily indicative of what our actual financial condition or results of operations would have been had the Business Combination been completed on the date indicated. The assumptions used in preparing the pro forma financial information may not prove to be accurate and other factors may affect our financial condition or results of operations. Accordingly, our financial condition and results of operations in the future may not be consistent with, or evident from, such pro forma financial information. The non-GAAP financial information included in this prospectus includes information that we use to evaluate our past performance, but you should not consider such information in isolation or as an alternative to measures of our performance determined under GAAP. For further information regarding such limitations, see “Summary Historical and Unaudited Pro Forma Financial and Other Data.”

Our joint ventures may not operate according to their business plans if our partners fail to fulfill their obligations or differences in views among our partners results in delayed decisions or failures to agree on major issues, which may adversely affect our results of operations and force us to dedicate additional resources to these joint ventures.

We currently participate in a number of joint ventures and may enter into additional joint ventures in the future. The nature of a joint venture requires us to share control with unaffiliated third parties and we sometimes have joint and several liability with our joint venture partners. If our joint venture partners do not fulfill their obligations, or if differences in views among the joint venture participants results in delayed decisions or failures to agree on major issues, the affected joint venture may not be able to operate according to its business plan. For example, our Zeolyst Joint Venture is structured as a general partnership in which we are equal partners with CRI Zeolites Inc. Accordingly, we do not control the Zeolyst Joint Venture and cannot unilaterally undertake strategies, plans, goals and operations or determine when cash distributions will be made to us. Furthermore, we are liable on a joint and several basis with CRI Zeolites Inc. for all of the partnership’s liabilities if it does not have sufficient assets to satisfy such liabilities. Such factors may adversely affect our results of operation and force us to dedicate additional and unexpected resources to our joint ventures.

Our failure to protect our intellectual property rights could adversely affect our future performance and growth.

Protection of our proprietary processes, methods, compounds and other technologies is important to our business. We depend upon our ability to develop and protect our intellectual property rights to distinguish our

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products from those of our competitors. Failure to protect our existing intellectual property rights may allow our competitors to copy our products and may result in the loss of valuable proprietary technologies or other intellectual property. Failure to protect our innovations and trademarks by securing intellectual property rights could also result in our having to pay other companies for infringing on their intellectual property rights. We rely on a combination of patent, trade secret, trademark and copyright law as well as regulatory and judicial enforcement to protect such technologies and trademarks. In addition, the laws of many foreign countries do not protect our intellectual property rights to the same extent as the laws of the United States. As of June 30, 2017, we owned 47 patented inventions in the United States, with approximately 300 patents issued in countries around the world and approximately 140 patent applications pending worldwide covering more than 25 additional inventions. Some of these patents are licensed to others. In addition, we have acquired certain rights under patents and inventions of others through licenses. Should any of these licenses granted to us by third parties terminate prior to the expiration of the licensed intellectual property, we would need to cease using the licensed intellectual property, and either develop or license alternative technologies. In such a case, there can be no assurance that alternative technologies exist or that we would be able to obtain such a license on favorable terms.

Competitors and third parties may infringe on our patents or violate our intellectual property rights. Defending and enforcing our intellectual property rights can involve litigation and can be expensive and time consuming. Such proceedings could put our patents at risk of being invalidated and confidential information may be disclosed through the discovery process; these costs and diversion of resources could harm our business.

We cannot provide any assurances that any of our pending applications will mature into issued patents, or that any patents that have issued or may issue in the future do or will include claims with a scope sufficient to provide any competitive advantage. Patents involve complex legal and factual questions and, therefore, the issuance, scope, validity and enforceability of any patent claims we have or may obtain cannot be predicted with certainty. Patents may be challenged, deemed unenforceable, invalidated or circumvented. Patents may be challenged in the courts, as well as in various administrative proceedings before the United States Patent and Trademark Office or foreign patent offices. We are currently and may in the future be a party to various adversarial patent office proceedings involving our patents or the patents of third parties. Such challenges can result in some or all of the claims of the challenged patent being invalidated, deemed unenforceable, or interpreted narrowly which, in the case of challenges to our own patents, may be adverse to our interests. Accordingly, the issuance of patents is not conclusive of the validity, scope, or enforceability of such patents. Moreover, even if valid and enforceable, competitors may be able to design around our patents or use pre-existing technologies to compete with us.

We also rely upon unpatented proprietary know-how, continuing technological innovation and other trade secrets to develop and maintain our competitive position, which may not provide us with complete protection against competitors. Misappropriation or unauthorized disclosure of our proprietary know-how could harm our competitive position or have an adverse effect on our business. While it is our policy to enter into confidentiality agreements with our employees and third parties to protect our intellectual property rights and we strive to maintain the physical security of our properties and the security of our IT systems, there can be no assurances that:

- our confidentiality agreements will not be breached;
- our security measures will not be breached;
- such agreements will provide meaningful protection for our trade secrets or proprietary know-how; or
- adequate remedies will be available in the event of an unauthorized use or disclosure of such trade secrets and know-how.

In addition, there can be no assurances that others will not obtain knowledge of these trade secrets through independent development or other access by legal means.

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Measures taken by us to protect these assets and rights may not provide meaningful protection for our trade secrets or proprietary manufacturing expertise and adequate remedies may not be available in the event of an unauthorized use or disclosure of our trade secrets or manufacturing expertise. In addition, as noted above, our patents and other intellectual property rights may be challenged, invalidated, circumvented or rendered unenforceable.

Furthermore, we cannot provide assurance that any pending patent or trademark application filed by us will result in an issued patent or registered trademark or, if patents are issued to us, that those patents will provide meaningful protection against competitors or against competitive technologies. The failure of our patents or other measures to protect our processes, apparatuses, technology, trade secrets and proprietary manufacturing expertise, methods and compounds or trademarks and provide us with freedom to exclude competition could have an adverse effect on our business, financial condition, results of operations and cash flows. See “Business—Intellectual Property.”

Our products may infringe the intellectual property rights of others, which may cause us to incur unexpected costs or prevent us from selling our products.

Our industry is characterized by vigilant pursuit of intellectual property rights, particularly with respect to our silica catalysts and zeolite catalysts product groups. Like us, our competitors rely on intellectual property rights to maintain profitability and competitiveness. As the number of products and competitors has increased, the likelihood of intellectual property disputes has risen. Although it is our policy and intention not to infringe valid patents of which we are aware, our processes, apparatuses, technology, proprietary manufacturing expertise, methods, compounds and products may infringe on issued patents or infringe or misappropriate other intellectual property rights of others. Accordingly, we continually monitor third-party intellectual property to confirm our freedom to operate. Nevertheless, we may be subject to legal proceedings and claims in the ordinary course of our business, including claims of alleged infringement of the patents or trademarks or infringement or misappropriation of other intellectual property rights of third parties by us or our licensees in connection with their use of our products. Intellectual property litigation is expensive and time-consuming, regardless of the merits of any claim, and could divert the attention of our management and technical personnel away from operating our business. If we were to discover that our processes, apparatuses, technology, products or trademarks infringe the valid intellectual property rights of others, we might need to obtain licenses from these parties or substantially reengineer or rebrand our products in order to avoid infringement. We may not be able to obtain the necessary licenses on acceptable terms, or at all, or be able to reengineer our products successfully or at an acceptable cost. Moreover, if we are sued for infringement and lose the suit, we could be required to pay substantial damages and/or be enjoined from using or selling the infringing products or technology or using the infringing trademark. Additionally or alternatively, we may seek to challenge third-party patents in administrative proceedings before the United States patent office or one or more foreign patent offices. Any of the foregoing could cause us to incur significant costs and prevent us from selling our products, which could have an adverse effect on our business, financial condition, results of operations and cash flows. Even if we ultimately prevail, the existence of lawsuits could prompt our customers to switch to alternative products. In addition, we have agreed, and will continue to agree, to indemnify certain customers for certain intellectual property infringement claims related to intellectual property relating to our products and the manufacture thereof. Should there be infringement claims against our licensees, we could be required to indemnify them for losses resulting from such claims or to refund amounts they have paid to us.

Losses and damages in connection with information technology risks could adversely affect our operations.

Our operations materially depend on the reliable performance of a complex, worldwide and highly available information technology infrastructure with integrated processes. The networks and data centers we use are subject to damage by material events such as major disruptions to public infrastructure, including power outages,

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cyber or terrorist attacks, viruses, physical or electronic break-ins and fires. Despite various disaster recovery plans, there can be no assurance that our systems are appropriately redundant and we do not control the operations at the back-up facility we use. Accordingly, such an event could cause material disruptions in our operations.

The broad use of information technology systems has increased the risk of unauthorized access to confidential data, such as customer information, strategic projects, product formulas and other trade secrets, and the risk of destruction or manipulation of material data by employees or third parties. Release of third party confidential information could materially harm our reputation, affect our relationships with such parties and expose us to liability. Although we have introduced many security measures, including firewalls and information technology security policies, we cannot ensure that these measures offer the appropriate level of security. A security breach or other compromise of our information security safeguards could expose our confidential information, including third party confidential information in our possession (such as customer information) to theft and misuse, which could in turn adversely affect our relationships with such third parties and have an adverse effect on our business, financial condition, results of operations and cash flows.

We depend on good relations with our workforce, and any significant disruptions could adversely affect our operations.

As of December 31, 2016, we had 2,949 employees globally, approximately 49% of which were represented by a union, works council or other employee representative body. As of December 31, 2016, approximately 66% of our U.S. unionized employees were covered under collective bargaining agreements that will expire on or before December 31, 2018. Failure to reach agreement with any of our unionized work groups regarding the terms of their collective bargaining agreements or annual pay increases may result in a labor strike, work stoppage or slowdown. In addition, a large number of our employees are employed in countries in which employment laws provide greater bargaining or other rights to employees than the laws of the United States. Such employment rights require us to work collaboratively with the legal representatives of the employees to effect any changes to labor arrangements. For example, many of our employees in Europe are represented by works councils that must approve any changes in conditions of employment, including salaries, benefits and staff changes, and may impede efforts to restructure our workforce. Although we believe that we have a good working relationship with our employees, a strike, work stoppage or slowdown by our employees or a dispute with our employees could result in a significant disruption to our operations or higher ongoing labor costs. In addition, our ability to make adjustments to control compensation and benefits costs, or otherwise adapt to changing business needs, may be limited by the terms and duration of our collective bargaining agreements.

We are subject to certain risks related to litigation filed by or against us, as well as administrative and regulatory proceedings, and adverse results may harm our business.

We cannot predict with certainty the cost of defense, the cost of prosecution or the ultimate outcome of litigation and other administrative and regulatory proceedings filed by or against us, including remedies or damage awards, and adverse results in any litigation or other administrative and regulatory proceedings may materially harm our business. Litigation and other administrative and regulatory proceedings may include, but are not limited to, actions relating to intellectual property, commercial arrangements, environmental, health and safety matters, joint venture agreements, labor and employment matters, domestic and foreign antitrust matters or other harms resulting from the actions of individuals or entities outside of our control. In the case of intellectual property litigation and proceedings, adverse outcomes could include the cancellation, invalidation or other loss of material intellectual property rights used in our business and injunctions prohibiting our use of our processes, apparatuses, technology, trade secrets and proprietary manufacturing expertise, methods and compounds that are subject to third-party patents or other third-party intellectual property rights. Litigation based on environmental matters or exposure to hazardous substances in the workplace or from our products could result in significant liability for us. For example, we are currently subject to various asbestos premises liability claims that relate to employee or contractor exposure to asbestos contained in certain building materials at our sites. Furthermore, our

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international operations expose us to potential administrative and regulatory proceedings in foreign jurisdictions. Antitrust authorities in Brazil have publicly announced that they are investigating alleged cartel activities by Brazilian silicate manufacturers, including our Brazilian subsidiary (“PQ Brazil”). The authorities allege that the activities occurred over an approximately 10-year period beginning in the late 1990s, which is prior to the time we owned PQ Brazil. PQ Brazil is fully cooperating with the authorities. Adverse outcomes in any of the foregoing could have a material adverse effect on our business. See “Business—Legal Proceedings.”

The terms of our indebtedness restrict our current and future operations, particularly our ability to respond to change or to take certain actions.

The indentures governing our outstanding indebtedness contain a number of restrictive covenants that impose significant operating and financial restrictions on us and may limit our ability to engage in acts that may be in our long-term best interest, including restrictions on our ability to incur additional indebtedness, make investments, acquisitions, loans and advances, sell, transfer or otherwise dispose of our assets or incur liens. See “Description of Certain Indebtedness” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Financial Condition, Liquidity and Capital Resources—Debt.” In addition, the restrictive covenants in the agreements governing our senior secured credit facilities require us to maintain specified financial ratios and satisfy other financial condition tests. Our ability to meet these financial ratios and tests can be affected by events beyond our control.

A breach of such covenants could result in an event of default unless we obtain a waiver to avoid such default. If we are unable to obtain a waiver, such a default may allow our creditors to accelerate the related debt and may result in the acceleration of, or default under, any other debt to which a cross-acceleration or cross-default provision applies. In the event our lenders or noteholders accelerate the repayment of our borrowings, we and our subsidiaries may not have sufficient assets to repay that indebtedness.

Because our operations are conducted through our subsidiaries and joint ventures, we are dependent on the receipt of distributions and dividends or other payments from our subsidiaries and joint ventures for cash to fund our operations and expenses, including to make future dividend payments, if any.

Our operations are conducted through our subsidiaries and joint ventures. As a result, our ability to make future dividend payments, if any, is dependent on the earnings of our subsidiaries and joint ventures and the payment of those earnings to us in the form of dividends, loans or advances and through repayment of loans or advances from us. Payments to us by our subsidiaries and joint ventures will be contingent upon our subsidiaries’ or joint ventures’ earnings and other business considerations and may be subject to statutory or contractual restrictions. We do not currently expect to declare or pay dividends on our common stock for the foreseeable future; however, to the extent that we determine in the future to pay dividends on our common stock, the agreements governing our outstanding indebtedness significantly restrict the ability of our subsidiaries to pay dividends or otherwise transfer assets to us.

We may need to recognize impairment charges related to goodwill, identified intangible assets and fixed assets.

We are required to test goodwill and any other intangible asset with an indefinite life for possible impairment on the same date each year and on an interim basis if there are indicators of a possible impairment. We are also required to evaluate indefinite-lived intangible assets and fixed assets for impairment if there are indicators of a possible impairment.

There is significant judgment required in the analysis of a potential impairment of goodwill, identified intangible assets and fixed assets. If, as a result of a general economic slowdown or deterioration in one or more

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of the industries in which we operate or in our financial performance or future outlook, or if the estimated fair value of our long-lived assets decreases, we may determine that one or more of our long-lived assets is impaired. An impairment charge would be determined based on the estimated fair value of the assets and any such impairment charge could have a material adverse effect on our results of operations and financial position.

Our ability to utilize our net operating losses is uncertain.

As of December 31, 2016, we had \$383.2 million of net operating losses for U.S. federal income tax purposes. Our ability to utilize these net operating losses to offset future income tax liabilities depends on our future financial performance and our future taxable income. In addition, our utilization of these net operating losses is currently limited under Section 382 of the Internal Revenue Code of 1986, as amended (the "Code"), impacting our ability to realize the benefits of these net operating losses. If any ownership changes occur within three years of the closing date of the Business Combination among stockholders owning directly or indirectly 5% or more of our common stock and that result in an aggregate ownership change with respect to such stockholders of more than 50% of our common stock, our utilization of these net operating losses and certain built-in losses would be subject to an additional limitation imposed by Section 382 of the Code.

We have unfunded and underfunded pension plan liabilities. We will require current and future operating cash flow to fund these shortfalls. We have no assurance that we will generate sufficient cash flow to satisfy these obligations.

We maintain defined benefit pension plans covering employees who meet age and service requirements. While some of our plans have been frozen, our net pension liability and cost is materially affected by the discount rate used to measure pension obligations, the longevity and actuarial profile of our workforce, the level of plan assets available to fund those obligations and the actual and expected long-term rate of return on plan assets. Significant changes in investment performance or a change in the portfolio mix of invested assets can result in corresponding increases and decreases in the valuation of plan assets, particularly equity securities, or in a change in the expected rate of return on plan assets. Assets available to fund the pension and other postemployment benefit obligations of our plans as of December 31, 2016 were approximately \$285.1 million, or approximately \$86.2 million less than the measured pension benefit obligation on a GAAP basis. In addition, any changes in the discount rate could result in a significant increase or decrease in the valuation of pension obligations, affecting the reported funded status of our pension plans as well as the net periodic pension cost in the following years. Similarly, changes in the expected return on plan assets can result in significant changes in the net periodic pension cost in the following years.

We also contribute to two multi-employer pension plans on behalf of certain of our employees in the United States pursuant to union agreements that generally provide defined benefits to employees covered by collective bargaining agreements. A total of approximately 18 employees currently participate in such multi-employer pension plans. Funding requirements for benefit obligations of multi-employer pension plans are subject to certain regulatory requirements and we may be required to make cash contributions to one of these plans to satisfy certain underfunded benefit obligations. Absent an applicable exemption, a contributor to a U.S. multi-employer plan is liable upon its withdrawal from, or the termination of, a plan for its proportionate share of the plan's underfunding, if any.

We also provide certain health care and life insurance benefits to certain of our employees and their dependents in the United States upon the retirement of such employee from us pursuant to union agreements. Costs of these other post-employment benefit plans are dependent upon numerous factors, assumptions and estimates.

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Risks Related to this Offering and to our Common Stock

CCMP and INEOS will continue to have significant influence over us after this offering, which could limit your ability to influence the outcome of key transactions, including a change of control.

Following completion of this offering, investment funds affiliated with CCMP will beneficially own % of our outstanding common stock (% if the underwriters exercise their option to purchase additional shares in full) and INEOS will beneficially own % of our outstanding common stock (% if the underwriters exercise their option to purchase additional shares in full). For as long as affiliates of CCMP and INEOS continue to beneficially own a substantial percentage of the voting power of our outstanding common stock, they will continue to have significant influence over us. For example, they will be able to strongly influence or effectively control the election of all of the members of our board of directors and our business and affairs, including any determinations with respect to mergers or other business combinations, the acquisition or disposition of assets, the incurrence of additional indebtedness, the issuance of any additional shares of common stock or other equity securities, the repurchase or redemption of shares of our common stock and the payment of dividends.

Additionally, CCMP and INEOS are in the business of making investments in companies and may acquire and hold interests in businesses that compete directly or indirectly with us. CCMP and INEOS may also pursue acquisition opportunities that may be complementary to our business, and, as a result, those acquisition opportunities may not be available to us. See “—Our certificate of incorporation after this offering will contain a provision renouncing our interest and expectancy in certain corporate opportunities, which could adversely impact our business.”

Our stock price could be extremely volatile and, as a result, you may not be able to resell your shares at or above the price you paid for them.

Since our inception, there has not been a public market for our common stock, and an active public market for our common stock may not develop or be sustained following completion of this offering. In addition, the stock market in general has been highly volatile. As a result, the market price of our common stock is likely to be similarly volatile, and investors in our common stock may experience a decrease, which could be substantial, in the value of their stock, including decreases unrelated to our operating performance or prospects, and could lose part or all of their investment. The price of our common stock could be subject to wide fluctuations in response to a number of factors, including those described elsewhere in this prospectus and others such as:

- variations in our operating performance and the performance of our competitors;
- actual or anticipated fluctuations in our quarterly or annual operating results;
- publication of research reports by securities analysts about us, our competitors or our industry;
- our failure or the failure of our competitors to meet analysts’ projections or guidance that we or our competitors may give to the market;
- additions or departures of key personnel;
- strategic decisions by us or our competitors, such as acquisitions, divestitures, spin-offs, joint ventures, strategic investments or changes in business strategy;
- the passage of legislation or other regulatory developments affecting us or our industry;
- changes in legislation, regulation and government policy as a result of the U.S. presidential and congressional elections;
- speculation in the press or investment community;
- changes in accounting principles;

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- terrorist acts, acts of war or periods of widespread civil unrest;
- natural disasters and other calamities; and
- changes in general market and economic conditions.

In addition, broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance, and factors beyond our control may cause our stock price to decline rapidly and unexpectedly. We are exposed to the impact of any global or domestic economic disruption, including any potential impact of the vote by the United Kingdom to exit the European Union, commonly referred to as “Brexit.”

In the past, securities class action litigation has often been initiated against companies following periods of volatility in their stock price. This type of litigation could result in substantial costs and divert our management’s attention and resources, and could also require us to make substantial payments to satisfy judgments or to settle litigation.

If we fail to maintain effective internal control over financial reporting and effective disclosure controls and procedures, we may not be able to accurately report our financial results in a timely manner or prevent fraud, which may adversely affect investor confidence in our company.

We are not currently required to comply with the rules of the Securities and Exchange Commission (the “SEC”) implementing Section 404 of the Sarbanes-Oxley Act and therefore are not required to make a formal assessment of the effectiveness of our internal control over financial reporting for that purpose. Upon becoming a public company, we will be required to comply with the SEC’s rules implementing Sections 302 and 404 of the Sarbanes-Oxley Act, which will require management to certify financial and other information in our quarterly and annual reports and provide an annual management report on the effectiveness of internal control over financial reporting. Although we will be required to disclose changes that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting on a quarterly basis, we will not be required to make our first annual assessment of our internal control over financial reporting pursuant to Section 404 until our second annual report required to be filed with the SEC.

To comply with the requirements of being a public company, we may need to undertake various actions, to develop, implement and test additional processes and other controls. Testing and maintaining internal controls can divert our management’s attention from other matters related to the operation of our business. In addition, when evaluating our internal control over financial reporting, we may identify material weaknesses that we may not be able to remediate resulting in our management being unable to assert that our internal control over financial reporting is effective.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim consolidated financial statements will not be prevented or detected on a timely basis.

As a private company, we identified a material weakness related to our control environment that was the result of the fact that Eco had insufficient resources and financial expertise to effectively carry out the accounting functions for its business. This identified material weakness contributed to control deficiencies in legacy Eco’s internal control over financial reporting that originated prior to the Business Combination. These deficiencies related to: (i) the inadequate design of controls to review the transactions within Eco’s account for goods received, but not invoiced, for appropriateness at period end which resulted in misstatements to cost of goods sold and property, plant and equipment and (ii) the inadequate design of appropriate controls to account for fair value adjustments to property, plant, and equipment, which resulted in misstatements to depreciation expense following the Business Combination. These control deficiencies were considered to be material weaknesses because they could have resulted in a misstatement of the aforementioned account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected.

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We have implemented improved processes and internal controls through integration with PQ Group Holdings processes and upgrading the organizational design and personnel performing the processes and controls specific to the Eco business unit. These control deficiencies were unremediated as of December 31, 2016 as the controls that we designed after the Business Combination to address these control deficiencies had not been operating for a sufficient amount of time to conclude that they had been remediated. We have completed further testing of these corrective actions and believe that the remediation activities were sufficient to remediate the previously existing material weaknesses as of March 31, 2017.

We cannot provide assurance that additional material weaknesses or control deficiencies will not occur in the future. If we identify additional material weaknesses in our internal control over financial reporting or are unable to comply with the requirements of Section 404 in a timely manner or assert that our internal control over financial reporting is effective, or if our independent registered public accounting firm is unable to express an unqualified opinion as to the effectiveness of our internal control over financial reporting in future periods, investors may lose confidence in the accuracy and completeness of our financial reports and the market price of our common stock could be negatively affected.

Your percentage ownership in us may be diluted by future issuances of capital stock, which could reduce your influence over matters on which stockholders vote.

Following completion of this offering, our board of directors has the authority, without action or vote of our stockholders, to issue all or any part of our authorized but unissued shares of common stock, including shares issuable upon exercise of options, or shares of our authorized but unissued preferred stock. Issuances of common stock or voting preferred stock would reduce your influence over matters on which our stockholders vote and, in the case of issuances of preferred stock, would likely result in your interest in us being subject to the prior rights of holders of that preferred stock.

There may be sales of a substantial amount of our common stock after this offering by our current stockholders, and these sales could cause the price of our common stock to fall.

Following completion of this offering, there will be _____ shares of our common stock outstanding. Of our issued and outstanding shares, all of the common stock sold in this offering will be freely transferable, except for any shares held by our “affiliates,” as that term is defined in Rule 144 under the Securities Act of 1933, as amended (the “Securities Act”). Following completion of this offering, approximately % and % of our outstanding common stock (or approximately % and % if the underwriters exercise their option to purchase additional shares in full) will be held by affiliates of CCMP and by INEOS, respectively.

Each of our officers and directors and certain holders of our common stock have entered into a lock-up agreement with Morgan Stanley & Co. LLC and Goldman Sachs & Co. LLC, as representatives of the underwriters, which regulates their sales of our common stock for a period of 180 days after the date of this prospectus, subject to certain exceptions. Morgan Stanley & Co. LLC and Goldman Sachs & Co. LLC may, in their sole discretion, release all or some portion of the shares subject to lock-up agreements at any time and for any reason. See “Shares Eligible for Future Sale—Lock-Up Agreements.”

Sales of substantial amounts of our common stock in the public market after this offering, the perception that such sales will occur, or early release of these lock-up agreements could adversely affect the market price of our common stock and make it difficult for us to raise funds through securities offerings in the future. Of the shares of our common stock to be outstanding following completion of this offering, the shares offered by this prospectus will be eligible for immediate sale in the public market without restriction by persons other than our affiliates. Our remaining outstanding shares will become available for resale in the public market as shown in the chart below, subject to the provisions of Rule 144 and Rule 701.

Number of Shares

Date Available for Resale

180 days after this offering (_____, 2018)
subject to certain exceptions

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Beginning 180 days after this offering, subject to certain exceptions, investment funds affiliated with CCMP may require us to register shares of our common stock held by them for resale under the federal securities laws, subject to reduction upon the request of the underwriter of the offering, if any. See “Certain Relationships and Related Party Transactions—Amended and Restated Stockholders Agreement.” Registration of those shares would allow the investment funds affiliated with CCMP to immediately resell their shares in the public market. Any such sales or anticipation thereof could cause the market price of our common stock to decline.

In addition, following completion of this offering, we intend to register shares of our common stock that we expect to issue pursuant to the 2017 Plan. For more information, see “Shares Eligible for Future Sale—Registration Statements on Form S-8.”

Provisions in our charter documents after this offering and Delaware law may deter takeover efforts that you feel would be beneficial to stockholder value.

In addition to investment funds affiliated with CCMP’s and INEOS’s beneficial ownership of a substantial percentage of our common stock, provisions in our certificate of incorporation and bylaws after this offering and Delaware law could make it harder for a third party to acquire us, even if doing so might be beneficial to our stockholders. These provisions include a classified board of directors and the ability of our board of directors to issue preferred stock without stockholder approval that could be used to dilute a potential hostile acquirer. Our certificate of incorporation will also impose some restrictions on mergers and other business combinations between us and any holder of 15% or more of our outstanding common stock other than investment funds affiliated with CCMP. As a result, you may lose your ability to sell your stock for a price in excess of the prevailing market price due to these protective measures, and efforts by stockholders to change the direction or management of the company may be unsuccessful. See “Description of Capital Stock—Anti-Takeover Effects of our Certificate of Incorporation and Bylaws.”

Our certificate of incorporation after this offering will designate courts in the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could limit our stockholders’ ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our certificate of incorporation will provide that, subject to limited exceptions, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for:

- any derivative action or proceeding brought on our behalf;
- any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders;
- any action asserting a claim against us arising pursuant to any provision of the General Corporation Law of the State of Delaware, our certificate of incorporation or our bylaws;
- any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or
- any other action asserting a claim against us that is governed by the internal affairs doctrine (each, a “Covered Proceeding”).

In addition, our certificate of incorporation will provide that if any action the subject matter of which is a Covered Proceeding is filed in a court other than the specified Delaware courts without the approval of our board of directors (each, a “Foreign Action”), the claiming party will be deemed to have consented to (i) the personal jurisdiction of the specified Delaware courts in connection with any action brought in any such courts to enforce the exclusive forum provision described above and (ii) having service of process made upon such claiming party in any such enforcement action by service upon such claiming party’s counsel in the Foreign Action as agent for such claiming party.

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Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to these provisions. These provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and employees. Alternatively, if a court were to find these provisions of our certificate of incorporation inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial condition.

If you purchase shares in this offering, you will suffer immediate and substantial dilution.

If you purchase shares of our common stock in this offering, you will incur immediate and substantial dilution in the pro forma book value of your stock of \$ per share as of June 30, 2017 based on an assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, because the price that you pay will be substantially greater than the net tangible book value per share of the shares you acquire. You will experience additional dilution upon the exercise of options to purchase shares of our common stock, including those options currently outstanding and those granted in the future, and the issuance of restricted stock or other equity awards under our stock incentive plans. To the extent we raise additional capital by issuing equity securities, our stockholders will experience substantial additional dilution. See "Dilution."

Our certificate of incorporation after this offering will contain a provision renouncing our interest and expectancy in certain corporate opportunities, which could adversely impact our business.

Each of CCMP and INEOS, and the members of our board of directors who are affiliated with CCMP and INEOS, by the terms of our certificate of incorporation, will not be required to offer us any corporate opportunity of which they become aware and can take any such corporate opportunity for themselves or offer it to other companies in which they have an investment. We, by the terms of our certificate of incorporation, will expressly renounce any interest or expectancy in any such corporate opportunity to the extent permitted under applicable law, even if the opportunity is one that we or our subsidiaries might reasonably have pursued or had the ability or desire to pursue if granted the opportunity to do so. Our certificate of incorporation will not be able to be amended to eliminate our renunciation of any such corporate opportunity arising prior to the date of any such amendment.

CCMP and INEOS are in the business of making investments in companies and may from time to time acquire and hold interests in businesses that compete directly or indirectly with us. These potential conflicts of interest could have a material adverse effect on our business, financial condition, results of operations or prospects if CCMP or INEOS allocate attractive corporate opportunities to themselves or their affiliates instead of to us.

There is no existing market for our common stock and we do not know if one will develop to provide you with adequate liquidity to sell our common stock at prices equal to or greater than the price you paid in this offering.

Prior to this offering, there has not been a public market for our common stock. We cannot predict the extent to which an active trading market on the New York Stock Exchange will develop. If an active trading market does not develop, you may have difficulty selling any of our common stock that you buy. The initial public offering price for our common stock will be determined by negotiations between us and the representative of the underwriters and may not be indicative of prices that will prevail in the open market following this offering. Consequently, you may not be able to sell our common stock at prices equal to or greater than the price you paid in this offering, or at all.

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As a public company, we will become subject to additional laws, regulations and stock exchange listing standards, which will impose additional costs on us and may strain our resources and divert our management's attention.

Prior to this offering, we operated on a private basis. After this offering, we will be subject to the reporting requirements of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, the listing requirements of the New York Stock Exchange and other applicable securities laws and regulations. Compliance with these laws and regulations will increase our legal and financial compliance costs and make some activities more difficult, time-consuming or costly, which may strain our resources or divert management's attention.

Regulations related to conflict minerals could adversely impact our business.

The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 contains provisions to improve transparency and accountability concerning the supply of certain minerals, known as conflict minerals, originating from the Democratic Republic of Congo (the "DRC") and adjoining countries. The SEC requires annual disclosure and reporting requirements for those companies who use conflict minerals mined from the DRC and adjoining countries in their products. These reporting requirements, first applicable to us in 2019, will require us to conduct due diligence to comply with such requirements. There will be costs associated with complying with these disclosure requirements, including for diligence to determine the sources of conflict minerals used in our products and other potential changes to products, processes or sources of supply as a consequence of such verification activities. These rules could adversely affect the sourcing, supply and pricing of materials used in our products. As there may be only a limited number of suppliers offering "conflict free" conflict minerals, we cannot be sure that we will be able to obtain necessary conflict minerals from such suppliers in sufficient quantities or at competitive prices.

Our management has broad discretion in the use of the net proceeds from this offering and may not use the net proceeds effectively.

We intend to use the net proceeds from this offering primarily to repay a portion of our indebtedness. Our management will have broad discretion in the application of the remaining net proceeds of this offering, if any. We cannot specify with certainty the additional uses to which we will apply any remaining net proceeds that we receive from this offering. Accordingly, you will be relying on the judgment of our management with regard to the use of such net proceeds, and you will not have the opportunity as part of your investment decision to assess whether the proceeds are being used appropriately. You may not agree with how the proceeds are used. It is possible that the proceeds will be invested in a way that does not yield a favorable, or any, return for the company. The failure by our management to apply these funds effectively could adversely affect our ability to continue to maintain and expand our business.

Because we have no current plans to pay cash dividends on our common stock for the foreseeable future, you may not receive any return on investment unless you sell your common stock for a price greater than that which you paid for it.

We may retain future earnings, if any, for future operations, expansion and debt repayment and have no current plans to pay any cash dividends for the foreseeable future. Any decision to declare and pay dividends in the future will be made at the discretion of our board of directors and will depend on, among other things, our results of operations, financial condition, cash requirements, contractual restrictions and other factors that our board of directors may deem relevant. In addition, our ability to pay dividends may be limited by covenants of any existing and future outstanding indebtedness we or our subsidiaries incur, including our credit facilities and outstanding notes. See "—Because our operations are conducted through our subsidiaries and joint ventures, we are dependent on the receipt of distributions and dividends or other payments from our subsidiaries and joint ventures for cash to fund our operations and expenses, including to make future dividend payments, if any." As a result, you may not receive any return on an investment in our common stock unless you sell your common stock for a price greater than that which you paid for it.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, including the sections entitled “Prospectus Summary,” “Risk Factors,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” “Business” and “Industry,” contains forward-looking statements. All statements other than statements of historical facts contained in this prospectus, including statements regarding our future results of operations and financial position, business strategy and plans and our objectives for future operations, are forward-looking statements. The words “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “intend,” “expect,” “should” and similar expressions are intended to identify forward-looking statements. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our financial condition, results of operations, business strategy, short- and long-term business operations and objectives, and financial needs. Examples of forward-looking statements include, but are not limited to, statements we make regarding our liquidity, including our belief that our current level of operations, cash and cash equivalents, cash flow from operations and borrowings under our credit facilities and other lines of credit will provide us adequate cash to fund the working capital, capital expenditure, debt service and other requirements for our business for the foreseeable future. These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those described in “Risk Factors.” Moreover, we operate in a very competitive and rapidly changing environment and new risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this prospectus may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

Some of the key factors that could cause actual results to differ from our expectations include risks related to:

- our exposure to local business risks and regulations in different countries;
- general economic conditions;
- exchange rate fluctuations;
- legal and regulatory compliance;
- technological or other changes in our customers’ products;
- our and our competitors’ research and development;
- fluctuations in prices of raw materials and relationships with our key suppliers;
- substantial competition;
- non-payment or non-performance by our customers;
- reliance on a small number of customers;
- potential early termination or non-renewal of customer contracts in our refining services product group;
- reductions in highway safety spending;
- seasonal fluctuations in demand for some of our products;
- retention of certain key personnel;
- our expansion projects;
- potential product liability claims;
- existing and potential future government regulation;

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- the extensive environmental, health and safety regulations to which we are subject;
- disruption of production and distribution of our products;
- our insurance coverage;
- product quality;
- our acquisition strategy;
- our joint venture investments;
- our failure to protect our intellectual property and infringement on the intellectual property rights of third parties;
- information technology risks;
- potential labor disruptions;
- litigation and other administrative and regulatory proceedings;
- our substantial indebtedness; and
- other factors that are described in “Risk Factors.”

The forward-looking statements included in this prospectus are made only as of the date hereof. You should not rely upon forward-looking statements as predictions of future events. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee that the future results, levels of activity, performance or events and circumstances reflected in the forward-looking statements will be achieved or occur. Moreover, neither we nor any other person assumes responsibility for the accuracy and completeness of the forward-looking statements. We undertake no obligation to update publicly any forward-looking statements for any reason after the date of this prospectus to conform these statements to actual results or to changes in our expectations.

You should read this prospectus with the understanding that our actual future results, levels of activity, performance and events and circumstances may be materially different from what we expect.

THE RECLASSIFICATION

In connection with this offering, on _____, 2017, we reclassified our Class A common stock into common stock and then effected a _____-for-1 split of our common stock. Following the reclassification of our Class A common stock, we had two classes of common stock outstanding, common stock and Class B common stock. The Class B common stock was identical to the Class A common stock, except that the Class B common stock was convertible into shares of our common stock as described below, and each share of Class B common stock was entitled to a preferential payment upon any liquidating distribution by us to holders of our capital stock, whether by dividend, distribution or otherwise, equal to the unreturned paid-in-capital amount for such share (\$ _____). After payment of this preference amount, each share of common stock and Class B common stock shared equally in all distributions by us to holders of our common stock.

Immediately prior to this offering, we will convert each outstanding share of our Class B common stock into approximately _____ shares of our common stock plus an additional number of shares of our common stock determined by dividing the unreturned paid-in capital amount of such share of Class B common stock, or \$ _____ per share, by the initial public offering price of a share of our common stock in this offering, rounded to the nearest whole share. Holders of our Class B common stock will not receive any cash payments from us in connection with the conversion of the Class B common stock.

References to the “Reclassification” throughout this prospectus refer to the reclassification of our Class A common stock into our common stock, the _____-for-1 split of our common stock and the conversion of our Class B common stock into our common stock.

Assuming an initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus, _____ shares of common stock will be outstanding immediately after the Reclassification but before this offering. The actual number of shares of our common stock that will be issued as a result of the Reclassification is subject to change based on the actual initial public offering price. See “Description of Capital Stock.”

Because the number of shares of common stock into which a share of our Class B common stock is convertible will be determined by reference to the initial public offering price in this offering, a change in the initial public offering price would have a corresponding impact on the number of outstanding shares of our common stock presented in this prospectus after giving effect to this offering. The following number of shares of our common stock would be outstanding immediately after the Reclassification but before this offering, assuming the initial public offering prices for our common stock shown below.

	\$	\$	\$	\$	\$
Class B conversion factor					
Shares outstanding ⁽¹⁾					

- (1) For additional information regarding the impact of a change in the initial public offering price on the number of shares outstanding after giving effect to this offering, see Note _____ to our unaudited pro forma consolidated financial statements included under “Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings.”

USE OF PROCEEDS

We estimate that the net proceeds we will receive from the sale of the shares of our common stock in this offering, after deducting underwriting discounts and commissions and estimated expenses payable by us, will be approximately \$ million (or \$ million if the underwriters exercise their option to purchase additional shares in full). This estimate assumes an initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus.

We intend to use the net proceeds from this offering to redeem approximately \$ million in aggregate principal amount of PQ Corporation's Floating Rate Senior Unsecured Notes due 2022 (the "Floating Rate Senior Unsecured Notes"), including accrued and unpaid interest and applicable redemption premiums, and the remaining net proceeds, if any, for general corporate purposes. As of June 30, 2017, there was \$525.0 million aggregate principal amount of Floating Rate Senior Unsecured Notes outstanding and approximately \$0.4 million of accrued and unpaid interest. The Floating Rate Senior Unsecured Notes bear interest at an annual rate equal to the three-month LIBOR plus 10.75%, with a 1% LIBOR floor, and mature on May 1, 2022, provided that if PQ Corporation's 8.5% Senior Notes due 2022 have been refinanced or otherwise repaid prior to such date, the Floating Rate Senior Unsecured Notes will instead mature on May 1, 2023. Up to 50% of the Floating Rate Senior Unsecured Notes may be redeemed at a price equal to 106% of the principal amount thereof plus accrued and unpaid interest using the net proceeds from this offering and the remaining 50% may be redeemed at a price equal to 100% of the principal amount thereof, plus accrued and unpaid interest, plus a "make whole" premium of %, calculated assuming a redemption date of , 2017. For additional information regarding the Floating Rate Senior Unsecured Notes, see "Description of Certain Indebtedness."

A \$1.00 increase (decrease) in the assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, would increase (decrease) the net proceeds to us from this offering by approximately \$ million (or approximately \$ million if the underwriters exercise their option to purchase additional shares in full), assuming the number of shares offered by us, as set forth on the cover of this prospectus, remains the same and after deducting underwriting discounts and commissions and estimated expenses payable by us. An increase (decrease) of 1.0 million in the number of shares offered by us in this offering would increase (decrease) the net proceeds to us from this offering by approximately \$ million (or approximately \$ million if the underwriters exercise their option to purchase additional shares in full), assuming the initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, remains the same and after deducting underwriting discounts and commissions and estimated expenses payable by us. In the event the net proceeds to us from this offering are lower than the assumed amount, the amount of Floating Rate Senior Unsecured Notes that we intend to redeem would change by a corresponding amount. The information above is illustrative only and will change based on the actual initial public offering price and other terms of this offering determined at pricing.

DIVIDEND POLICY

Our board of directors does not currently intend to pay regular dividends on our common stock. However, we expect to reevaluate our dividend policy on a regular basis following this offering and may, subject to compliance with the covenants contained in the agreements governing our credit facilities, the indentures governing our outstanding notes, applicable law and other considerations, determine to pay dividends in the future. See “Description of Certain Indebtedness.”

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CAPITALIZATION

The following table sets forth our cash and cash equivalents and our capitalization as of June 30, 2017 on (1) an actual basis and (2) an as adjusted basis to give effect to (i) the Reclassification that will be completed immediately prior to this offering, as described under “The Reclassification,” as if it had occurred on June 30, 2017 and based on an assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, and (ii) the sale by us of shares of our common stock in this offering, assuming no exercise of the underwriters’ option to purchase additional shares, at an assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, and the application of the net proceeds therefrom, as described under “Use of Proceeds,” after deducting estimated underwriting discounts and commissions and estimated expenses payable by us.

The following table should be read in conjunction with “The Reclassification,” “Use of Proceeds,” “Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings,” “Selected Consolidated Financial Data of PQ Group Holdings,” “Supplemental Selected Consolidated Financial Data of Legacy PQ,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and the related notes included elsewhere in this prospectus.

	As of June 30, 2017	
	Actual	As Adjusted(1)
	(in thousands)	
Cash and cash equivalents	\$ 50,457	\$
Debt:		
Senior secured U.S. dollar denominated term loan facility	\$ 920,792	\$
Senior secured Euro denominated term loan facility	321,752	
6.75% Senior Secured Notes due 2022	625,000	
Floating Rate Senior Unsecured Notes due 2022	525,000	
8.5% Senior Notes due 2022	200,000	
ABL revolving credit facility	65,000	
Other	70,944	
Total debt	2,728,488	
Stockholder’s Equity:		
Class A common stock, \$0.01 par value per share, 160,500,000 shares authorized, 627,251 shares issued and 625,172 shares outstanding on an actual basis; no shares authorized, issued or outstanding on an as adjusted basis	6	
Class B common stock, \$0.01 par value per share, 30,000,000 shares authorized, 6,727,685 shares issued and 6,711,756 shares outstanding on an actual basis; no shares authorized, issued or outstanding on an as adjusted basis	67	
Common stock, \$0.01 par value per share; no shares authorized, issued or outstanding on an actual basis; shares authorized and shares issued and outstanding on an as adjusted basis	—	
Preferred stock, \$0.01 par value per share, 1,500,000 shares authorized and no shares issued and outstanding on an actual basis; shares authorized and no shares issued or outstanding on an as adjusted basis	—	
Additional paid-in capital	1,169,965	
Accumulated deficit	(94,443)	
Treasury stock, at cost	(239)	
Accumulated other comprehensive loss	(15,798)	
Total stockholders’ equity	1,059,558	
Noncontrolling interest	4,858	
Total capitalization	\$3,792,904	\$

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- (1) A \$1.00 increase (decrease) in the assumed initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, would increase (decrease) the net proceeds to us from this offering by approximately \$ million (or approximately \$ million if the underwriters exercise their option to purchase additional shares in full), assuming the number of shares offered by us, as set forth on the cover of this prospectus, remains the same and after deducting underwriting discounts and commissions and estimated expenses payable by us. An increase (decrease) of 1.0 million in the number of shares offered by us in this offering would increase (decrease) the net proceeds to us from this offering by approximately \$ million (or approximately \$ million if the underwriters exercise their option to purchase additional shares in full), assuming the initial public offering price of \$ per share, which is the midpoint of the price range set forth on the cover of this prospectus, remains the same and after deducting underwriting discounts and commissions and estimated expenses payable by us. In the event the net proceeds to us from this offering are lower than the assumed amount, the amount of Floating Rate Senior Unsecured Notes that we intend to redeem would change by a corresponding amount. See “Use of Proceeds.”

DILUTION

If you invest in our common stock, your ownership interest will be immediately diluted to the extent of the difference between the initial public offering price per share of our common stock and the net tangible book value per share of our common stock after this offering. Dilution results from the fact that the initial public offering price per share of the common stock is substantially in excess of the book value per share of our common stock attributable to the existing stockholders for the presently outstanding shares of common stock. We calculate net tangible book value per share of our common stock by dividing the net tangible book value (total consolidated tangible assets less total consolidated liabilities) by the number of outstanding shares of our common stock.

Our net tangible book value at June 30, 2017 was approximately \$(1,039.1) million, or \$ _____ per share of our common stock after giving effect to the Reclassification but before giving effect to this offering. Pro forma net tangible book value per share before this offering has been determined by dividing net tangible book value by the number of shares of common stock outstanding at June 30, 2017, assuming the Reclassification had taken place on June 30, 2017. Dilution in net tangible book value per share represents the difference between the amount per share that you pay in this offering and the net tangible book value per share immediately after this offering.

After giving effect to the receipt of the estimated net proceeds from our sale of shares in this offering, assuming an initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus, and the application of the estimated net proceeds therefrom as described under "Use of Proceeds," our pro forma net tangible book value at June 30, 2017 would have been approximately \$ _____ million, or \$ _____ per share of our common stock. This represents an immediate increase in net tangible book value per share of \$ _____ to existing stockholders and an immediate decrease in net tangible book value per share of \$ _____ to you. The following table illustrates this dilution per share.

	\$
Assumed initial public offering price per share	
Pro forma net tangible book value per share at June 30, 2017	\$
Increase per share attributable to new investors in this offering	_____
Pro forma net tangible book value per share after this offering	_____
Dilution per share to new investors	\$ _____

If the underwriters exercise their option to purchase additional shares in full, the pro forma net tangible book value per share after giving effect to this offering would be \$ _____ per share of our common stock. This represents an increase in pro forma net tangible book value of \$ _____ per share to existing stockholders and dilution in pro forma net tangible book value of \$ _____ per share of our common stock to you.

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A \$1.00 increase (decrease) in the assumed initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus, would increase (decrease) our pro forma net tangible book value after giving effect to this offering by \$ _____ million, or by \$ _____ per share, assuming no change to the number of shares of our common stock offered by us as set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated expenses payable by us. Because the number of shares of our common stock into which a share of our Class B common stock is convertible will be determined by reference to the initial public offering price in this offering, a change in the initial public offering price would also have a corresponding impact on our pro forma net tangible book value per share of our common stock. Our pro forma net tangible book value per share of our common stock would have been the following at June 30, 2017, assuming the initial public offering prices for our common stock shown below:

\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
\$ _____	\$ _____	\$ _____	\$ _____	\$ _____

The following table sets forth, as of June 30, 2017, the number of shares of our common stock purchased from us, the total consideration paid to us and the average price per share paid by existing stockholders and to be paid by new investors purchasing shares in this offering, before deducting underwriting discounts and commissions and estimated offering expenses payable by us.

	Shares Purchased		Total Consideration		Average Price
	Number	Percent	Amount	Percent	Per Share
Existing stockholders ⁽¹⁾		%	\$ _____	%	\$ _____
New investors					
Total		100%		100%	\$ _____

(1) The number of shares purchased by existing stockholders is determined as follows:

Class B shares issued and outstanding as of June 30, 2017	_____
Less: Class B treasury shares as of June 30, 2017	_____
Net Class B shares outstanding as of June 30, 2017	_____
Class B conversion factor ^(a)	_____
Converted net Class B shares as of June 30, 2017	_____
Common shares issued and outstanding as of June 30, 2017	_____
Less: Common treasury shares as of June 30, 2017	_____
Total common shares purchased by existing stockholders	_____

(a) See “The Reclassification” for a computation of the Class B conversion factor.

Because the number of shares of our common stock into which a share of our Class B common stock is convertible will be determined by reference to the initial public offering price in this offering, a change in the initial public offering price would have a corresponding impact on the number of shares purchased by existing stockholders. The number of shares purchased by existing stockholders would have been the following as of June 30, 2017, assuming the initial public offering prices for our common stock shown below:

Class B conversion factor	\$ _____	\$ _____	\$ _____	\$ _____	\$ _____
Shares purchased by existing stockholders					
Percent of total shares purchased by existing stockholders					

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If the underwriters were to exercise their option to purchase additional shares in full, the percentage of shares of our common stock held by existing stockholders would be %, and the percentage of shares of our common stock held by new investors would be %.

To the extent any outstanding options or other equity awards are exercised or become vested or any additional options or other equity awards are granted and exercised or become vested or other issuances of our common stock are made, there may be further economic dilution to new investors.

**UNAUDITED PRO FORMA CONDENSED COMBINED FINANCIAL INFORMATION
OF PQ GROUP HOLDINGS**

The unaudited pro forma combined financial information for the year ended December 31, 2016 presented below was derived from our audited financial statements, which are included elsewhere in this prospectus.

On May 4, 2016, we consummated the Business Combination to reorganize and combine the businesses of legacy PQ and legacy Eco under a new holding company, PQ Group Holdings. Investment funds affiliated with CCMP held a controlling interest in legacy Eco prior to the Business Combination. Legacy Eco is treated as the acquirer in the Business Combination and the predecessor to PQ Group Holdings for accounting purposes.

The unaudited pro forma combined financial information includes our historical results of operations and the results of operations of legacy PQ, after giving pro forma effect to the following as if they had occurred on January 1, 2015:

- the Business Combination and the related financing transactions;
- the retroactive application of the reclassification of our Class A common stock into our common stock, the -for-1 split of our common stock and the conversion of our Class B common stock into our common stock;
- the issuance of shares of common stock in this offering; and
- the use of the net proceeds from this offering to repay \$ million of outstanding indebtedness as described in “Use of Proceeds.”

The unaudited pro forma combined financial information has been prepared from, and should be read in conjunction with, the respective historical consolidated financial statements and related notes of PQ Group Holdings and legacy PQ appearing elsewhere in this prospectus. See also “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

We describe the assumptions underlying the pro forma adjustments in the accompanying notes, which should be read in conjunction with this unaudited pro forma combined financial information. The unaudited pro forma adjustments are based upon available information and assumptions that we believe are factually supportable, directly attributable to the Business Combination and the related financing transactions, and with respect to the statement of operations, expected to have a continuing impact on our business, and that we believe are reasonable under the circumstances. The unaudited pro forma combined statement of operations is not intended to represent what our results of operations would have been if the Business Combination and related financing transactions had occurred on January 1, 2015 or to project our results of operations for any future period. The unaudited pro forma combined statement of operations may not be comparable to, or indicative of, future performance.

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UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands, except per share data)

	<u>PQ Group Holdings Inc.</u>	<u>PQ Holdings Inc.</u>		<u>Pro Forma Adjusted</u>	<u>Pro Forma Combined</u>
	<u>Year ended December 31, 2016</u>	<u>Period from January 1, 2016 through May 3, 2016</u>			
Sales	\$ 1,064,177	\$ 339,420	\$ (556) ⁽¹⁾		\$1,403,041
Cost of goods sold	810,085	248,842	(21,818) ⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾		1,037,109
Gross profit	254,092	90,578	21,262		365,932
Selling, general and administrative expenses	107,601	39,404	(1,964) ⁽⁵⁾		145,041
Other operating expense, net	62,301	13,565	(894) ⁽⁶⁾⁽⁷⁾		74,972
Operating income	84,190	37,609	24,120		145,919
Equity in net loss (income) from affiliated companies	2,612	(8,078)	(29,744) ⁽⁸⁾		(35,210)
Interest expense	140,315	37,310	10,320 ⁽⁹⁾		187,945
Debt extinguishment costs	13,782	40,153	(52,142) ⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾		1,793
Other expense (income), net	(3,402)	(5,467)	—		(8,869)
Income (loss) before income taxes and noncontrolling interest	(69,117)	(26,309)	95,686		260
Provision for income taxes	10,041	11,391	36,535 ⁽¹³⁾		57,967
Net (loss) income	(79,158)	(37,700)	59,151		(57,707)
Less: Net income attributable to the noncontrolling interest	588	637	—		1,225
Net (loss) income attributable to the Combined Business	<u>\$ (79,746)</u>	<u>\$ (38,337)</u>	<u>\$ 59,151</u>		<u>\$ (58,932)</u>
<u>Class B shares⁽¹⁴⁾</u>					
Net (loss) per share, basic and diluted	—	—	—		—
Weighted average shares outstanding, basic and diluted	—	—	—		4,947,982
<u>Class A shares⁽¹⁴⁾</u>					
Net (loss) per share, basic and diluted	—	—	—		\$ (137.03)
Weighted average shares outstanding, basic and diluted	—	—	—		430,051

NOTES TO THE UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands)

- (1) Represents the elimination of \$556 in intercompany sales and related cost of goods sold between PQ Holdings and the company during the period from January 1, 2016 through May 3, 2016.
- (2) Represents the depreciation expense associated with the step-up of fixed assets of \$19,903, less the adjustment of previously recognized depreciation recorded by legacy PQ of \$18,902, for the pre-Business Combination period from January 1, 2016 through May 3, 2016. Depreciation expense related to property, plant and equipment is calculated on a straight-line basis over the estimated useful lives of the assets, ranging from three to thirty-three years. Depreciation expense related to leasehold improvements is calculated on a straight-line basis over the shorter of the useful life of the improvement or remaining lease term.
- (3) Represents the amortization expense associated with the step-up of certain intangible assets of \$4,949 for the pre-Business Combination period from January 1, 2016 through May 3, 2016, less the adjustment of previously recognized amortization recorded by PQ Holdings of \$1,528. Amortization expense is calculated on a straight-line basis over the estimated useful lives of the intangible assets, ranging from five to twenty years.
- (4) Represents the adjustment of previously recognized, non-recurring amortization expense associated with the step-up in fair value of inventory of \$25,684 for the year ended December 31, 2016.

Below is a summary of adjustments (1), (2), (3), and (4) outlined above to cost of goods sold to arrive at the net adjustment recorded in the pro forma statement of operations:

Category	Adjustment
Adjustments that increase cost of goods sold	
(2) Depreciation expense related to the step-up in fair value of property, plant and equipment	\$ 19,903
(3) Amortization expense related to the step-up in fair value of definite-lived intangible assets	4,949
	<u>24,852</u>
Adjustments that decrease cost of goods sold	
(1) Removal of cost of goods sold related to intercompany sales	(556)
(2) Removal of previously recognized depreciation expense recorded by PQ Holdings	(18,902)
(3) Removal of previously recognized amortization expense recorded by PQ Holdings	(1,528)
(4) Removal of the one-time charge related to the step-up in fair value of inventory	(25,684)
	<u>(46,670)</u>
Reduction in cost of goods sold	<u>\$ (21,818)</u>

Below is a summary of the assumptions used to calculate the depreciation expense related to the step-up in fair value of property, plant and equipment and the amortization expense related to the step-up in fair value of definite-lived intangible assets:

Asset Class	Fair Value	Estimated Useful Life	Depreciation Adjustment to Cost of Goods Sold
Land	\$ 101,337	Indefinite	\$ —
Buildings	112,041	15 to 33 years	3,202
Machinery and equipment	338,766	3 to 10 years	16,701
Construction in progress	131,529		—
	<u>\$ 683,673</u>		<u>\$ 19,903</u>

NOTES TO THE UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands)

	Amount	Weighted-Average Expected Useful Life (in years)	Amortization Adjustment to Cost of Goods Sold
Intangible assets subject to amortization:			
Trademarks	\$ 35,400	15	\$ —
Technical know-how	189,300	20	3,120
Contracts	19,800	5.3	1,829
Customer relationships	268,700	10.6	—
In-process research and development	6,800		—
Total intangible assets subject to amortization	520,000		4,949
Tradenames, not subject to amortization	151,100	Indefinite	—
Trademarks, not subject to amortization	82,900	Indefinite	—
Total	\$754,000		\$ 4,949

- (5) Represents additional depreciation expense associated with the step-up of fixed assets of \$1,161, less the adjustment of previously recognized depreciation expense recorded by legacy PQ of \$980, for the pre-Business Combination period from January 1, 2016 through May 3, 2016. Adjustment also reflects changes related to the modification of stock compensation awards as a result of the Business Combination. Stock compensation expense has been adjusted to remove previously recorded stock compensation expense of \$2,356 for legacy Eco and legacy PQ in the period from January 1, 2016 through May 3, 2016, as well as \$1,174 related to an acceleration of expense due to a partial cash settlement related to the legacy Eco awards. The additional \$1,385 for stock compensation expense based on the new capital structure represents the fair value of the newly granted awards that would have been recognized for the period from January 1, 2016 through May 3, 2016 assuming the Business Combination occurred on January 1, 2015. No further adjustment has been made, as the expense related to these awards is already reflected in the post-Business Combination period from May 4, 2016 through December 31, 2016.

Category	Adjustment
Adjustments that increase selling, general and administrative expenses	
Depreciation expense related to the step-up in fair value of property, plant and equipment	\$ 1,161
Stock compensation expense based on the new capital structure	1,385
	<u>2,546</u>
Adjustments that decrease selling, general and administrative expenses	
Removal of previously recognized depreciation expense recorded by PQ Holdings	(980)
Removal of the stock compensation acceleration clause related to the Business Combination	(1,174)
Removal of stock compensation expense based on the prior capital structure	(2,356)
	<u>(4,510)</u>
Reduction in selling, general and administrative expenses	<u>\$ (1,964)</u>

NOTES TO THE UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands)

Below is a summary of the assumptions used to calculate the depreciation expense related to the step-up in fair value of property, plant and equipment:

<u>Asset Class</u>	<u>Fair Value</u>	<u>Estimated Useful Life</u>	<u>Depreciation Adjustment to Selling, General and Administrative Expenses</u>
Land	\$101,337	Indefinite	\$ —
Buildings	112,041	15 to 33 years	176
Machinery and equipment	338,766	3 to 10 years	985
Construction in progress	131,529		—
	<u>\$683,673</u>		<u>\$ 1,161</u>

- (6) Represents the amortization expense associated with the step-up of intangible assets of \$9,437, less the adjustment of previously recognized amortization expense recorded by legacy PQ of \$8,536, for the pre-Business Combination period from January 1, 2016 through May 3, 2016. Amortization expense related to trademarks, technical know-how, contracts and customer relationships is calculated on a straight-line basis over the estimated useful lives of the intangible assets, ranging from five to twenty years.
- (7) Represents the adjustment of transaction fee costs of \$1,795 related to the Business Combination.

Below is a summary of the adjustments (6) and (7) outlined above to other operating expense, net to arrive at the net adjustment recorded in the pro forma statement of operations:

<u>Category</u>	<u>Adjustment</u>
<u>Adjustments that increase other operating expense, net</u>	
(6) Amortization expense related to the step-up in fair value of definite-lived intangible assets	\$ 9,437
<u>Adjustments that decrease other operating expense, net</u>	
(6) Removal of previously recognized amortization expense recorded by PQ Holdings	(8,536)
(7) Removal of one-time transaction fees related to the Business Combination	(1,795)
	<u>(10,331)</u>
Reduction in other operating expense, net	<u>\$ (894)</u>

Below is a summary of the assumptions used to calculate the amortization expense related to the step-up in fair value of definite-lived intangible assets:

	<u>Amount</u>	<u>Weighted-Average Expected Useful Life (in years)</u>	<u>Amortization Adjustment to Other Operating Expense, Net</u>
Intangible assets subject to amortization:			
Trademarks	\$ 35,400	15	\$ 784
Technical know-how	189,300	20	—
Contracts	19,800	5.3	—
Customer relationships	268,700	10.6	8,653

NOTES TO THE UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands)

	<u>Amount</u>	<u>Weighted-Average Expected Useful Life (in years)</u>	<u>Amortization Adjustment to Other Operating Expense, Net</u>
In-process research and development	\$ 6,800		\$ —
Total intangible assets subject to amortization	520,000		9,437
Tradenames, not subject to amortization	151,100	Indefinite	—
Trademarks, not subject to amortization	82,900	Indefinite	—
Total	<u>\$754,000</u>		<u>\$ 9,437</u>

- (8) Represents the amortization on the acquisition accounting adjustments for identifiable intangible assets of \$2,211, less the adjustment of previously recognized amortization expense recorded by legacy PQ of \$796 and the adjustment of \$31,159 of non-recurring charges related to the step-up in fair value of inventory for our Zeolyst Joint Venture, for the pre-Business Combination period from January 1, 2016 through May 3, 2016. The adjustment related to the step-up in fair value of inventory for our Zeolyst Joint Venture is calculated by analyzing the historical inventory turnover rates and average profit margins of each component of our Zeolyst Joint Venture's inventory to calculate a rate that is applied to each such component to determine a fair value as of the date of the Business Combination.

<u>Category</u>	<u>Adjustment</u>
Adjustments that increase equity in net loss (income) from affiliated companies	
Removal of previously recognized amortization expense on definite-lived intangible assets related to our Zeolyst Joint Venture	\$ (796)
Removal of the non-recurring post-Business Combination step-up in fair value of inventory related to our Zeolyst Joint Venture	<u>(31,159)</u>
	(31,955)
Adjustments that decrease equity in net loss (income) from affiliated companies	
Amortization expense related to the step-up of fixed and definite-lived intangible assets	<u>2,211</u>
Increase in equity in net loss (income) from affiliated companies	<u>\$ (29,744)</u>

- (9) Represents interest expense of \$56,480 associated with our senior secured credit facilities less the adjustment of \$36,371 in interest expense related to the legacy debt structure for the period of January 1, 2016 through May 3, 2016. Also represents amortization of deferred financing fees and original issue discount of \$2,179 associated with our senior secured credit facilities less the adjustment of \$2,873 in deferred financing fees and original issue discount related to the legacy debt structure for the period of January 1, 2016 through May 3, 2016.

	<u>Amount</u>	<u>Interest Rate</u>	<u>Interest Payment</u>	<u>OID</u>	<u>Amortization of</u>		<u>Total Interest Expense</u>
					<u>Deferred Financing Fees</u>		
U.S. dollar-denominated term loan facility	\$900,000	5.25%	\$17,106	\$614	\$ 464		\$18,184
Euro-denominated term loan facility	300,000	5.00%	5,037	204	133		5,374
6.75% Senior Secured Notes due 2022	625,000	6.75%	13,945	118	208		14,271

NOTES TO THE UNAUDITED PRO FORMA CONDENSED COMBINED STATEMENT OF OPERATIONS
For the year ended December 31, 2016
(Dollars in thousands)

	<u>Amount</u>	<u>Interest Rate</u>	<u>Interest Payment</u>	<u>Amortization of</u>		<u>Total Interest Expense</u>
				<u>OID</u>	<u>Deferred Financing Fees</u>	
Floating Rate Senior Unsecured Notes due 2022	\$ 525,000	11.75%	\$20,392	\$ 401	\$ 37	\$ 20,830
Total debt	\$2,350,000		\$56,480	\$1,337	\$ 842	\$ 58,659
						Less historical interest expense of PQ Holdings Inc. (39,244)
						Less historical interest expense of Eco Services (9,095)
						Increase to pro forma interest expense <u>\$ 10,320</u>

A 1/8% increase or decrease in the respective base interest rates underlying the company's variable-rate debt would result in an increase or decrease, as applicable, in pro forma interest expense associated with the company's interest payments of approximately \$698 for the period from January 1, 2016 through May 3, 2016. However, each of the respective base interest rates underlying the company's variable-rate debt at the time of the Business Combination was subject to a floor such that a decrease in the respective base interest rates would have no impact on interest expense.

- (10) Represents the write-off of existing deferred financing fees and original issue discount of \$21,145 related to the legacy debt structure incurred prior to the Business Combination and related financing transactions.
- (11) Includes the write-off of \$26,250 in prepayment penalties associated with the refinancing of the legacy PQ and legacy Eco debt.
- (12) Includes the write-off of \$4,747 in refinancing charges.
- (13) Represents the tax effect of the adjustments noted above, including \$298 related to the change in tax status of Eco from a limited liability company to a C-corporation, which represents the tax provision had Eco been treated as a C-corporation for the period from January 1, 2016 through May 3, 2016. Each adjustment noted above was tax effected at the company's statutory rate in effect for the applicable jurisdiction as of December 31, 2016. Eco's weighted average statutory rate used to calculate the change in tax status was 37.25%.
- (14) The number of Class A and Class B shares used to compute pro forma basic and diluted net (loss) per share is the number of shares outstanding as of December 31, 2016. Class B shares are considered preferential participating securities and will not be allocated any losses in the periods of net losses, but will be allocated income in the periods of net income. As a result, pro forma basic and diluted (loss) per share have not been computed for Class B shares.

SELECTED CONSOLIDATED FINANCIAL DATA OF PQ GROUP HOLDINGS

The following tables set forth our selected historical consolidated financial data as of and for the periods indicated.

On May 4, 2016, we consummated the Business Combination to reorganize and combine the business of legacy PQ and legacy Eco under a new holding company, PQ Group Holdings. Investment funds affiliated with CCMP held a controlling interest in legacy Eco prior to the Business Combination. Legacy Eco is treated as the acquirer in the Business Combination and the predecessor to PQ Group Holdings for accounting purposes.

Legacy Eco operated as a business unit of Solvay until the acquisition of substantially all of the assets of Solvay's Eco Services business unit by Eco on December 1, 2014, and therefore, the financial statements of legacy Eco contained in this prospectus for periods prior to the 2014 Acquisition are not necessarily indicative of what legacy Eco's financial position, results of operations and cash flows would have been had legacy Eco operated as a separate, standalone entity independent of Solvay. In connection with the 2014 Acquisition, the acquisition method of accounting was applied, and the assets and liabilities of legacy Eco were adjusted to fair value on December 1, 2014. Accordingly, with respect to the historical financial and related information of legacy Eco included in this prospectus, references to "Predecessor" include each of the periods from January 1, 2012 to November 30, 2014. For 2014, the results include 11 months of legacy Eco operating activity (January 1, 2014 to November 30, 2014) and include amounts that have been "carved out" from Solvay's financial statements using assumptions and allocations made by Solvay to reflect Solvay's Eco Services business unit on a stand-alone basis. References in this prospectus to "Successor" refer to the period from inception of Eco (July 30, 2014) to December 31, 2014, but only include one month of legacy Eco operating activity (December 1, 2014 to December 31, 2014), because there was no operating activity for the period from inception (July 30, 2014) to November 30, 2014, and reflects legacy Eco on a stand-alone basis.

The consolidated statement of operations data and cash flows data for the years ended December 31, 2016 and 2015, the Successor period from inception (July 30, 2014) to December 31, 2014 and Predecessor period from January 1, 2014 to November 30, 2014, and the consolidated balance sheet data as of December 31, 2016 and 2015 were derived from our audited consolidated financial statements included elsewhere in this prospectus. The consolidated statement of operations data and cash flows data for the six months ended June 30, 2017 and 2016 and the consolidated balance sheet data as of June 30, 2017 were derived from our unaudited consolidated financial statements included elsewhere in this prospectus. The consolidated statement of operations data and cash flows data for the years ended December 31, 2013 and 2012 and the consolidated balance sheet data as of December 31, 2014, 2013 and 2012 were derived from our combined financial statements not included in this prospectus.

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The selected historical consolidated financial data set forth below does not give pro forma effect to the Reclassification, the Business Combination or the 2014 Acquisition and should be read in conjunction with the disclosures set forth under “Capitalization,” “Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and the related notes thereto included elsewhere in this prospectus.

	Six months ended June 30,		Year ended December 31,		Successor	Predecessor		
	Unaudited				Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014	Year ended December 31,	
	2017	2016	2016	2015	2014	2014	2013	2012
(Dollars in thousands)								
Statement of operations data:								
Sales	\$722,198	\$371,467	\$1,064,177	\$ 388,875	\$ 35,539	\$ 361,823	\$ 390,834	\$ 410,369
Cost of goods sold	532,072	283,068	810,085	278,791	30,160	265,829	286,371	294,754
Gross profit	190,126	88,399	254,092	110,084	5,379	95,994	104,463	115,615
Selling, general and administrative expenses	69,738	38,014	107,601	34,613	2,623	45,168	46,871	53,617
Other operating expense, net	27,324	25,588	62,301	19,696	16,347	5,593	—	—
Operating income (loss)	93,064	24,797	84,190	55,775	(13,591)	45,233	57,592	61,998
Equity in net (income) loss from affiliated companies	(14,622)	4,693	2,612	—	—	—	—	—
Interest expense, net	94,961	45,752	140,315	44,348	8,470	86	122	179
Debt extinguishment costs	—	11,858	13,782	—	—	—	—	—
Other (income) expense, net	16,613	3,024	(3,402)	—	—	—	(3,266)	(13,000)
(Loss) income before income taxes and noncontrolling interest	(3,888)	(40,530)	(69,117)	11,427	(22,061)	45,147	60,736	74,819
(Benefit) provision for income taxes	97	39,549	10,041	—	—	14,602	21,445	26,342
Net (loss) income	(3,985)	(80,079)	(79,158)	11,427	(22,061)	30,545	39,291	48,477
Less: Net income attributable to the noncontrolling interest	78	314	588	—	—	—	—	—
Net (loss) income attributable to PQ Group Holdings Inc.	<u>\$ (4,063)</u>	<u>\$ (80,393)</u>	<u>\$ (79,746)</u>	<u>\$ 11,427</u>	<u>\$ (22,061)</u>	<u>\$ 30,545</u>	<u>\$ 39,291</u>	<u>\$ 48,477</u>

	Six months ended June 30,		Year ended December 31,		Successor
	Unaudited				Period from inception (July 30, 2014) to December 31, 2014
	2017	2016	2016	2015	2014
Earnings (loss) per share:					
Basic					
Class B shares	\$ —	\$ —	\$ —	\$ 7.58	\$ (14.78)
Class A shares	(9.45)	(186.90)	(185.43)	—	—
Diluted					
Class B shares	—	—	—	7.58	(14.78)
Class A shares	(9.45)	(186.90)	(185.43)	—	—
Weighted average shares outstanding:					
Basic					
Class B shares	6,679,077	3,224,645	4,947,982	1,507,719	1,492,682
Class A shares	429,985	430,136	430,051	—	—
Diluted					
Class B shares	6,679,077	3,224,645	4,947,982	1,507,719	1,492,682
Class A shares	429,985	430,136	430,051	—	—

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	Six months ended June 30, 2017 <i>Unaudited</i>	Year ended December 31,		Successor	Predecessor	
		2016		2014	2012	
		2016	2015	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014	2013
(Dollars in thousands)						
Balance sheet data (at end of period):						
Cash and cash equivalents	\$ 50,457	\$ 70,742	\$ 25,155	\$ 22,627	\$ —	\$ —
Net working capital (deficit)(1)	198,347	179,544	(9,895)	(16,173)	10,954	13,479
Property, plant and equipment, net	1,203,925	1,181,388	481,073	472,156	345,041	336,631
Total assets	4,390,031	4,259,671	1,007,636	1,025,094	742,046	756,291
Total liabilities	3,325,615	3,231,727	772,343	807,270	201,831	214,788
Total debt, net of original issue discount and deferred financing costs including current portion	2,676,048	2,562,198	673,101	675,254	—	—
Total stockholders' equity	1,064,416	1,027,944	235,293	217,824	540,215	541,503
Cash flows data:						
Net cash provided by (used in):						
Operating activities	\$ 21,751	\$ 119,720	\$ 44,715	\$ (2,057)	\$ 57,593	\$ 81,195
Investment activities	(103,556)	(1,929,680)	(38,725)	(888,347)	(32,852)	(40,980)
Financing activities	66,817	1,861,433	(3,462)	913,031	(24,741)	(40,215)
Effect of exchange rate changes	(5,299)	(5,886)	—	—	—	—

	Six months ended June 30,		Year ended December 31,		Successor	Predecessor		
	2017		2016		2014	2012		
	2017	2016	2016	2015	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014	2013	2012
(Dollars in thousands)								
Segment Sales:								
Performance Materials & Chemicals	\$488,709	\$173,648	\$ 638,951	\$ —	\$ —	\$ —	\$ —	\$ —
Environmental Catalysts & Services(2)	235,273	198,219	426,747	388,875	35,539	361,823	390,834	410,369
Segment Adjusted EBITDA(3):								
Performance Materials & Chemicals	\$118,856	\$ 46,574	\$ 158,679	\$ —	\$ —	\$ —	\$ —	\$ —
Environmental Catalysts & Services	120,678	78,703	196,825	117,704	9,122	98,075	105,499	110,786

(1) Net working capital (deficit) is defined as current assets minus current liabilities minus cash and cash equivalents

(2) Excludes the company's proportionate share of total net sales from the Zeolyst Joint Venture, which we account for as an equity method investment in accordance with GAAP. The proportionate share of total net sales from the Zeolyst Joint Venture is \$63,369 and \$94,516 for the six months ended June 30, 2017 and for the year ended December 31, 2016, respectively.

(3) Segment Adjusted EBITDA is exclusive of corporate expenses. See "Prospectus Summary—Summary Historical and Unaudited Pro Forma Financial and Other Data."

SUPPLEMENTAL SELECTED CONSOLIDATED FINANCIAL DATA OF LEGACY PQ

The following tables set forth certain selected consolidated financial data as of and for the periods indicated for legacy PQ on a stand-alone basis. The consolidated statement of operations data and cash flows data for the years ended December 31, 2015, 2014 and 2013 and the consolidated balance sheet data as of December 31, 2015 and 2014 were derived from legacy PQ's audited consolidated financial statements included elsewhere in this prospectus. The consolidated statement of operations data and cash flows data for the year ended December 31, 2012 and the consolidated balance sheet data as of December 31, 2013 and 2012 were derived from legacy PQ's consolidated financial statements not included in this prospectus. The consolidated statement of operations data and cash flows data for the three months ended March 31, 2016 and the consolidated balance sheet data as of March 31, 2016 were derived from legacy PQ's unaudited consolidated financial statements included elsewhere in this prospectus.

The selected consolidated financial data set forth below should be read in conjunction with the "Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the consolidated financial statements and the related notes thereto included elsewhere in this prospectus.

(Dollars in thousands)	Legacy PQ	Legacy PQ			
	Three months ended March 31,	Year ended December 31,			
	2016 unaudited	2015	2014	2013	2012
Statement of operations data:					
Sales	\$ 237,393	\$ 1,024,326	\$ 1,114,904	\$ 1,085,019	\$ 1,084,782
Cost of goods sold	173,613	748,756	818,483	795,416	803,159
Gross profit	63,780	275,570	296,421	289,603	281,623
Selling, general and administrative expenses	28,524	107,097	110,886	111,229	112,138
Other operating expense, net	11,461	51,516	71,148	49,373	42,261
Operating income	23,795	116,957	114,387	129,001	127,224
Equity in net income from affiliated companies	4,659	45,325	29,359	53,808	26,206
Interest expense, net	26,413	108,375	111,553	120,347	111,228
Debt extinguishment costs	—	—	2,476	20,287	20,063
Other expense, net	(3,422)	21,383	23,886	3,316	(3,751)
Income before income taxes and noncontrolling interest	5,463	32,524	5,831	38,859	25,890
Provision for income taxes	3,904	22,902	7,548	10,608	18,918
Net income (loss)	1,559	9,622	(1,717)	28,251	6,972
Less: Net income attributable to the noncontrolling interest	457	1,771	1,894	1,521	1,788
Net income (loss) attributable to Legacy PQ	<u>\$ 1,102</u>	<u>\$ 7,851</u>	<u>\$ (3,611)</u>	<u>\$ 26,730</u>	<u>\$ 5,184</u>
Balance sheet data (at end of period):					
Cash and cash equivalents	\$ 44,195	\$ 53,507	\$ 100,836	\$ 117,749	\$ 124,451
Net working capital (1)	157,925	140,887	135,247	153,980	150,235
Property, plant and equipment, net	576,534	569,168	546,716	510,345	496,242
Total assets	2,293,912	2,268,084	2,310,262	2,379,308	2,333,480
Total liabilities	2,207,911	2,191,967	2,212,714	2,232,422	2,216,117
Total debt, including current portion	1,820,012	1,803,763	1,807,404	1,809,201	1,781,449
Total stockholders' equity	86,001	76,117	97,548	146,886	117,363

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(Dollars in thousands)	Legacy PQ	Legacy PQ			
	Three months ended	Year ended December 31,			
	March 31,	2015	2014	2013	2012
	2016				
	unaudited				
Cash flows data:					
Net cash provided by (used in):					
Operating activities	\$ 6,229	\$ 98,896	\$ 120,410	\$ 115,898	\$ 84,971
Investment activities	(29,505)	(125,144)	(114,032)	(125,358)	(66,208)
Financing activities	13,912	(10,379)	(14,787)	6,929	(943)
Effect of exchange rate changes on cash	52	(10,702)	(8,504)	(4,171)	(1,770)

(1) Net working capital is defined as current assets minus current liabilities minus cash and cash equivalents.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The statements in the discussion and analysis regarding industry outlook, our expectations regarding the performance of our business and the forward-looking statements are subject to numerous risks and uncertainties, including, but not limited to, the risks and uncertainties described in "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements." Our actual results may differ materially from those contained in or implied by any forward-looking statements. You should read the following discussion together with the sections entitled "Risk Factors," "Prospectus Summary—Summary Historical and Unaudited Pro Forma Financial and Other Data," "Selected Consolidated Financial Data of PQ Group Holdings," "Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings" and the historical audited and unaudited consolidated financial statements, including the related notes, appearing elsewhere in this prospectus. All references to years, unless otherwise noted, refer to our fiscal years, which end on December 31. All dollar values in this section, unless otherwise noted, are denoted in millions.

Overview

We are a leading global provider of catalysts, specialty materials and chemicals, and services that enable environmental improvements, enhance consumer products and increase personal safety. Our products and solutions help companies produce vehicles with improved fuel efficiency and cleaner emissions. Our materials are critical ingredients in consumer products that make teeth brighter, skin softer and wounds heal faster. We produce highly engineered materials that make highways and airports safer for drivers and pilots. Because our products are predominantly inorganic and carbon-free, we believe we contribute to improving the sustainability of our planet.

We conduct operations through two reporting segments: environmental catalysts and services and performance materials and chemicals. Our environmental catalysts and services business is a leading global innovator and producer of catalysts for the refinery, emissions control and petrochemical industries and is also a leading provider of catalyst recycling services to the North American refining industry. We believe our products are mission critical for our customers in these growing applications and impart essential functionality in chemical and refining production processes and in emissions control for engines. Our environmental catalysts and services business consists of three product groups: silica catalysts, zeolite catalysts and refining services. Our performance materials and chemicals business is a silicates and specialty materials producer with leading supply positions for the majority of our products sold in North America, Europe, South America, Australia and Asia (excluding China) serving diverse and growing end uses such as personal and industrial cleaning products, fuel efficient tires ("green tires"), surface coatings and food and beverage. Our products are essential additives, ingredients, and precursors that are critical to the performance characteristics of our customers' products, yet typically represent only a small portion of our customers' overall end-product costs. Our performance materials and chemicals business consists of two product groups: performance chemicals and performance materials. In 2016, we served over 4,000 customers globally across many end uses and, as of June 30, 2017, operated out of 72 manufacturing facilities, which are strategically located across six continents.

Company Background and Business Combination

On December 1, 2014, Eco Services Operations LLC ("Eco"), a Delaware limited liability company and an indirect subsidiary of investment funds affiliated with CCMP, acquired substantially all of the assets of Solvay's Eco Services business unit (the "2014 Acquisition").

On August 17, 2015, PQ Group Holdings Inc. ("PQ Group Holdings" or "the company"), PQ Holdings Inc. ("PQ Holdings"), PQ Corporation, Eco, Eco Services Intermediate Holdings LLC, Eco Services Group Holdings LLC, investment funds affiliated with CCMP, and certain other stockholders of PQ Holdings and Eco entered into a reorganization and transaction agreement pursuant to which the companies consummated a series of

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transactions (the “Business Combination”) to reorganize and combine the businesses of PQ Holdings and Eco under a new holding company, PQ Group Holdings. The Business Combination was consummated on May 4, 2016. We refer to the business of PQ Holdings prior to the Business Combination as “legacy PQ” and the business of Eco prior to the Business Combination as “legacy Eco.”

In accordance with GAAP, legacy Eco was the accounting acquirer in the Business Combination and, as such, legacy Eco is treated as our predecessor. Investment funds affiliated with CCMP held a controlling interest in legacy Eco and a non-controlling interest in legacy PQ prior to the Business Combination.

The following table summarizes, for each of the periods specified below and for which financial information is included for the issuer, PQ Group Holdings, in this prospectus, the portion, if any, of the financial results of legacy PQ and legacy Eco that is included in the financial results for such periods presented in accordance with GAAP.

	Six months ended June 30,		Pro forma year ended December 31, 2016	Years ended December 31,		Successor	Predecessor
	2017	2016		2016	2015	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014
Operations of legacy Eco	Included	Included	Included	Included	Included	Partially included (December 1 to December 31)	Included (January 1 to November 30)
Operations of legacy PQ	Included	Partially included (May 4 to June 30)	Included	Partially included (May 4 to December 31)	Not included	Not included	Not included

The financial statements of our accounting predecessor contained in this prospectus for periods prior to the 2014 Acquisition are not necessarily indicative of what legacy Eco’s financial position, results of operations and cash flows would have been had legacy Eco operated as a separate, standalone entity independent of Solvay.

Key Performance Indicator

Adjusted EBITDA

Adjusted EBITDA is a non-GAAP financial measure that we use to evaluate our past performance. Adjusted EBITDA is presented as a key performance indicator as we believe it will enhance a prospective investor’s understanding of our results of operations and financial condition. EBITDA consists of net income (loss) attributable to PQ Group Holdings before interest, taxes, depreciation and amortization. Adjusted EBITDA consists of EBITDA adjusted for (i) non-operating income or expense and (ii) the impact of certain non-cash or other items that are included in net income and EBITDA that we do not consider indicative of our ongoing operating performance. We believe that these adjustments provide investors with meaningful information to understand our operating results and ability to analyze our financial and business trends on a period-to-period basis.

You should not consider Adjusted EBITDA in isolation or as an alternative to (a) operating profit or profit for the period (as reported in accordance with GAAP), (b) cash flows from operating, investing and financing activities as a measure to meet our cash needs or (c) any other measures of performance under GAAP. You should exercise caution in comparing Adjusted EBITDA as reported by us to similar measures of other

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companies. In evaluating Adjusted EBITDA, you should be aware that we are likely to incur expenses similar to those eliminated in this presentation in the future and that certain of these items could be considered recurring in nature. Our presentation of Adjusted EBITDA should not be construed as an inference that our future results will be unaffected by unusual or nonrecurring items. For a discussion of additional limitations of Adjusted EBITDA as well as a reconciliation from net income (loss) for the periods presented to EBITDA and Adjusted EBITDA, see “Prospectus Summary—Summary Historical and Unaudited Pro Forma Financial and Other Data.”

Key Factors and Trends Affecting Operating Results and Financial Condition

Sales

Our environmental catalysts and services business consists of three product groups: silica catalysts, zeolite catalysts, and refining services. Our environmental catalysts and services sales have grown primarily due to expansion into new end applications, including emission control catalysts, polymer catalysts, and refining catalysts, as well as continued supply share gains. Sales in our environmental catalysts and services segment are made on both a purchase order basis and pursuant to long-term contracts.

Our performance materials and chemicals business consists of two product groups: performance chemicals and performance materials. Expansions into new applications, including personal care and consumer cleaning, as well as share gains in existing end uses, have added to the growth of our sales. We have seen recent declines in the pulp and paper and oil and gas end uses. Historically, our performance materials and chemicals business has experienced relatively stable demand both seasonally and throughout economic cycles, due to the diverse consumer and industrial end uses that our products serve. Product sales from our performance chemicals product group are made on both a purchase order basis and pursuant to long-term contracts. In the performance materials product group, sales have been driven by the growth of spending on repair, maintenance and upgrade of existing highways and the construction of new highways and roads by governments around the world. Product sales in our performance materials product group are made principally on a purchase order basis. There may be modest fluctuations in timing of orders, but orders are mainly driven by demand and general economic conditions.

Cost of Goods Sold

Cost of goods sold consists of variable product costs, fixed manufacturing expenses, depreciation expense and freight expenses. Variable product costs include all raw materials, energy and packaging costs that are directly related to the manufacturing process. Fixed manufacturing expenses include all plant employment costs, manufacturing overhead and periodic maintenance costs. The primary raw materials used in the manufacture of products in our performance materials and chemicals business include soda ash, industrial sand, aluminum trihydrate, sodium hydroxide, and cullet. For the years ended December 31, 2016 and 2015, approximately 45% of sales with our largest sodium silicate customers in North America are made under contracts that include price adjustments for changes in the price of raw materials and natural gas. Under these contracts, there generally is a time lag of three to nine months for price changes to pass through, depending on the magnitude of the change in cost and other market dynamics. The primary raw materials for our environmental catalysts and services business include spent sulfuric acid, sulfur, sodium silicates, acids, bases, and certain metals. Most of our refining services contracts feature take-or-pay volume protection and/or quarterly price adjustments for commodity inputs, labor, the Chemical Engineering Index (U.S. chemical plant construction cost index) and natural gas. Over 94% and 91% of our refining services product group pro forma sales for the years ended December 31, 2016 and 2015, respectively, were under contracts featuring quarterly price adjustments. The price adjustments generally reflect actual costs for producing acid and tend to protect us from volatility in labor, fixed costs and raw material pricing. Freight expenses are generally passed through directly to customers. Spent acid for our refining services product group is supplied by customers for a nominal charge as part of their contracts. While natural gas is not a direct feedstock for any product, all businesses use natural gas powered furnaces to heat raw materials and create the chemical reactions necessary to produce end-products. We maintain multiple suppliers wherever possible, hedge exposure to fluctuations in prices for natural gas purchases in the United States, make forward purchases

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of natural gas in the United States, Canada, and Europe to mitigate our exposure to price volatility, and structure our customer contracts when possible to allow for the pass-through of raw material and natural gas costs.

Joint Ventures

We account for our investments in our equity joint ventures under the equity method. Our largest joint venture, the Zeolyst Joint Venture, manufactures high performance specialty zeolite-based catalysts for use in the emissions control industry, the petrochemical industry and other areas of the broader chemicals industry. We share proportionally in the management of our joint ventures with the other parties to each such joint venture.

Industry

We compete in the specialty chemicals and materials industry. Our industry is characterized by constant development of new products and the need to support customers with new product innovation and technical services to meet their challenges. In addition, products must maintain consistent quality and be a reliable source of supply in order to meet the needs of customers. In addition, many products in the specialty chemicals and materials industry benefit from economics that favor incumbent producers because the capital cost to expand existing capacity is typically significantly less than the capital cost necessary to build a new plant. Our industry is also characterized by the need to produce consistent quality in a safe and environmentally sustainable manner.

Seasonality

Our results of operations are subject to seasonal fluctuations, primarily with respect to our performance materials and refining services product groups. As the road striping season occurs during warmer weather, sales, and earnings are primarily generated during the second and third quarters in our performance materials product group. Our refining services product group typically experiences similar seasonal fluctuations as a result of higher demand for gasoline products in the summer months. Working capital is built during the first half of the year, while cash generation occurs primarily in the second half of the fiscal year.

Inflation

Inflationary pressures may have an adverse effect on us, impacting raw material costs and other operating costs, as well as resulting in higher fixed asset replacement costs. We attempt to manage these impacts with cost control, productivity improvements and contractual arrangements, as well as price increases to customers.

Foreign Currency

As a global business, we are subject to the impact of gains and losses on currency translations, which occur when the financial statements of foreign operations are translated into U.S. dollars. We operate a geographically diverse business with approximately 39% and 34% of our sales for the six months ended June 30, 2017 and the year ended December 31, 2016, respectively, in currencies other than the U.S. dollar. Because our consolidated financial results are reported in U.S. dollars, sales or earnings generated in currencies other than the U.S. dollar can result in a significant increase or decrease in the amount of those sales and earnings when translated to U.S. dollars. The foreign currencies to which we have the most significant exchange rate exposure include the Euro, British pound, Canadian dollar, Brazilian real and the Mexican peso. See “—Quantitative and Qualitative Disclosures about Market Risk—Foreign Exchange Risk.”

Public Company Costs

As a result of this offering, we expect to incur additional legal, accounting and other expenses that we did not previously incur, including costs associated with SEC reporting and corporate governance requirements. These requirements include compliance with the Sarbanes-Oxley Act and the listing standards of the New York Stock Exchange. Our financial statements following this offering will reflect the impact of these expenses.

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Pro Forma Results of Operations

In addition to the analysis of historical results of operations, we have prepared unaudited supplemental pro forma results of operations for the six months ended June 30, 2016 as well as the years ended December 31, 2016 and 2015. The unaudited pro forma statements of operations reflect pro forma adjustments to the results of PQ Group Holdings to give effect to the Business Combination and the related financing transactions as if they had occurred on January 1, 2015. The unaudited pro forma adjustments include:

- elimination of intercompany sales between legacy PQ and legacy Eco;
- adjustments to depreciation expense related to the step-up in fair value of property, plant and equipment;
- adjustments to amortization expense related to the step-up in fair value of definite-lived intangible assets;
- removal of non-recurring adjustments related to the step-up in the fair value of inventory;
- adjustments to stock compensation expense to reflect charges as they relate to our new capital structure;
- adjustments related to the amortization of the step-up in fair value of property, plant, equipment and definite-lived intangible assets related to our Zeolyst Joint Venture;
- adjustments to interest expense related to the senior secured term loan facility;
- adjustments related to the write-off of existing deferred financing fees, original issue discounts and prepayment penalties; and
- the tax effect of the aforementioned adjustments, including the effect related to the change in tax status of Eco from a limited liability company to a C-corporation.

The unaudited pro forma statements of operations have been prepared in accordance with Article 11 of Regulation S-X by combining the historical results of operations of legacy Eco and legacy PQ for the periods prior to May 4, 2016 and should be read in conjunction with our historical consolidated financial statements and related notes thereto included elsewhere in this prospectus.

The unaudited pro forma statements of operations have been prepared for illustrative purposes only and are not necessarily indicative of the combined results of operations that would have been realized had the pro forma transactions been completed as of the dates indicated, nor are they meant to be indicative of any anticipated future results of operations. The unaudited pro forma adjustments are based upon available information and assumptions we believe are factually supportable, directly attributable to the Business Combination and the related financing transactions, and with respect to the statement of operations, expected to have a continuing impact on our business, and that we believe are reasonable under the circumstances. In addition, the unaudited pro forma statements of operations do not include any pro forma adjustments to reflect expected cost savings or restructuring actions which may be achievable or the impact of any non-recurring activity and transaction-related costs.

Management believes the unaudited pro forma statements of operations are a useful presentation of our results of operations as they provide comparative information, period-over-period, on a more comparable basis.

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Results of Operations

Historical and Pro Forma—Six Months Ended June 30, 2017 Compared to the Six Months Ended June 30, 2016 (the Pro Forma Discussion Compares the Historical Six Months Ended June 30, 2017 to the Pro Forma Six Months Ended June 30, 2016)

Highlights

The following is a summary of our financial performance for the six months ended June 30, 2017 compared with the prior six months ended June 30, 2016.

Sales

- ***Historical:*** Net sales increased \$350.7 million, or 94.4%, to \$722.2 million. The increase in sales was primarily due to the inclusion of \$524.1 million of legacy PQ sales in our results of operations for the six months ended June 30, 2017 as compared to \$184.8 million of legacy PQ sales included in our results of operations for the period of May 4, 2016 through June 30, 2016.
- ***Pro Forma:*** Net sales increased \$11.9 million, or 1.7%, to \$722.2 million. The increase in sales was primarily due to favorable pricing and customer mix in both performance materials and chemicals and environmental catalysts and services and favorable volumes within performance materials and chemicals. This was partially offset by the unfavorable effect of foreign currency translation.

Gross Profit

- ***Historical:*** Gross profit increased \$101.7 million, or 115.0%, to \$190.1 million. Our increase in gross profit was primarily due to the inclusion of \$122.9 million of legacy PQ gross profit in our results of operations for the six months ended June 30, 2017 as compared to \$30.2 million of legacy PQ gross profit included in our results of operations for the period of May 4, 2016 through June 30, 2016.
- ***Pro Forma:*** Gross profit decreased \$3.7 million, or 1.9%, to \$190.1 million. Our decrease in gross profit was primarily due to higher manufacturing costs and depreciation expense in performance materials and chemicals, which was partially offset by favorable pricing in both performance materials and chemicals and environmental catalysts and services.

Operating Income

- ***Historical:*** Operating income increased \$68.3 million, or 275.4%, to \$93.1 million. Our increase in operating income was primarily due to the inclusion of \$41.9 million of legacy PQ operating income in our results of operations for the six months ended June 30, 2017 as compared to the inclusion of \$0.7 million of legacy PQ operating loss in our results of operations for the period of May 4, 2016 through June 30, 2016. The increase in operating income was also due to lower selling, general and administrative expenses due to cost reduction initiatives and lower other operating expense, net from lower restructuring and severance related charges.
- ***Pro Forma:*** Operating income increased \$15.7 million, or 20.3%, to \$93.1 million. Our increase in operating income was primarily due to lower selling, general and administrative and other operating expenses, which was partially offset by lower gross profit, as described above. The lower other operating expenses were a result of lower restructuring and severance related costs.

Equity in Net Income of Affiliated Companies

- ***Historical:*** Equity in net income of affiliated companies increased \$19.3 million, or 410.6%, to \$14.6 million. Our increase in equity in net income of affiliated companies was primarily due to the inclusion of \$14.6 million of legacy PQ equity in net income of affiliated companies in our results of operations for the six months ended June 30, 2017 as compared to the inclusion of \$4.7 million of legacy PQ included in our results of operations for the period of May 4, 2016 through June 30, 2016.

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- *Pro Forma*: Equity in net income of affiliated companies increased \$1.1 million, or 8.1%, to \$14.6 million. Our increase in equity in net income of affiliated companies was primarily driven by higher earnings generated by our Zeolyst Joint Venture from higher volumes of pressure products and specialty catalysts, which were partially offset by lower volumes within our hydrocracking product line and various expansion and growth related cost increases.

The following is our condensed consolidated statement of operations and a summary of financial results, presented on a historical and pro forma basis, for the six months ended June 30, 2017 and June 30, 2016. The historical results of operations include Eco for all periods presented and legacy PQ for the six months ended June 30, 2017 and the period of May 4, 2016 through June 30, 2016. The unaudited pro forma results of operations reflect pro forma adjustments to the results of PQ Group Holdings to give effect to the Business Combination and the related financing transactions as if they had occurred on January 1, 2015.

	Historical				Historical Pro Forma			
	Six months ended June 30,		Change		Six months ended June 30,		Change	
	2017	2016	\$	%	2017	2016	\$	%
	Unaudited	Unaudited			Unaudited	Unaudited		
	(in millions, except percentages)							
Sales	\$ 722.2	\$ 371.5	\$350.7	94.4%	\$ 722.2	\$ 710.3	\$ 11.9	1.7%
Cost of goods sold	532.1	283.1	249.0	88.0%	532.1	516.5	15.6	3.0%
Gross profit	190.1	88.4	101.7	115.0%	190.1	193.8	(3.7)	(1.9)%
Gross profit margin	26.3%	23.8%			26.3%	27.3%		
Selling, general and administrative expenses	69.7	38.0	31.7	83.4%	69.7	75.5	(5.8)	(7.7)%
Other operating expense, net	27.3	25.6	1.7	6.6%	27.3	40.9	(13.6)	(33.3)%
Operating income	93.1	24.8	68.3	275.4%	93.1	77.4	15.7	20.3%
Operating income margin	12.9%	6.7%			12.9%	10.9%		
Equity in net (income) loss of affiliated companies	(14.6)	4.7	(19.3)	(410.6)%	(14.6)	(13.5)	(1.1)	8.1%
Interest expense, net	95.0	45.8	49.2	107.4%	95.0	94.0	1.0	1.1%
Debt extinguishment costs	—	11.9	(11.9)	(100.0)%	—	—	—	—
Other (income) expense, net	16.5	3.0	13.5	450.0%	16.5	(2.5)	19.0	(760.0)%
Income (loss) before income taxes and noncontrolling interest	(3.8)	(40.6)	36.8	(90.6)%	(3.8)	(0.6)	(3.2)	533.3%
Provision for income taxes	0.1	39.5	(39.4)	(99.7)%	0.1	45.8	(45.7)	(99.8)%
Effective tax rate	(2.6)%	(97.3)%			(2.6)%	(7,633.3)%		
Net loss	(3.9)	(80.1)	76.2	(95.1)%	(3.9)	(46.4)	42.5	(91.6)%
Less: Net income attributable to the noncontrolling interest	0.1	0.3	(0.2)	—	0.1	1.0	(0.9)	(90.0)%
Net loss attributable to PQ Group Holdings Inc.	\$ (4.0)	\$ (80.4)	\$ 76.4	(95.0)%	\$ (4.0)	\$ (47.4)	\$ 43.4	(91.6)%

Sales

	Historical				Historical Pro Forma			
	Six months ended June 30,		Change		Six months ended June 30,		Change	
	2017	2016	\$	%	2017	2016	\$	%
	(in millions, except percentages)							
Net Sales:								
Performance Materials & Chemicals	\$488.7	\$173.6	\$315.1	181.5%	\$ 488.7	\$ 481.9	\$ 6.8	1.4%
Environmental Catalysts & Services	235.3	198.2	37.1	18.7%	235.3	229.4	5.9	2.6%
Inter-segment sales eliminations	(1.8)	(0.3)	(1.5)	500.0%	(1.8)	(1.0)	(0.8)	80.0%
Total net sales	\$722.2	\$371.5	\$350.7	94.4%	\$ 722.2	\$ 710.3	\$ 11.9	1.7%

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Historical Sales

Sales for the six months ended June 30, 2017 were \$722.2 million, an increase of \$350.7 million, or 94.4%, compared to sales of \$371.5 million for the six months ended June 30, 2016. The increase in sales within our performance materials and chemicals segment was due to the inclusion of legacy PQ sales of \$488.7 million in our results of operations for the six months ended June 30, 2017 as compared to legacy PQ sales of \$173.6 million in our results of operations for the period of May 4, 2016 through June 30, 2016. The increase in sales within our environmental catalysts and services segment was due to the inclusion of \$37.2 million of legacy PQ sales in our results of operations for the six months ended June 30, 2017 as compared to legacy PQ sales of \$12.1 million in our results of operations for the period of May 4, 2016 through June 30, 2016 and an increase of \$12.0 million in our refining services product group. The increase in our refining services product group was primarily driven by higher average selling prices of \$6.5 million and increased volumes of \$5.5 million. The increase in average selling price was driven by the higher realization from sulfuric acid regeneration contract renewals and the increase in volumes was due to an increased demand for virgin sulfuric acid.

Pro Forma Sales

Performance Materials & Chemicals: Sales in performance materials and chemicals for the six months ended June 30, 2017 were \$488.7 million, an increase of \$6.8 million, or 1.4%, compared to sales of \$481.9 million for the six months ended June 30, 2016. The increase in sales was primarily due to higher average selling price and customer mix of \$8.6 million and favorable volumes of \$5.2 million, which was partially offset by the unfavorable effects of foreign currency translation of \$7.0 million.

The higher average selling price was principally a result of favorable U.S. dollar denominated sales and U.S. dollar cost pass through pricing in certain foreign locations. The increase in volumes within performance materials and chemicals was primarily driven by higher sodium silicate industrial demand, an increase in oil drilling, and an increase in European highway as a result of our recent acquisition of Sovitec, which was partially offset by lower North America highway sales volumes due to delays in government spending. The stronger U.S. dollar compared to the British pound and Euro unfavorably impacted our sales.

Environmental Catalysts & Services: Sales in environmental catalysts and services for the six months ended June 30, 2017 were \$235.3 million, an increase of \$5.9 million, or 2.6%, compared to sales of \$229.4 million for the six months ended June 30, 2016. The increase in sales was primarily due to higher average selling price and customer mix of \$8.8 million, which was partially offset by lower volumes of \$2.0 million and the unfavorable effects of foreign currency translation of \$0.9 million.

The higher average selling price and customer mix was driven by the higher realization from sulfuric acid regeneration contract renewals and increased prices in the silica catalysts product group, partly offset by unfavorable virgin sulfuric acid pricing due to the mix of customers. The decrease in volumes was driven by lower chemical catalysts sales due to record sales volumes to the methyl methacrylate industry in the prior year and lower microspheres sales, which was partially offset by stronger virgin sulfuric acid sales volumes due to the timing of our customer's plant turnarounds. The stronger U.S. dollar compared to the British pound unfavorably impacted our sales.

Gross Profit

Historical: Gross profit for the six months ended June 30, 2017 was \$190.1 million, an increase of \$101.7 million, or 115.0%, compared with \$88.4 million for the six months ended June 30, 2016. The increase in gross profit was due to \$122.9 million attributable to the inclusion of legacy PQ gross profit in our results of operations for the six months ended June 30, 2017 as compared to legacy PQ gross profit of \$30.2 million in our results of operations for the period of May 4, 2016 through June 30, 2016 and an increase of \$9.0 million from our refining services product group. The increase in our refining services gross profit was due to favorable pricing of \$6.5 million and higher volumes of \$3.8 million, which was partially offset by higher depreciation expense of \$2.0 million. The favorable pricing was due to higher realization from sulfuric acid regeneration contract renewals,

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partially offset by unfavorable indexing, which limited our ability to pass through raw materials costs. The increase in volume was driven by higher virgin sulfuric acid product line shipments to the mining industry.

Pro Forma: Gross profit for the six months ended June 30, 2017 was \$190.1 million, a decrease of \$3.7 million, or 1.9%, compared with \$193.8 million for the six months ended June 30, 2016. The decrease in gross profit was due to higher depreciation expense of \$11.6 million, higher manufacturing costs of \$5.2 million, the unfavorable effects of foreign currency translation of \$2.7 million and a decrease in volumes of \$1.3 million, which was partially offset by favorable pricing of \$17.4 million. The higher manufacturing costs were primarily driven by increased costs to build our new Thermodrop product offering which was released for sale towards the end of the second quarter of 2017, and higher production and labor inflation costs. The unfavorable effect of foreign currency translation was driven by the stronger U.S. dollar compared to the British pound and Euro. The greater average selling price was a result of the positive impact of U.S. dollar denominated sales and U.S. dollar pass through pricing in certain foreign locations and higher realization from sulfuric acid regeneration customer contracts, partially offset by unfavorable virgin sulfuric acid customer mix and indexing, which limited our ability to pass through raw materials costs.

Selling, General and Administrative Expenses

Historical: Selling, general and administrative expenses for the six months ended June 30, 2017 were \$69.7 million, an increase of \$31.7 million, or 83.4%, compared with \$38.0 million for the six months ended June 30, 2016. The increase in selling, general and administrative expenses was due to \$60.1 million attributable to the inclusion of legacy PQ selling, general and administrative expenses in our results of operations for the six months ended June 30, 2017 as compared to legacy PQ selling, general and administrative expenses of \$18.1 million in our results of operations for the period of May 4, 2016 through June 30, 2016. This was partly offset by \$8.1 million of lower selling, general and administrative expenses as a result of cost reduction initiatives.

Pro Forma: Selling, general and administrative expenses for the six months ended June 30, 2017 were \$69.7 million, a decrease of \$5.8 million, or 7.7%, compared with \$75.5 million for the six months ended June 30, 2016. The reduction in selling, general and administrative expenses related to our cost reduction initiatives.

Other Operating Expense, Net

Historical: Other operating expense, net for the six months ended June 30, 2017 was \$27.3 million, an increase of \$1.7 million, or 6.6%, compared with \$25.6 million for the six months ended June 30, 2016. The increase in other operating expense, net was due to \$20.9 million attributable to the inclusion of legacy PQ other operating expense, net in our results of operations for the six months ended June 30, 2017 as compared to legacy PQ other operating expense, net of \$12.7 million in our results of operations for the period of May 4, 2016 through June 30, 2016. This was partly offset by \$5.5 million of lower restructuring and severance related costs.

Pro Forma: Other operating expense, net for the six months ended June 30, 2017 was \$27.3 million, a decrease of \$13.6 million, or 33.3%, compared with \$40.9 million for the six months ended June 30, 2016. The decrease in other operating expense, net was due to \$9.5 million of lower restructuring and severance related costs and \$5.2 million of lower amortization expense.

Equity in Net Income of Affiliated Companies

Historical: Equity in net income of affiliated companies for the six months ended June 30, 2017 was \$14.6 million, an increase of \$19.3 million, or 410.6%, compared with a loss of \$4.7 million for the six months ended June 30, 2016. The increase was primarily due to \$19.4 million of earnings generated by our Zeolyst Joint Venture during the six months ended June 30, 2017 as compared to \$7.7 million for the period of May 4, 2016 through June 30, 2016 and \$7.0 million of lower amortization expense on the fair value step-up of the underlying assets of our Zeolyst Joint Venture.

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Pro Forma: Equity in net income of affiliated companies for the six months ended June 30, 2017 was \$14.6 million, an increase of \$1.1 million, or 8.1%, compared with \$13.5 million for the six months ended June 30, 2016. The increase in earnings generated by our Zeolyst Joint Venture was due to higher pressure products sales from growth in emissions products and custom dewaxing products, of which sales began during the second half of 2016, partly offset by lower hydrocracking volumes to the methyl methacrylate industry.

Interest Expense, Net

Historical: Interest expense, net for the six months ended June 30, 2017 was \$95.0 million, an increase of \$49.2 million, or 107.4%, as compared with \$45.8 million for the six months ended June 30, 2016. Interest expense increased primarily due to higher third-party interest expense under our debt structure compared to the legacy Eco debt structure on a standalone basis.

Pro Forma: Interest expense, net for the six months ended June 30, 2017 was \$95.0 million, an increase of \$1.0 million, or 1.1%, as compared with \$94.0 million for the six months ended June 30, 2016.

Debt Extinguishment Costs

Historical: Debt extinguishment costs for the six months ended June 30, 2016 were \$11.9 million. On May 4, 2016, and concurrently with the consummation of the Business Combination, the company refinanced its existing credit facilities. The company recorded \$4.6 million of new creditor and third-party financing fees as debt extinguishment costs. In addition, previous unamortized deferred financing costs of \$6.3 million and original issue discount of \$1.0 million associated with the old debt were written off as debt extinguishment costs.

Other (Income) Expense, Net

Historical: Other expense, net was \$16.5 million for the six months ended June 30, 2017, an unfavorable change of \$13.5 million, or 450.0% compared with other expense, net of \$3.0 million for the six months ended June 30, 2016. The change in other expense, net primarily consisted of \$16.4 million of foreign currency losses for the six months ended June 30, 2017 as compared to foreign currency losses of \$3.1 million for the six months ended June 30, 2016.

Pro Forma: Other expense, net was \$16.5 million for the six months ended June 30, 2017, an unfavorable change of \$19.0 million, or 760.0%, compared with other income, net of \$2.5 million for the six months ended June 30, 2016. The change in other income, net primarily consisted of \$16.4 million of foreign currency losses for the six months ended June 30, 2017 as compared to foreign currency gains of \$2.2 million for the six months ended June 30, 2016.

Provision for Income Taxes

Historical: The provision for income taxes for the six months ended June 30, 2017 was \$0.1 million, a decrease of \$39.4 million, or 99.7%, compared to a \$39.5 million provision for the six months ended June 30, 2016. The effective income tax rate for the six months ended June 30, 2017 was (2.6)% compared to (97.3)% for the six months ended June 30, 2016. The difference between the U.S. federal statutory income tax rate and our effective income tax rate for the six months ended June 30, 2017 was mainly due to the tax effect of repatriating foreign earnings back to the United States as dividends offset by lower tax rates in foreign jurisdictions as compared to the U.S. tax rate, foreign withholdings taxes, state taxes and non-deductible transaction costs.

Pro Forma: The provision for income taxes for the six months ended June 30, 2017 was \$0.1 million, a decrease of \$45.7 million, or 99.8%, compared to a \$45.8 million provision for the six months ended June 30, 2016. The effective income tax rate for the six months ended June 30, 2017 was (2.6)% compared to (7,633.3)% for the six months ended June 30, 2016.

The difference between the U.S. federal statutory income tax rate and our effective income tax rate for the six months ended June 30, 2017 was mainly due to the tax effect of repatriating foreign earnings back to the

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United States as dividends offset by lower tax rates in foreign jurisdictions as compared to the U.S. tax rate, foreign withholdings taxes, state taxes and non-deductible transaction costs.

Net Loss Attributable to PQ Group Holdings

Historical: For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net loss attributable to PQ Group Holdings Inc. was \$4.0 million for the six months ended June 30, 2017, a decrease of \$76.4 million, or 95.0%, as compared to a net loss of \$80.4 million for the six months ended June 30, 2016.

Pro Forma: For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net loss attributable to PQ Group Holdings Inc. was \$4.0 million for the six months ended June 30, 2017, a decrease of \$43.4 million, or 91.6%, as compared to a net loss of \$47.4 million for the six months ended June 30, 2016.

Historical and Pro Forma Adjusted Earnings before Interest, Taxes, Depreciation and Amortization (Adjusted EBITDA)

Summarized historical and pro forma Segment Adjusted EBITDA information is shown below in the following table.

	Historical		Pro Forma	
	Six months ended June 30,			
	2017	2016	Change	
	(dollars in millions)			
Segment Adjusted EBITDA ⁽¹⁾ :				
Performance Materials & Chemicals	\$ 118.9	\$ 119.7	\$(0.8)	(0.7)%
Environmental Catalysts & Services ⁽²⁾	120.7	103.6	17.1	16.5%
Total Segment Adjusted EBITDA ⁽³⁾	239.6	223.3	16.3	7.3%
Corporate	(15.6)	(15.5)	(0.1)	0.6%
Total Adjusted EBITDA ⁽³⁾	\$ 224.0	\$ 207.8	\$ 16.2	7.8%

- (1) We define Segment Adjusted EBITDA as EBITDA adjusted for certain items as noted in the reconciliation below. Our management evaluates the performance of our segments and allocates resources based primarily on Segment Adjusted EBITDA. Segment Adjusted EBITDA does not represent cash flow for periods presented and should not be considered as an alternative to net income as an indicator of our operating performance or as an alternative to cash flows as a source of liquidity. Segment Adjusted EBITDA may not be comparable with EBITDA or Adjusted EBITDA as defined by other companies.
- (2) The equity in net income included in the environmental catalysts and services segment for our Zeolyst Joint Venture was \$42.3 million and \$38.8 million for the six months ended June 30, 2017 and pro forma six months ended June 30, 2016, respectively
- (3) Our total Segment Adjusted EBITDA differs from our total consolidated Adjusted EBITDA due to unallocated corporate expenses.

Adjusted EBITDA for the six months ended June 30, 2017 was \$224.0 million, an increase of \$16.2 million, or 7.8%, compared with \$207.8 million on a pro forma basis for the six months ended June 30, 2016.

Performance Materials & Chemicals: Adjusted EBITDA for the six months ended June 30, 2017 was \$118.9 million, a decrease of \$0.8 million, or 0.7%, compared with \$119.7 million on a pro forma basis for the six months ended June 30, 2016. The decrease in Adjusted EBITDA was due to the effects of unfavorable foreign currency translation adjustments and higher raw material and variable production costs offset by higher volumes in North America and the Sovitec acquisition.

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Environmental Catalysts & Services: Adjusted EBITDA for the six months ended June 30, 2017 was \$120.7 million, an increase of \$17.1 million, or 16.5%, compared with \$103.6 million on a pro forma basis for the six months ended June 30, 2016. The increase in Adjusted EBITDA was due to higher sales from our Zeolyst Joint Venture, higher realization from sulfuric acid regeneration contract renewals and favorable operating costs from cost reduction initiatives.

A reconciliation of Segment Adjusted EBITDA and pro forma Segment Adjusted EBITDA to net loss and pro forma net loss attributable to PQ Group Holdings is as follows:

	Historical	Pro Forma
	Six months ended June 30,	
	2017	2016
(dollars in millions)		
Reconciliation of net loss attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA		
Net loss attributable to PQ Group Holdings Inc.	\$ (4.0)	\$ (47.4)
Provision for income taxes	0.1	45.8
Interest expense, net	95.0	94.0
Depreciation and amortization	83.2	79.5
EBITDA	174.3	171.9
Joint venture depreciation, amortization and interest ^(a)	5.5	5.2
Amortization of investment in affiliate step-up ^(b)	5.3	3.0
Amortization of inventory step-up ^(c)	0.9	—
Net loss on asset disposals ^(d)	2.9	2.3
Foreign currency exchange loss (gain) ^(e)	16.4	(2.2)
Non-cash revaluation of inventory, including LIFO	2.5	0.5
Management advisory fees ^(f)	2.5	2.8
Transaction and other related costs ^(g)	4.3	3.6
Equity-based and other non-cash compensation	2.8	3.2
Restructuring, integration and business optimization expenses ^(h)	3.1	13.3
Defined benefit plan pension cost ⁽ⁱ⁾	1.4	2.8
Other ^(j)	2.1	1.4
Adjusted EBITDA	224.0	207.8
Unallocated corporate expenses	15.6	15.5
Total Segment Adjusted EBITDA	<u>\$ 239.6</u>	<u>\$ 223.3</u>

- (a) We use Adjusted EBITDA as a performance measure to evaluate our financial results. Because our environmental catalysts and services segment includes our 50% interest in our Zeolyst Joint Venture, we include an adjustment for our 50% proportionate share of depreciation, amortization and interest expense of our Zeolyst Joint Venture.
- (b) Represents the amortization of the fair value adjustments associated with the equity affiliate investment in our Zeolyst Joint Venture as a result of the Business Combination. We determined the fair value of the equity affiliate investment and the fair value step-up was then attributed to the underlying assets of our Zeolyst Joint Venture. Amortization is primarily related to the fair value adjustments associated with inventory, fixed assets and intangible assets, such as customer relationships, formulations and product technology.
- (c) As a result of the Business Combination, there was a step-up in the fair value of inventory at PQ Holdings, which is amortized through cost of goods sold in the income statement.
- (d) We do not have a history of significant asset disposals. However, when asset disposals occur, we remove the impact of net gain/loss of the disposed asset because such impact primarily reflects the non-cash write-off of long-lived assets no longer in use.
- (e) Reflects the exclusion of the negative or positive transaction gains and losses of foreign currency in the income statement primarily related to the non-permanent intercompany debt denominated in local currency translated to U.S. dollars.

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- (f) Reflects consulting fees paid to CCMP and affiliates of INEOS for consulting services that include certain financial advisory and management services. These payments would cease as of the effective date of our initial public offering.
- (g) Relates to certain transaction costs described in our condensed consolidated financial statements for the quarter ended June 30, 2017 as well as other costs related to several transactions that are completed, pending or abandoned and that we believe are not representative of our ongoing business operations.
- (h) Includes the impact of restructuring, integration and business optimization expenses that are related to specific, one-time items, including severance for a reduction in force and post-merger integration costs that are not expected to recur.
- (i) Represents adjustments for defined benefit pension plan costs in our income statement. More than two-thirds of our defined benefit pension plan obligations are under defined benefit pension plans that are frozen and the remaining obligations primarily relate to plans operated in certain of our non-U.S. locations that, pursuant to jurisdictional requirements, cannot be frozen. As such, we do not view such expenses as core to our ongoing business operations.
- (j) Other costs consist of certain expenses that are not core to our ongoing business operations and are generally related to specific, one-time items, including environmental remediation-related costs associated with the legacy operations of our business prior to the Business Combination, capital and franchise taxes, non-cash asset retirement obligation accretion and the initial implementation of procedures to comply with Section 404 of the Sarbanes-Oxley Act.

Historical and Pro Forma—Year Ended December 31, 2016 Compared to the Year Ended December 31, 2015 (the Pro Forma Discussion Compares the Pro Forma Year Ended December 31, 2016 to the Pro Forma Year Ended December 31, 2015)

Highlights

The following is a summary of our financial performance for the year ended December 31, 2016 compared with the prior year ended December 31, 2015.

Sales

- *Historical:* Net sales increased \$675.3 million to \$1,064.2 million. The increase in sales was primarily due to the inclusion of \$690.5 million of legacy PQ sales included in our results of operations from May 4, 2016 through December 31, 2016, which was partly offset by a decrease of \$15.2 million in sales from our refining services product group.
- *Pro Forma:* Net sales decreased \$10.2 million to \$1,403.0 million. The decrease in sales was primarily due to unfavorable foreign currency exchange variations compared to the same period in the prior year (\$27.3 million), lower refining services pricing, which was primarily due to cost adjusted pass through contracts, and lower volumes in performance materials and chemicals, partially offset by higher volumes and higher average selling price and customer mix improvement in environmental catalysts and services.

Gross Profit

- *Historical:* Gross profit increased \$144.4 million to \$254.1 million. Our increase in gross profit was primarily due to the inclusion of \$142.6 million of legacy PQ gross profit included in our results of operations from May 4, 2016 through December 31, 2016.
- *Pro Forma:* Gross profit increased \$1.4 million to \$365.9 million. The increase in gross profit was driven primarily by favorable volume contribution and lower manufacturing costs in our environmental catalysts and services segment. This was offset by lower environmental catalysts and services pricing, the unfavorable effect of foreign currency translation totaling \$7.6 million and \$44.8 million of higher depreciation and amortization expense as a result of the step-up in asset values due to the Business Combination.

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Operating Income

- *Historical:* Operating income increased by \$28.4 million to \$84.2 million. Our operating income increased due to the inclusion of \$18.0 million of legacy PQ operating income included in our results of operations from May 4, 2016 through December 31, 2016 and \$10.4 million of operating income associated with our refining services product group.
- *Pro Forma:* Operating income decreased \$10.0 million to \$145.9 million. Our operating income decreased due to higher other operating expenses, primarily related to purchase accounting, restructuring, severance, and transaction costs.

Equity in Net (Loss) Income of Affiliated Companies

- *Historical:* Equity in net loss of affiliated companies was \$2.6 million which was primarily due to step up amortization related to our Zeolyst Joint Venture.
- *Pro Forma:* Equity in net income of affiliated companies was \$35.2 million, a decrease of \$5.9 million. The decrease was due to lower earnings generated by our Zeolyst Joint Venture, primarily from lower hydrocracking and specialty catalyst volumes, and due to various expansion and growth related cost increases.

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The following is our consolidated statement of operations and a summary of financial results, presented on a historical and pro forma basis, for the years ended December 31, 2016 and December 31, 2015. The historical results of operations include Eco for all periods presented and legacy PQ from May 4, 2016, the date of consummation of the Business Combination, through December 31, 2016. The unaudited pro forma results of operations reflect pro forma adjustments to the results of PQ Group Holdings to give effect to the Business Combination and the related financing transactions as if they had occurred on January 1, 2015.

	Historical				Pro Forma			
	Year ended December 31,		Change		Year ended December 31,		Change	
	2016	2015	\$	%	2016	2015	\$	%
	(in millions, except percentages)							
Sales	\$1,064.2	\$388.9	\$675.3	173.6%	\$ 1,403.0	\$1,413.2	\$(10.2)	(0.7)%
Cost of goods sold	810.1	278.8	531.3	190.6%	1,037.1	1,048.7	(11.6)	(1.1)%
Gross profit	254.1	110.1	144.0	130.8%	365.9	364.5	1.4	0.4%
<i>Gross profit margin</i>	23.9%	28.3%			26.1%	25.8%		
Selling, general and administrative expenses	107.6	34.6	73.0	211.0%	145.0	140.9	4.1	2.9%
Other operating expense, net	62.3	19.7	42.6	216.2%	75.0	67.7	7.3	10.8%
Operating income (loss)	84.2	55.8	28.4	50.9%	145.9	155.9	(10.0)	(6.4)%
<i>Operating income margin</i>	7.9%	14.3%			10.4%	11.0%		
Equity in net (loss) income of affiliated companies	(2.6)	—	(2.6)	—	35.2	41.1	(5.9)	(14.4)%
Interest expense, net	140.3	44.3	96.0	216.7%	187.9	199.6	(11.7)	(5.9)%
Debt extinguishment costs	13.8	—	13.8	—	1.8	—	1.8	—
Other (income) expense, net	(3.4)	—	(3.4)	—	(8.8)	21.3	(30.1)	(141.3)%
(Loss) income before income taxes and noncontrolling interest	(69.1)	11.5	(80.6)	(700.9)%	0.3	(23.9)	24.1	(100.8)%
Provision for income taxes	10.0	—	10.0	—	58.0	1.2	56.8	4,733.3%
<i>Effective tax rate</i>	(14.5)%	0.0%			22,295.0%	(4.8)%		
Net (loss) income	(79.1)	11.5	(90.6)	(787.8)%	(57.7)	(25.1)	(32.7)	130.3%
Less: Net income attributable to the noncontrolling interest	0.6	—	0.6	—	1.2	1.8	(0.6)	(33.3)%
Net (loss) income attributable to PQ Group Holdings Inc.	<u>\$ (79.7)</u>	<u>\$ 11.5</u>	<u>\$ (91.2)</u>	<u>(793.0)%</u>	<u>\$ (59.0)</u>	<u>\$ (26.9)</u>	<u>\$(32.1)</u>	<u>119.3%</u>

Sales

	Historical				Pro Forma			
	Year ended December 31,		Change		Year ended December 31,		Change	
	2016	2015	\$	%	2016	2015	\$	%
	(in millions, except percentages)							
Net Sales:								
Performance Materials & Chemicals	\$ 639.0	\$ —	\$639.0	—	\$ 947.2	\$ 966.1	\$(18.9)	(2.0)%
Environmental Catalysts & Services	426.7	388.9	37.8	9.7%	457.9	447.1	10.8	2.4%
Inter-segment sales eliminations	(1.5)	—	(1.5)	—	(2.1)	—	(2.1)	—
Total net sales	<u>\$1,064.2</u>	<u>\$388.9</u>	<u>\$675.3</u>	<u>173.6%</u>	<u>\$1,403.0</u>	<u>\$1,413.2</u>	<u>\$(10.2)</u>	<u>(0.7)%</u>

Historical Sales

Sales for the fiscal year ended December 31, 2016 were \$1,064.2 million, an increase of \$675.3 million, or 173.6%, compared to sales of \$388.9 million for the year ended December 31, 2015. The increase in sales in our

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performance materials and chemicals segment was due to the inclusion of legacy PQ sales of \$639.0 million in our results of operations for the period from May 4, 2016 to December 31, 2016. The increase in sales within our environmental catalysts and services segment was due to the inclusion of legacy PQ sales totaling \$53.0 million in our results of operations for the period from May 4, 2016 to December 31, 2016, partly offset by a decrease of \$15.2 million in sales from our refining services product group. The decrease in sales from our refining services product group was primarily due to lower pricing of \$29.7 million, partially offset by an increase in volumes of \$14.5 million. The lower pricing was driven by indexing to pass through lower raw material costs, mainly sulfur and natural gas. The higher volume was primarily driven by strong gasoline demand for the refining services product group, partly offset by lower virgin sulfuric acid shipments.

Pro Forma Sales

Performance Materials & Chemicals: Performance materials and chemicals sales for the year ended December 31, 2016 were \$947.2 million, a decrease of \$18.9 million, or 2.0%, compared to sales of \$966.1 million for the year ended December 31, 2015. The decrease in sales was primarily due to the unfavorable effects of foreign currency translation of \$25.1 million, partially offset by higher average selling price and customer mix of \$4.4 million and higher volumes of \$1.8 million.

The increase in volumes in performance materials and chemicals was the result of higher sales in precipitated silicas, spray dry silicate (in Europe) and strong customer demand for our personal care and microsphere products, which was partially offset by lower volumes of zeolite, beer gels, potassium silicate, spray dry silicate in the Americas, and microspheres within the performance materials product line. The lower demand in potassium silicate and spray dry silicate was due to lower drilling activity in North America. The higher average selling price is principally a result of favorable U.S. dollar denominated sales and U.S. dollar cost pass through pricing in certain foreign locations and higher selling prices for transportation safety and certain microsphere products, including hollow microspheres. Lower pricing for our cost adjusted pass through contracts in North America and lower microspheres customer mix partially offset this favorable pricing impact. The stronger U.S. dollar compared to a number of other major currencies, including the Canadian dollar, the Mexican peso, the British pound, and Brazilian real, unfavorably impacted our sales.

Environmental Catalysts & Services: Environmental catalysts and services sales for the year ended December 31, 2016 were \$457.9 million, an increase of \$10.8 million, or 2.4%, compared to sales of \$447.1 million for the year ended December 31, 2015. The increase in sales was primarily due to increased volumes of \$40.2 million, partially offset by lower average selling price, primarily from lower cost pass through pricing of \$27.2 million, and the unfavorable effects of foreign currency translation of \$2.2 million.

Environmental catalysts and services sales were higher from increased sales volumes, which were primarily driven by strong demand across multiple product lines, primarily in our silica catalyst product group serving the packaging and engineered plastics end uses and strong gasoline demand within our refining services product group. Average selling prices in the silica catalysts product group increased from favorable customer mix. This was partially offset by unfavorable indexing to lower pass through raw material costs, mainly sulfur and natural gas.

Gross Profit

Historical Gross Profit

Gross profit for the year ended December 31, 2016 was \$254.1 million, an increase of \$144.0 million, or 130.8% compared with \$110.1 million for the year ended December 31, 2015. The increase in gross profit was due to \$142.6 million attributable to the inclusion of legacy PQ in our results of operations for the period from May 4, 2016 to December 31, 2016 and an increase of \$1.4 million in gross profit from our refining services product group. The increase in refining services gross profit was due to lower manufacturing costs of

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\$30.6 million and higher volumes of \$10.2 million, which was offset by lower pricing and unfavorable customer mix of \$29.7 million and higher depreciation expense of \$9.7 million. The lower manufacturing costs were primarily driven by lower raw material pass through costs, including sulfur and natural gas, and from fixed plant cost reduction activities.

Pro Forma Gross Profit

Gross profit for the year ended December 31, 2016 was \$365.9 million, an increase of \$1.4 million, or 0.4% compared with \$364.5 million for the year ended December 31, 2015. The \$1.4 million of higher gross profit was due to lower manufacturing costs of \$35.5 million and higher volumes of \$15.9 million. The increase in gross profit was offset by increases in depreciation and amortization expense of \$19.0 million, lower average selling price of \$22.8 million, the unfavorable effects of foreign currency translation of \$7.6 million and unfavorable product mix of \$0.6 million.

The lower manufacturing costs were primarily driven by lower raw material pass-through costs, including sulfur, caustic and natural gas and by-product mix. The higher volume was primarily driven by strong demand across multiple product lines, including our silica catalyst product group serving the packaging and engineered plastics industries and our refining services product group, partially offset by lower volumes of higher margin potassium silicate and spray dry silicate (due to lower oil drilling activity) along with lower zeolite and beer gel volumes in the Americas. Our unfavorable variance in pricing relates to pass-through pricing of natural gas and sulfur.

Selling, General and Administrative Expenses

Historical: Selling, general and administrative expenses for the year ended December 31, 2016 were \$107.6 million, an increase of \$73.0 million compared with \$34.6 million for the year ended December 31, 2015. The increase in Selling, general and administrative was due to \$76.2 million attributable to the inclusion of legacy PQ in our results of operations for the period from May 4, 2016 to December 31, 2016, partly offset by \$3.2 million of lower Selling, general and administrative expenses from the benefit of cost reduction initiatives.

Pro Forma: Selling, general and administrative expenses for the year ended December 31, 2016 were \$145.0 million as compared with \$140.9 million for the year ended December 31, 2015.

Other Operating Expense, Net

Historical: Other operating expense, net for the year ended December 31, 2016 was \$62.3 million, an increase of \$42.6 million, or 216.2%, compared with \$19.7 million for the year ended December 31, 2015. The increase in other operating expense, net was due to \$48.4 million attributable to the inclusion of legacy PQ in our results of operations for the period from May 4, 2016 to December 31, 2016, partly offset by \$5.6 million of lower restructuring and severance related costs.

Pro Forma: Other operating expense, net for the year ended December 31, 2016 was \$75.0 million, an increase of \$7.3 million, or 10.8%, compared with \$67.7 million for the year ended December 31, 2015. The change was primarily driven by \$6.4 million of intangible asset impairment charges, \$6.1 million of higher restructuring and severance related charges and \$4.0 million from the absence of prior year nitrogen oxide credit sales. These changes were partly offset by lower transaction and other related costs of \$10.2 million. During the year ended December 31, 2015, we incurred separation charges related to an executive who left our company.

Equity in Net (Loss) Income of Affiliated Companies

Historical: Equity in net loss of affiliated companies for the year ended December 31, 2016 was \$2.6 million. The loss was due to the impact of \$36.3 million of amortization on the fair value step-up of the

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underlying assets of our Zeolyst Joint Venture in connection with the Business Combination, partly offset by \$33.2 million of earnings generated mainly by our Zeolyst Joint Venture from the Business Combination during the period from May 4, 2016 through December 31, 2016.

Pro Forma: Equity in net income of affiliated companies for the year ended December 31, 2016 was \$35.2 million, a decrease of \$5.9 million, compared with \$41.1 million for the year ended December 31, 2015. The decrease was primarily driven by lower contribution from reduced sales of hydrocracking and specialty catalysts and other various cost increases, partially offset by increased volume in pressure products (primarily due to emission regulations). Cost drivers include higher fixed costs and depreciation from expansion and inflation, and growth-related increases in selling, general and administrative and research and development expense, partly offset by favorable inventory absorption. Hydrocracking demand was down primarily due to the timing of re-fills as the products used in hydrocracking typically have a two-to-four year life cycle before they must be replaced.

Interest Expense, Net

Historical: Interest expense, net for the year ended December 31, 2016 was \$140.3 million, an increase of \$96.0 million, or 216.7%, as compared with \$44.3 million for the year ended December 31, 2015. Interest expense increased primarily due to higher third-party interest expense under our new debt structure compared to the legacy Eco debt structure on a standalone basis.

Pro Forma: Interest expense, net for the year ended December 31, 2016 was \$187.9 million, a decrease of \$11.7 million, or 5.9%, compared with \$199.6 million for the year ended December 31, 2015. Interest expense decreased primarily due to the repricing of our new debt structure during the year ended December 31, 2016.

Debt Extinguishment Costs

Historical: On May 4, 2016, and concurrently with the consummation of the Business Combination, the company refinanced its existing credit facilities. The company recorded \$4.7 million of new creditor and third-party financing costs fees as debt extinguishment costs. In addition, previous unamortized deferred financing costs of \$6.3 million and original issue discount of \$1.0 million associated with the old debt were written off as debt extinguishment costs.

On November 14, 2016, the company repriced its existing senior secured term loan facility. The company recorded \$0.5 million of new creditor and third-party financing costs fees as debt extinguishment costs. In addition, previously unamortized deferred financing costs of \$0.6 million and original issue discount of \$0.8 million associated with the previously outstanding debt were written off as debt extinguishment costs.

Pro Forma: On November 14, 2016, the company repriced its existing senior secured term loan facility. The company recorded \$0.5 million of new creditor and third-party financing costs fees as debt extinguishment costs. In addition, previously unamortized deferred financing costs of \$0.6 million and original issue discount of \$0.7 million associated with the old debt were written off as debt extinguishment costs.

Other (Income) Expense

Historical: Other income, net was \$3.4 million for the year ended December 31, 2016. Other income, net primarily consisted of \$3.6 million of foreign currency gains for the year ended December 31, 2016. The change in foreign currency for the year ended December 31, 2016 was driven by a weakening U.S. dollar (as compared to the prior year) on intercompany debt denominated in foreign currencies translated to U.S. dollars.

Pro Forma: Other income, net was \$8.8 million for the year ended December 31, 2016, a favorable change of \$30.1 million, compared with \$21.3 million of other expense, net for the year ended December 31, 2015. Other income, net primarily consisted of \$8.8 million of foreign currency gain for the year ended December 31,

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2016 as compared to a \$21.1 million loss for the year ended December 31, 2015. The change in foreign currency for the year ended December 31, 2016 was driven by a weakening U.S. dollar (as compared to the prior year) on intercompany debt denominated in foreign currencies translated to U.S. dollars.

Provision for Income Taxes

Historical: The provision for income taxes for the year ended December 31, 2016 was \$10.0 million. The effective income tax rate for the year ended December 31, 2016 was (14.5%). As a result of the Business Combination, Eco had a change in tax status. Eco was previously a partnership for tax purposes and, following the Business Combination, is taxed as a C-corporation. As a result of being a partnership, Eco had not previously recorded deferred taxes as its members were responsible for their respective tax liabilities. Upon the change in tax status, Eco's net deferred tax liability was recorded as a charge to the tax provision.

Pro Forma: The provision for income taxes for the year ended December 31, 2016 was \$58.0 million compared with a \$1.2 million provision for the year ended December 31, 2015. The effective income tax rate for the year ended December 31, 2016 was 22,295.0% compared to 4.8% for the year ended December 31, 2015. As a result of the Business Combination, Eco had a change in tax status. Eco was previously a partnership for tax purposes and, following the Business Combination, is taxed as a C-corporation. As a result of being a partnership, Eco had not previously recorded deferred taxes as its members were responsible for their respective tax liabilities. Upon the change in tax status, Eco's net deferred tax liability was recorded as a charge to the tax provision. The company's effective income tax rate fluctuates based on, among other factors, changes in income mix. The difference between the U.S. federal statutory income tax rate and the company's effective income tax rate for the years ended December 31, 2016 and 2015 was mainly due to the tax effect of repatriating foreign earnings back to the United States as dividends, differences between tax rates in foreign jurisdictions as compared to the U.S. tax rate, withholding taxes, and changes to reserves for uncertain tax positions.

Net (Loss) Income Attributable to PQ Group Holdings

Historical: For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net loss attributable to PQ Group Holdings Inc. was \$79.7 million for the year ended December 31, 2016 compared with net income of \$11.5 million for year ended December 31, 2015.

Pro Forma: For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net loss attributable to PQ Group Holdings was \$59.0 million for the year ended December 31, 2016 compared to a net loss of \$26.9 million for the year ended December 31, 2015.

Pro Forma Segment Adjusted Earnings Before Interest, Taxes, Depreciation and Amortization (Adjusted EBITDA)

Summarized Segment Adjusted EBITDA information is shown below in the following table.

	Pro Forma		Change	
	Year ended December 31,		\$	%
	2016	2015		
	(in millions, except percentages)			
Segment Adjusted EBITDA ⁽¹⁾ :				
Performance Materials & Chemicals	\$ 231.8	\$ 241.7	\$ (9.9)	(4.1)%
Environmental Catalysts & Services ⁽²⁾	221.8	190.8	31.0	16.3%
Total Segment Adjusted EBITDA ⁽³⁾	453.6	432.5	21.1	4.9%
Corporate ⁽⁴⁾	(32.8)	(19.4)	(13.4)	69.1%
Total Adjusted EBITDA ⁽³⁾	\$ 420.8	\$ 413.1	\$ 7.7	1.9%

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- (1) We define Segment Adjusted EBITDA as EBITDA adjusted for certain items as noted in the reconciliation below. Our management evaluates the performance of our segments and allocates resources based on several factors, of which the primary measure is Segment Adjusted EBITDA. Segment Adjusted EBITDA does not represent cash flow for periods presented and should not be considered as an alternative to net income as an indicator of our operating performance or as an alternative to cash flows as a source of liquidity. Segment Adjusted EBITDA may not be comparable with EBITDA or Adjusted EBITDA as defined by other companies.
- (2) The equity in net income included in the environmental catalysts and services segment for the Zeolyst Joint Venture was \$41.6 million and \$46.7 million for the years ended December 31, 2016 and 2015, respectively.
- (3) Our Total Segment Adjusted EBITDA differs from our total consolidated Adjusted EBITDA due to unallocated corporate expenses.
- (4) Included in Corporate in the year ended December 31, 2016 are \$5.5 million of corporate costs related to the environmental catalysts and services segment.

Adjusted EBITDA for the year ended December 31, 2016 was \$420.8 million, an increase of \$7.7 million, or 1.9%, compared with \$413.1 million for the year ended December 31, 2015.

Performance Materials & Chemicals: Adjusted EBITDA for the year ended December 31, 2016 was \$231.8 million, a decrease of \$9.9 million, or 4.1%, compared with \$241.7 million for the year ended December 31, 2015.

The decrease in Adjusted EBITDA was primarily due to the unfavorable effect of foreign currency translation of \$6.3 million, prior year nitrogen oxide credit sales of \$4.0 million that were not in the current year, and lower volumes of higher margin potassium silicate and spray dry silicate (due to lower oil drilling activity) along with lower zeolite and beer gel volumes in the Americas. This was partially offset by higher selling prices and mix improvements primarily from increased sales of higher margin specialty silicas, magnesium silicate, and spray dry silicates (in Europe), reduced sales of lower margin sodium silicates and improved mix in transportation safety.

Environmental Catalysts & Services: Adjusted EBITDA for the year ended December 31, 2016 was \$221.8 million, an increase of \$31.0 million, or 16.3%, compared with \$190.8 million for the year ended December 31, 2015.

The increase in Adjusted EBITDA was due to higher volume primarily driven by strong demand across multiple product lines, including our silica catalyst product group serving the packaging and engineered plastics industries and our refining services product group and lower fixed plant cost reductions and plant turnaround expense. This was partially offset by the unfavorable effect of foreign currency translation of \$1.0 million and unfavorable product mix.

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A reconciliation of Segment Adjusted EBITDA to our pro-forma net income (loss) is as follows:

	Pro Forma	
	Year ended December 31,	
	2016	2015
	(in millions, except percentages)	
Reconciliation of pro forma net loss attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA		
Net loss attributable to PQ Group Holdings Inc.	\$ (59.0)	\$ (26.9)
Provision for income taxes	58.0	1.2
Interest expense, net	187.9	199.6
Depreciation and amortization	165.8	152.2
EBITDA	352.7	326.1
Joint venture depreciation, amortization and interest ^(a)	10.3	7.9
Amortization of investment in affiliate step-up ^(b)	5.8	6.6
Amortization of inventory step-up ^(c)	4.9	—
Impairment of long-lived and intangible assets	6.9	0.4
Debt extinguishment costs	1.8	—
Net loss on asset disposals ^(d)	4.8	5.5
Foreign currency exchange loss (gain) ^(e)	(9.0)	21.1
Non-cash revaluation of inventory, including LIFO	1.3	(2.1)
Management advisory fees ^(f)	5.3	5.6
Transaction and other related costs ^(g)	2.6	13.2
Equity-based and other non-cash compensation	6.5	4.2
Restructuring, integration and business optimization expenses ^(h)	17.9	8.6
Defined benefit plan pension cost ⁽ⁱ⁾	2.8	6.1
Transition services ^(j)	—	4.9
Other ^(k)	6.0	5.1
Adjusted EBITDA	420.8	413.1
Unallocated corporate expenses	32.8	19.4
Total Segment Adjusted EBITDA	<u>\$ 453.6</u>	<u>\$ 432.5</u>

- (a) We use Adjusted EBITDA as a performance measure to evaluate our financial results. Because our environmental catalysts and services segment includes our 50% interest in our Zeolyst Joint Venture, we include an adjustment for our 50% proportionate share of depreciation, amortization and interest expense of our Zeolyst Joint Venture.
- (b) Represents the amortization of the fair value adjustments associated with the equity affiliate investment in our Zeolyst Joint Venture as a result of the Business Combination. We determined the fair value of the equity affiliate investment and the fair value step-up was then attributed to the underlying assets of our Zeolyst Joint Venture. Amortization is primarily related to the fair value adjustments associated with inventory, fixed assets and intangible assets, such as customer relationships, formulations and product technology.
- (c) As a result of the Business Combination, there was a step-up in the fair value of inventory at PQ Holdings, which is amortized through cost of goods sold in the income statement.
- (d) We do not have a history of significant asset disposals. However, when asset disposals occur, we remove the impact of net gain/loss of the disposed asset because such impact primarily reflects the non-cash write-off of long-lived assets no longer in use.
- (e) Reflects the exclusion of the negative or positive transaction gains and losses of foreign currency in the income statement primarily related to the non-permanent intercompany debt denominated in local currency translated to U.S. dollars.
- (f) Reflects consulting fees paid to CCMP and affiliates of INEOS for consulting services that include certain financial advisory and management services. These payments will cease as of the effective date of our initial public offering.

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- (g) Relates to certain transaction costs described elsewhere in our consolidated financial statements included in this prospectus as well as other costs related to several transactions that are either completed, pending or abandoned and that we believe are not representative of our ongoing business operations.
- (h) Includes the impact of restructuring, integration and business optimization expenses that are related to specific, one-time items, including severance for a reduction in force and post-merger integration costs that are not expected to recur.
- (i) Represents adjustments for defined benefit pension plan costs in our income statement. More than two-thirds of our defined benefit pension plan obligations are under defined benefit pension plans that are frozen and the remaining obligations primarily relate to plans operated in certain of our non-U.S. locations that, pursuant to jurisdictional requirements, cannot be frozen. As such, we do not view such expenses as core to our ongoing business operations.
- (j) Represents costs under a transition services agreement with Solvay that provided certain transition services to legacy Eco by Solvay following the 2014 Acquisition. The transition services agreement ended in 2015.
- (k) Other costs consist of certain expenses that are not core to our ongoing business operations and are generally related to specific, one-time items, including environmental remediation-related costs associated with the legacy operations of our business prior to the Business Combination, capital and franchise taxes, non-cash asset retirement obligation accretion and the initial implementation of procedures to comply with Section 404 of the Sarbanes-Oxley Act.

Year Ended December 31, 2015 Compared to the Period from Inception (July 30, 2014) to December 31, 2014 (Successor Period) and the Period from January 1, 2014 to November 30, 2014 (Predecessor Period)

The following is our consolidated statement of operations and a summary financial performance for the year ended December 31, 2015, the period from inception (July 30, 2014) to December 31, 2014 ("Successor" period) and the period from January 1, 2014 to November 30, 2014 ("Predecessor" period) and should be read in conjunction with our historical audited financial statements and notes thereto included elsewhere in this prospectus. These results of operations include legacy Eco for all periods presented and may not be comparable to our financial statements for periods following the Business Combination.

Highlights

The following is a summary of our financial performance for the year ended December 31, 2015 compared with the Successor period and Predecessor period.

	Historical	
	Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
Year ended December 31, 2015	(in millions, except percentages)	
Sales	\$ 388.9	\$ 35.5
Cost of goods sold	278.8	30.2
Gross profit	110.1	5.3
<i>Gross profit margin</i>	28.3%	14.9%
Selling, general and administrative expenses	34.6	2.6
Other operating expense, net	19.7	16.3
Operating income (loss)	55.8	(13.6)
<i>Operating income margin</i>	14.3%	(38.3)%
Interest expense, net	44.3	8.5
Income (loss) before income taxes	11.5	(22.1)
Provision for income taxes	—	—
<i>Effective tax rate</i>	0.0%	0.0%
Net income (loss)	\$ 11.5	\$ (22.1)
	\$ 361.8	\$ 265.8
	96.0	26.5%
	45.2	5.6
	45.2	12.5%
	0.1	45.1
	14.6	32.3%
	\$ 30.5	

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Sales

	Historical	
	Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
Year ended December 31, 2015	December 31, 2014	
(in millions, except percentages)		
Net Sales:		
Performance Materials & Chemicals	\$ —	\$ —
Environmental Catalysts & Services	388.9	35.5
Inter-segment sales eliminations	—	—
Total net sales	<u>\$ 388.9</u>	<u>\$ 35.5</u>
		<u>\$ 361.8</u>

Sales for the year ended December 31, 2015, the Successor period and the Predecessor period was \$388.9 million, \$35.5 million and \$361.8 million, respectively. Virgin sulfuric acid sales decreased due to lower pricing related to raw material (sulfur) costs passed through to customers and reduced volumes to a large customer. This was partially offset by an increase in regeneration volumes.

Gross Profit

Gross profit for the year ended December 31, 2015, the Successor period and Predecessor period was \$110.1 million, \$5.3 million and \$96.0, respectively. The increase in gross profit was primarily due to lower sulfur and natural gas prices, fixed plant costs and lower freight transportation costs.

Selling, General and Administrative Expenses

Selling, general and administrative expenses for the year ended December 31, 2015, the Successor period and Predecessor period was \$34.6 million, \$2.6 million and \$45.2 million, respectively. The decrease was primarily due to a lower depreciation expense in selling, general and administrative expense. Partially offsetting this decrease was an increase in certain selling, general and administrative expenses, due to post-acquisition transition costs associated with the 2014 Acquisition, including the costs of the Solvay transition services agreement, stock-based compensation expense, higher salaries, fringe benefits and severance expense, plus increased professional fees for accounting, legal and other advisory services.

Other Operating Expense, Net

Other operating expense, net for the year ended December 31, 2015, the Successor period and Predecessor period was \$19.7 million, \$16.3 million and \$5.6 million, respectively. The decrease in operating expense, net was primarily due to one-time transaction fees incurred in the Successor and Predecessor periods related to the 2014 Acquisition.

Interest Expense, Net

Interest expense, net for the year ended December 31, 2015, the Successor period and Predecessor period was \$44.3 million, \$8.5 million and \$0.1 million, respectively. The increase in interest expense was due to a full year of interest expense in 2015 for the \$700.0 million of new debt obligations related to the Eco's senior secured credit facilities and Eco's 8.5% senior unsecured notes due 2022 issued on December 1, 2014.

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Provision for Income Taxes

Eco was a single member limited liability company, treated as a partnership for federal and state income tax purposes. All income tax liabilities and/or benefits of Eco were passed through to the member. As such, no recognition of federal or state income taxes for Eco was provided for in the Successor period financial statements.

For the Predecessor period financial statements, income taxes have been prepared on a separate return basis as if Solvay's Eco Services business unit was a stand-alone entity. Historically, Solvay's Eco Services business unit was included in the tax filings with other Solvay entities. Solvay's Eco Services business unit's tax results as presented are not reflective of the results that Eco generated following the 2014 Acquisition or would have generated on a stand-alone basis.

Net Income (Loss)

For the foregoing reasons, net income (loss) for the year ended December 31, 2015, the Successor period and the Predecessor period was \$11.5 million, \$(22.1) million and \$30.5 million, respectively.

Financial Condition, Liquidity and Capital Resources

Our primary sources of liquidity consist of cash flow from operations, existing cash balances as well as funds available under our asset based lending revolving credit facility. We expect that ongoing requirements for debt service and capital expenditures will be funded from these sources. Our primary liquidity requirements include funding working capital requirements (primarily inventory and accounts receivable, net of accounts payable and other accrued liabilities), debt service requirements and capital expenditures. Our capital expenditures include both maintenance capital, which includes spending on maintenance of business and health, safety and environmental initiatives, and expansion capital, which includes spending to drive organic sales growth and cost savings initiatives. For the six months ended June 30, 2017, we spent approximately \$36.7 million in maintenance capital expenditures and \$17.5 million in expansion capital expenditures. For the year ended December 31, 2016, we spent approximately \$98.7 million in maintenance capital expenditures and \$31.6 million in expansion capital expenditures.

We believe that our existing cash, cash equivalents and cash flows from operations, combined with availability under our asset based lending revolving credit facility, will be sufficient to meet our presently anticipated future cash needs for at least the next 12 months. We may also pursue strategic acquisition opportunities, which may impact our future cash requirements. We may, from time to time, increase borrowings under our asset based lending revolving credit facility to meet our future cash needs. As of June 30, 2017, we had cash and cash equivalents of \$50.5 million and availability of \$105.2 million under our asset based lending revolving credit facility, after giving effect to \$19.6 million of outstanding letters of credit and \$65.0 million of revolving credit facility borrowings, for a total available liquidity of \$155.6 million. As of June 30, 2017, we were in compliance with all covenants under our debt agreements.

Included in our cash and cash equivalents balance as of June 30, 2017 was \$43.5 million of cash and cash equivalents held in foreign jurisdictions. We repatriate cash held outside of the United States from certain foreign subsidiaries in order to meet domestic liquidity needs. In certain cases, the repatriation of foreign cash under current U.S. tax laws is subject to income taxes. We have an intercompany loan structure in place with several of our foreign subsidiaries that allows us, under current U.S. tax laws, to repatriate foreign cash in a tax efficient manner from those subsidiaries. Depending on domestic and foreign cash needs, we have the flexibility to repatriate foreign cash to meet our future liquidity needs, subject to satisfaction of any applicable U.S. income taxes.

As of June 30, 2017, our total indebtedness was \$2,728.4 million, with up to \$105.2 million of available borrowings under our asset based lending revolving credit facility. Our liquidity requirements are significant, primarily due to debt service requirements. As reported, our cash interest expense for the six months ended

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June 30, 2017 and 2016 was approximately \$91.7 million and \$35.1 million, respectively. Before any impact of hedges, a one percent change in assumed interest rates for our variable interest credit facilities would have an annual impact of approximately \$17.7 million on interest expense. Our ability to make payments on and to refinance our indebtedness will depend on our ability to generate cash in the future.

Cash Flow

	Six months ended June 30,		Year ended December 31,		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
	2017	2016	2016	2015		
(in millions)						
Net cash provided by (used in)						
Operating activities	\$ 21.8	\$ (4.4)	\$ 119.7	\$ 44.7	\$ (2.1)	\$ 57.6
Investing activities	(103.5)	(1,831.5)	(1,929.7)	(38.7)	(888.3)	(32.9)
Financing activities	66.8	1,859.5	1,861.4	(3.4)	913.0	(24.7)
Effect of exchange rate changes on cash and cash equivalents	(5.3)	(1.3)	(5.9)	—	—	—
Net change in cash and cash equivalents	(20.2)	22.3	45.5	2.6	22.6	—
Cash and cash equivalents at beginning of period	70.7	25.2	25.2	22.6	—	—
Cash and cash equivalents at end of period	<u>\$ 50.5</u>	<u>\$ 47.5</u>	<u>\$ 70.7</u>	<u>\$ 25.2</u>	<u>\$ 22.6</u>	<u>\$ —</u>

	Six months ended June 30,		Year ended December 31,		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
	2017	2016	2016	2015		
(in millions)						
Working capital changes that provided (used) cash:						
Receivables	\$ (44.0)	\$ (8.0)	\$ 27.8	\$ (0.3)	\$ (7.9)	\$ (4.1)
Inventories	2.0	2.8	(2.3)	(1.7)	4.9	(5.2)
Prepays and other current assets	(1.4)	0.6	0.5	20.1	(2.2)	—
Accounts payable	(7.4)	(7.9)	11.9	(2.5)	(1.6)	6.8
Accrued liabilities	(25.8)	(17.2)	(24.8)	(13.8)	23.3	2.6
Other, net	(1.4)	(2.4)	(6.8)	(4.8)	0.2	(5.8)
	<u>\$ (78.0)</u>	<u>\$ (32.1)</u>	<u>\$ 6.3</u>	<u>\$ (3.0)</u>	<u>\$ 16.7</u>	<u>\$ (5.7)</u>

Six Months Ended June 30, 2017 Compared to the Six Months Ended June 30, 2016

Net cash provided by operating activities was \$21.8 million for the six months ended June 30, 2017 compared to \$4.4 million of cash used in the six months ended June 30, 2016. Cash generated by operating earnings after giving effect to non-cash items recognized in the income statement during the period was higher during the six months ended June 30, 2017 by \$72.0 million compared to the same period in the prior year. Cash used in working capital during the six months ended June 30, 2017 was unfavorable compared to the six months ended June 30, 2016. Working capital for the six months ended June 30, 2017 used cash of \$78.0 million compared to cash used of \$32.1 million for the six months ended June 30, 2016.

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The increase in non-cash items of \$72.0 million as compared to the prior year period was due to a decrease in our net loss of \$76.1 million, an increase of \$41.2 million of depreciation and amortization expense, \$14.9 million of dividends received from affiliated companies, \$13.3 million of foreign currency losses, and \$2.0 million of amortization of deferred financing costs and original issue discount, which was partially offset by \$31.3 million of deferred tax benefits, \$19.3 million of net income from affiliated companies, \$16.8 million of lower acquisition accounting valuation adjustments on inventory sold, \$7.2 million of lower debt extinguishment costs, and \$2.8 million of pension and postretirement plan net funding.

The decrease in cash from working capital of \$45.9 million compared to the prior year was primarily due to unfavorable changes in accounts receivable, accrued liabilities, prepaid and other current assets and inventories. The unfavorable change was partially offset by favorable changes in accounts payable and other liabilities.

The unfavorable change in accounts receivable was due primarily to higher accounts receivables from higher current year pricing and volumes. The favorable change in accounts payable is due to timing of payments for capital expenditures. The unfavorable change in accrued liabilities is primarily due to the timing of accrued interest under our new debt structure and various other accruals.

Net cash used in investing activities was \$103.5 million for the six months ended June 30, 2017 compared to cash used of \$1,831.5 million during the same period in 2016. Current year uses of cash include utilizing \$60.6 million to fund capital expenditures and \$41.6 million to fund the Sovitec acquisition. Prior year uses of cash include utilizing \$1,777.7 million to fund the Business Combination and \$38.5 million to fund capital expenditures.

Net cash provided by financing activities was \$66.8 million for the six months ended June 30, 2017 compared to \$1,859.5 million during the same period in 2016. The change in cash from financing activities was primarily driven by the issuance of \$2,291.4 million in debt, net of financing fees, related to the Business Combination in the prior year, partially offset by \$466.8 million in lower debt repayments and \$37.0 million in net revolver borrowings in the current year.

Year Ended December 31, 2016 Compared to the Year Ended December 31, 2015

Net cash provided by operating activities was \$119.7 million for the year ended December 31, 2016, compared to \$44.7 million provided during the same period in the year ended December 31, 2015. Cash generated by operating earnings after giving effect to non-cash items recognized in the income statement during the period was higher during the year ended December 31, 2016 by \$65.8 million compared to the same period in the prior year. Cash provided by working capital during the year ended December 31, 2016 was favorable compared to the year ended December 31, 2015. Working capital for the year ended December 31, 2016 provided cash of \$6.3 million, compared to cash used of \$3.0 million for the year ended December 31, 2015.

The increase in non-cash items of \$65.8 million as compared to the prior year was due to an increase of \$89.3 million of depreciation and amortization expense, \$29.1 million of acquisition accounting valuation adjustments on inventory sold, \$8.6 million of debt extinguishment costs, \$11.1 million of pension and postretirement plan net funding and \$7.6 million of dividends received from affiliates, which was partially offset by \$90.6 million of lower net income.

The increase in cash from working capital of \$9.3 million compared to the prior year was primarily due to favorable changes in accounts receivable and accounts payable, partially offset by unfavorable changes in prepaid and other current assets, accrued liabilities and other long-term assets and liabilities.

The favorable change in accounts receivable was due primarily to \$1.2 million of lower accounts receivable from lower current year pricing and higher collections and \$26.9 million due to the impact from the Business Combination. The favorable change in accounts payable includes \$12.5 million favorability from timing of current year plant turnaround capital expenditures and higher raw material and transportation purchases.

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The unfavorable change in prepaid expenses and other current assets was due to decreases in other receivable balances, mainly the prior year legacy Eco collection of \$23.3 million from Solvay related to the 2014 Acquisition. The unfavorable change in accrued liabilities was mainly due to the timing of various accruals.

Net cash used in investing activities was \$1,929.7 million for the year ended December 31, 2016, compared to cash used of \$38.7 million during the same period in 2015. The increase in current year cash used in investing activities compared to the prior year was primarily due to the Business Combination activity, net of cash acquired in the Business Combination of \$1,777.7 million, increases in capital spending of \$80.4 million and increases in loans receivable of \$15.6 million and related increases in restricted cash of \$14.8 million under the NMTC financing. The capital expenditures increase was primarily due to \$75.4 million related to the companies acquired as part of the Business Combination and \$5.0 million in capital spending. Higher current year strategic project costs were partly offset by lower plant turnaround expenses.

Net cash provided by financing activities was \$1,861.4 million for the year ended December 31, 2016, compared to net cash used of \$3.4 million during the same period in 2015. The change in cash from financing activities was primarily driven by \$1,865.0 million debt issuance activity from the Business Combination, net of repayments, \$22.0 million net revolver payments in 2016, recent stock purchase activity of \$2.5 million and payments of \$1.6 million related to hedge premiums. This was partially offset by \$22.0 million of cash received under the issuance of long-term debt under the NMTC financing and \$5.1 million of current year equity contributions, most of which resulted from the Business Combination.

Year Ended December 31, 2015 Compared to the Period from Inception (July 30, 2014) to December 31, 2014 (Successor Period) and the Period from January 1, 2014 to November 30, 2014 (Predecessor Period)

Cash Flows from Operating Activities—Successor Period

Net cash provided by operating activities was \$44.7 million for the year ended December 31, 2015. The net cash provided by operating activities was the result of net income of \$11.4 million, adjusted for noncash items of \$36.2 million for depreciation, amortization, amortization of debt issuance costs, accretion of debt discount, pension expense, loss on disposal of fixed assets and stock-based compensation expense. Routine operating activities produced cash of \$20.1 million through net changes in prepaid expenses and other current assets. These activities were offset by certain routine operating activities, which used cash of \$23.1 million represented by net changes in accounts receivable, inventories, accounts payable, accrued expenses and other assets and liabilities.

Net cash used in operating activities for the period from inception (July 30, 2014) to December 31, 2014 (Successor period) was the result of a net loss of \$22.1 million, adjusted for noncash items of \$3.2 million for depreciation, amortization, including amortization of debt issuance costs, accretion of debt discount and \$16.8 million of cash provided for routine operating activities represented by net changes in accounts receivable, other receivables, inventories, prepaid expenses, accounts payable, other payables, other current liabilities, accrued expenses and other long-term liabilities. For the Successor period, routine operating activities produced cash through a decrease in inventory of \$4.9 million and an increase in accrued liabilities of \$23.3 million. This was partially offset by an increase in accounts receivable of \$7.9 million, an increase in prepaid and other current assets of \$2.2 million and a decrease in accounts payable of \$1.6 million.

Cash Flows from Operating Activities—Predecessor Period

Net cash provided by operating activities for the period from January 1, 2014 to November 30, 2014 (Predecessor period) was the result of net income of \$30.5 million, adjusted for noncash items of \$32.7 million for depreciation, amortization, stock-based compensation and deferred income tax expense, and \$5.7 million of cash used for routine operating activities, represented by changes in accounts receivable, other receivables, inventories, prepaid expenses, accounts payable, accrued expenses, other long-term liabilities and long-term deferred revenue. For the Predecessor period, routine operating activities used cash through an increase in

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accounts receivable of \$4.1 million, an increase in inventories of \$5.2 million and a decrease in other assets and liabilities of \$5.8 million. This was partially offset by an increase in accounts payable of \$6.8 million and an increase in accrued liabilities of \$2.6 million.

Cash Flows from Investing Activities—Successor Period

Net cash used for investing activities was \$38.7 million for the year ended December 31, 2015 due to purchases of property, plant, and equipment and intangible assets.

Net cash used for investing activities for the Successor period was \$888.3 million, primarily as the result of cash paid for the 2014 Acquisition of \$885.4 million and \$2.9 million for capital expenditures.

Cash Flows from Investing Activities—Predecessor Period

Net cash used for investing activities for the Predecessor period was \$32.9 million resulting primarily from capital expenditures.

Cash Flows from Financing Activities—Successor Period

Net cash used in financing activities was \$3.4 million for the year ended December 31, 2015, primarily due to \$5.0 million repayment of term loan borrowings, partially offset by proceeds from issuance of member's equity of \$1.5 million. Eco borrowed and repaid \$12 million from its revolving credit facility during the year ended December 31, 2015.

Net cash provided by financing activities for the Successor period was \$913.0 million. Cash provided from financing activities was the result of funding the 2014 Acquisition, including \$239.9 million from the issuance of members' equity, \$497.5 million proceeds from issuance senior secured credit facilities borrowings, net of discount, and \$200.0 million proceeds from the issuance of senior unsecured notes, partially offset by debt issuance costs of \$24.4 million.

Cash Flows from Financing Activities—Predecessor Period

Net cash used for financing activities was \$24.9 million for the Predecessor period, which included \$24.7 million in net transfers to Solvay.

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Debt

	As of	As of December 31,	
	June 30,	2016	2015
	2017	(in millions)	
Term Loan Facility (U.S. dollar denominated)	\$ 920.8	\$ 925.4	\$ —
Term Loan Facility (Euro denominated)	321.7	297.3	—
6.75% Senior Secured Notes due 2022	625.0	625.0	—
Floating Rate Senior Unsecured Notes due 2022	525.0	525.0	—
8.5% Senior Notes due 2022	200.0	200.0	200.0
Eco Senior secured credit facilities	—	—	495.0
ABL Facility	65.0	—	—
Other	70.9	45.2	—
Total debt	2,728.4	2,617.9	695.0
Original issue discount	(26.4)	(28.4)	(2.2)
Deferred financing costs	(26.0)	(27.3)	(19.7)
Total debt, net of original issue discount and deferred financing costs	\$ 2,676.0	\$ 2,562.2	\$ 673.1
Less: current portion	(86.3)	(14.5)	(5.0)
Total long term debt, net of original issue discount and deferred financing costs	\$ 2,589.7	\$ 2,547.7	\$ 668.1

As of June 30, 2017 our total debt was \$2,728.4 million, including \$2.3 million of other foreign debt and \$51.8 million of notes payable for the NMTC financing and excluding the original issue discount of \$26.4 million and deferred financing fees of \$26.0 million for our senior secured credit facilities and notes. Our net debt was \$2,623.8 million, excluding \$2.3 million of other foreign debt, \$51.8 million of NMTC, and including cash of \$50.5 million. Our total available liquidity as of June 30, 2017 was \$155.6 million, which represents our cash on hand of \$50.5 million plus our excess availability under our asset based lending revolving credit facility of \$105.2 million, after giving effect to \$19.6 million of outstanding letters of credit and \$65.0 million of ABL revolver borrowings. For a further description of our outstanding indebtedness, see “Description of Certain Indebtedness.”

Capital Expenditures

Maintenance capital expenditures include spending on maintenance of business, cost savings initiatives and health, safety and environmental initiatives. Expansion capital expenditures include spending to drive organic sales growth. These capital expenditures represent our “book” capital expenditures for which the company has recorded, but not necessarily paid for the capital expenditures.

	Six months ended		Year ended		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
	June 30,	June 30,	December 31,	December 31,		
	2017	2016	2016	2015		
	(in millions)					
Maintenance capital expenditures	\$ 36.7	\$ 25.8	\$ 98.7	\$41.0	\$ 2.9	\$ 32.7
Expansion capital expenditures	17.5	12.7	31.6	0.9	—	—
Total capital expenditures	\$ 54.2	\$ 38.5	\$130.3	\$41.9	\$ 2.9	\$ 32.7

Capital expenditures remained at a level sufficient for required maintenance and certain expansion growth initiatives during these periods. Maintenance capital expenditures are higher in the year ended December 31,

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2016 due mainly to the Business Combination, partly offset by lower current year refining services plant turnaround maintenance costs. Expansion capital expenditures are higher in the year ended December 31, 2016 due to timing of our expansion projects related to our strategic growth and cost reduction initiatives, each from the Business Combination and in our refining services product group.

Pension Funding

We paid \$3.6 million and \$0.3 million in cash contributions into our defined benefit pension plans and other post-retirement plans during the six months ended June 30, 2017 and 2016, respectively. The periodic pension expense was \$2.1 million and \$1.6 million for those same periods, respectively.

We paid \$2.9 million and \$14.9 million in cash contributions into our defined benefit pension plans and other post-retirement plans during the years ended December 31, 2016 and 2015, respectively. Included in the 2015 cash contributions, legacy Eco paid \$4.3 million in start-up contributions for the new defined benefit plan associated with the spin-off from Solvay in December 2014. The periodic pension expense was \$2.0 million and \$2.9 million for those same periods, respectively.

As of December 31, 2016, our pension plans and other post-retirement benefit plans were underfunded by \$68.4 million and \$4.6 million, respectively. In addition, our supplemental retirement plan had a liability of \$13.2 million, which is funded by our general assets, including assets held in a Rabbi trust of \$5.6 million, or restoration plan assets.

Off-Balance Sheet Arrangements

We had \$19.6 million and \$18.4 million of outstanding letters of credit on our revolver facility as of June 30, 2017 and December 31, 2016, respectively.

Contractual Obligations and Commitments

The following table reflects our contractual obligations, commercial commitments and long-term debt obligations as of December 31, 2016. As of June 30, 2017, there had been no material changes to such contractual obligations, commercial commitments and long-term debt.

	Payments due by period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 yrs
Long-term debt(a)	\$ 2,617.9	\$ 14.5	\$ 24.6	\$ 45.6	\$ 2,533.2
Interest payments(b)	1,022.7	187.4	372.8	370.4	92.1
Operating leases	55.6	16.5	17.3	10.2	11.6
Purchase obligations(c)	34.3	17.2	12.1	1.6	3.4
Other obligations(d)	21.4	9.5	3.3	2.9	5.7
Total contractual obligations	<u>\$ 3,751.9</u>	<u>\$ 245.1</u>	<u>\$ 430.1</u>	<u>\$ 430.7</u>	<u>\$ 2,646.0</u>

- (a) No prepayment or redemption of any of our long-term debt balances has been assumed. Refer to “Financial Condition, Liquidity and Capital Resources” section of this Management’s Discussion and Analysis and Note 15, Long-term Debt, in the Notes to the Audited Consolidated Financial Statements of PQ Group Holdings Inc. and Subsidiaries included elsewhere in this prospectus for information regarding the terms of our long-term debt agreements. For a further description of our outstanding indebtedness, see “Description of Certain Indebtedness.”
- (b) Interest on long-term debt excludes the amortization of deferred financing fees and original issue discount. The amounts represent minimum interest payments. All future interest payments on Euro-denominated loans were calculated using a December 31, 2016 Euro to U.S. Dollar spot exchange rate.

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- (c) Purchase obligations include agreements to purchase goods and services that are enforceable and legally binding and that specify all significant terms, including fixed and minimum quantities to be purchased, fixed, minimum or variable provisions, and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable without penalty.
- (d) Other obligations represent payments related to our pension plans, supplemental retirement plans and other post-retirement benefit plans. Included in these amounts are expected pension plan contributions of \$7.7 million in 2017. Contributions to the pension plan beyond 2016 cannot be reasonably estimated and are not reflected in this table.

We expect that we will be able to fund our remaining obligations and commitments with cash flow from operations. To the extent we are unable to fund these obligations and commitments with cash flow from operations, we intend to fund these obligations and commitments with proceeds from available borrowing capacity under our ABL Facility or under future financings.

Critical Accounting Policies

We prepare our consolidated financial statements in conformity with GAAP and our significant accounting policies are described in Note 2 to our consolidated financial statements. The preparation of financial statements in conformity with GAAP requires us to make estimates and assumptions that affect reported amounts and related disclosures. We base our estimates and judgments on historical experience and other relevant factors that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. We have identified below the accounting policies and estimates that we believe are most critical in compiling our consolidated statements of financial condition and operating results.

Business Combinations

We record acquisitions using the acquisition method of accounting and accordingly, the results of operations of the businesses we acquire are included in our consolidated financial statements from the date control is obtained of each respective acquisition. The acquisition purchase price for each business is allocated based on the fair values of the assets acquired, liabilities assumed and any noncontrolling interest in the acquired entity. Acquisition-related costs attributable to a business combination are expensed as incurred and are not included in the cost allocated to the acquired assets and assumed liabilities. Goodwill is an asset representing the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recognized. Goodwill as of the acquisition date is measured as the excess of the fair value of consideration transferred over the fair values of the net assets acquired.

The valuation of the net assets acquired in a business combination is subject to estimation, in particular around intangible assets other than goodwill and property, plant and equipment. To assist in the valuation of these assets, we typically utilize a third-party valuation specialist. Significant intangible assets other than goodwill acquired include customer relationships, technical know-how, trade names and trademarks. We generally value acquired intangibles other than goodwill using an income approach, namely the relief-from-royalty method for trade names, trademarks and technical know-how, and the multi-period excess earnings method for customer relationships. Key assumptions underlying the respective income approach methodologies include projected sales, estimated economic lives of the assets, discount and royalty rates, and contributory asset charges. We value acquired property, plant and equipment using either the market or cost approaches depending on the type of fixed asset.

While we use our best estimates and assumptions to accurately value assets acquired and liabilities assumed at the acquisition date, our estimates are inherently uncertain and subject to refinement to reflect information about the facts and circumstances existing as of the acquisition date that, if known, would have affected the

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measurement of the amounts recognized as of the acquisition date. As a result, during the measurement period, which may be up to one year from the acquisition date, we may record adjustments to the provisional amounts recorded for the net assets acquired, with the corresponding offset to goodwill. Under new guidance adopted on a prospective basis beginning on December 31, 2015, adjustments to the provisional amounts are reflected in the consolidated financial statements for the reporting period in which the adjustments are determined, including by recognizing in current period earnings the full effect of changes in depreciation, amortization or other income effects. Upon the final determination of the fair values of the net assets acquired, any subsequent adjustments are recorded in our consolidated statements of operations.

Revenue Recognition and Accounts Receivable

Revenue, net of related discounts and allowances, is recognized when both title and risk of loss of the product have been transferred to the customer (generally upon shipment), the seller's price to the buyer is fixed or determinable, collectability is reasonably assured and persuasive evidence of an arrangement exists. Customers take title and assume all the risks of ownership based on delivery terms, which are generally included in customer contracts of sale, order confirmation documents and invoices.

We recognize rebates given to customers as a reduction of revenues based on an allocation of the cost of honoring rebates earned and claimed to each of the underlying revenue transactions that result in progress by the customer toward earning the rebate. Rebates are recognized at the time revenue is recorded. We measure the rebate obligation based on the estimated amount of sales that will result in a rebate at the adjusted sales price per the respective sales agreement.

Amounts billed to a customer in a sale transaction related to shipping and handling, if any, represent revenues earned for the goods provided and are classified as revenue. Costs related to shipping and handling of products shipped to customers are classified as cost of goods sold.

We make certain assumptions and estimates when accruing for allowances for doubtful accounts. Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is our best estimate of the amount of probable credit losses in our existing accounts receivable. A specific reserve for bad debt is recorded for known or suspected doubtful accounts receivable. For all other accounts, we recognize a reserve for bad debt based on the length of time receivables are past due and historical write-off experience. Account balances are charged against the allowance when we believe it is probable that the associated receivables will not be recovered. If the financial condition of our customers was to deteriorate resulting in an impairment of their ability to make payments, additional allowances may be required. We do not have any off-balance sheet credit exposure related to our customers.

Our estimates and assumptions made under the revenue recognition policy have been applied on a consistent basis. The amounts accrued for allowances and returns have not had a material impact on our financial condition or operating performance.

Property, Plant and Equipment

Property, plant and equipment are carried at cost and include expenditures for new facilities, major renewals and betterments. We capitalize the cost of furnace rebuilds as part of property, plant and equipment. Plant and equipment under capital leases are carried at the present value of minimum lease payments as determined at the beginning of the lease term. Maintenance, repairs and minor renewals are charged to expense as incurred. We capitalize certain internal costs associated with the implementation of purchased software. When property, plant and equipment is retired or otherwise disposed of, the net carrying amount is eliminated with any gain or loss on disposition recognized in earnings at that time. We also lease property, plant and equipment, principally under operating leases. Rent expense for operating leases, which may have escalating rentals or rent holidays, is recorded on a straight-line basis over the respective lease terms.

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Depreciation is provided on the straight-line method based on the estimated useful lives of the assets, which generally range from 15 to 33 years for buildings and improvements and 3 to 10 years for machinery and equipment. Leasehold improvements are depreciated using the straight-line method based on the shorter of the useful life of the improvement or remaining lease term. Interest cost associated with the development and construction of significant new plant and equipment is capitalized and depreciated over the lives of the related assets.

We perform an impairment review of property, plant and equipment and definite-lived intangible assets when facts and circumstances indicate that the carrying value of an asset or asset group may not be recoverable from its undiscounted future cash flows. When evaluating long-lived assets for impairment, if the carrying amount of an asset or asset group is found not to be recoverable, a potential impairment loss may be recognized. An impairment loss is measured by comparing the carrying amount of the asset or asset group to its fair value. Fair value is determined using quoted market prices when available, or other techniques including discounted cash flows. Our estimates of future cash flows involve assumptions concerning future operating performance, economic conditions and technological changes that may affect the future useful lives of the assets.

Goodwill and Intangible Assets

Goodwill and intangible assets with indefinite lives are not amortized, but are tested for impairment annually or more frequently if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. We perform our annual impairment tests of goodwill and indefinite-lived intangible assets as of October 1 of each year.

Goodwill is tested for impairment at the reporting unit level. In performing tests for goodwill impairment, we are permitted to first perform a qualitative assessment about the likelihood of the carrying value of a reporting unit exceeding its fair value. If an entity determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount based on the qualitative assessment, it is required to perform a two-step goodwill impairment test to identify the potential goodwill impairment and measure the amount of the goodwill impairment loss, if any, to be recognized for that reporting unit. However, if an entity concludes otherwise based on the qualitative assessment, the two-step goodwill impairment test is not required. The option to perform the qualitative assessment can be utilized at our discretion, and the qualitative assessment need not be applied to all reporting units in a given goodwill impairment test. For an individual reporting unit, if we elect not to perform the qualitative assessment, or if the qualitative assessment indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, then we must perform the two-step goodwill impairment test for the reporting unit.

In applying the two-step process, the first step used to identify potential impairment involves comparing the reporting unit's estimated fair value to its carrying value, including goodwill. If the estimated fair value of a reporting unit exceeds its carrying value, goodwill is not impaired. If the carrying value exceeds the estimated fair value, there is an indication of potential impairment and the second step is performed to measure the amount of impairment, if any. The second step of the process involves the calculation of an implied fair value of goodwill for each reporting unit for which step one indicated potential impairment. The implied fair value of goodwill is determined in a manner similar to how goodwill is calculated in a business combination. That is, the estimated fair value of the reporting unit, as calculated in step one, is allocated to the individual assets and liabilities as if the reporting unit was being acquired in a business combination. If the implied fair value of goodwill exceeds the carrying value of goodwill assigned to the reporting unit, there is no impairment. If the carrying value of goodwill assigned to a reporting unit exceeds the implied fair value of the goodwill, an impairment charge is recorded to write down the carrying value. An impairment loss cannot exceed the carrying value of goodwill assigned to a reporting unit and the loss establishes a new basis in the goodwill. Subsequent reversal of an impairment loss is not permitted.

For the purposes of the quantitative goodwill impairment test, we determine the fair value of our reporting units using a split between a market approach and an income, or discounted cash flow, approach. Estimating the

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fair value of a reporting unit requires various assumptions including the use of projections of future cash flows and discount rates that reflect the risks associated with achieving those cash flows. The key assumptions used in estimating the fair value are operating margin growth rates, revenue growth rates, the weighted average cost of capital, the perpetual growth rate, and the estimated earnings market multiples of each reporting unit. The market value is estimated using publicly traded comparable company values by applying their most recent annual EBITDA multiples to the reporting unit's EBITDA for the trailing twelve months. The income approach value is estimated using a discounted cash flow approach. The assumptions about future cash flows and growth rates are based on our assessment of a number of factors including the reporting unit's recent performance against budget as well as management's ability to execute on planned future strategic initiatives. Discount rate assumptions are based on an assessment of the risk inherent in those future cash flows.

For intangible assets other than goodwill, definite-lived intangible assets are amortized over their respective estimated useful lives. Intangible assets with indefinite lives are not amortized, but rather are tested for impairment at least annually or more frequently if events occur or circumstances change that would more likely than not reduce the fair value of the intangible asset below its carrying amount. Our indefinite-lived intangible assets include trade names and certain trademarks. Similar to the goodwill impairment test, we may first assess qualitative factors to determine whether it is necessary to perform a quantitative impairment test. If we choose to bypass the qualitative assessment, or if the qualitative assessment indicates that the indefinite-lived intangible asset is more likely than not impaired, a quantitative impairment test must be performed. Unlike the goodwill impairment test, the quantitative test for indefinite-lived intangible assets is a one-step test comparing the fair value of the asset to its carrying amount. If the fair value of the indefinite-lived intangible asset is less than the carrying amount, an impairment loss is recognized in an amount equal to the difference.

The unit of accounting used to test our indefinite-lived intangible assets for impairment is at the reporting unit level. The fair values of our indefinite-lived trade names and trademarks are determined for impairment testing purposes based on an income approach using a discounted cash flow valuation model under a relief from royalty methodology. Significant assumptions under the relief from royalty method include the royalty rate a market participant may assume, projected sales and the discount rate applied to the estimated cash flows.

For definite-lived intangible assets, we amortize technical know-how over periods that range from fourteen to twenty years, customer relationships over periods that range from seven to fifteen years, trademarks over a fifteen year period, contracts over periods that range from two to sixteen years, and permits over five years. We perform an impairment review of definite-lived intangible assets when facts and circumstances indicate that the carrying value of an asset may not be recoverable from its undiscounted future cash flows. The impairment test for definite-lived intangible assets is consistent with the test applied to property, plant and equipment as described in our policy.

Pensions and Postretirement Benefits

We maintain defined benefit pension plans covering certain employees in the United States and Canada as well as certain employees in other international locations. Benefits for a majority of the plans are based on average final pay and years of service. Our funding policy, consistent with statutory requirements, is based on actuarial computations utilizing the projected unit credit method of calculation. Not all defined benefit pension plans are funded. In the United States and Canada, the pension plans' assets include equity and fixed income securities. Certain assumptions are made regarding the occurrence of future events affecting pension costs, such as mortality, withdrawal, disablement and retirement, changes in compensation and benefits, and discount rates to reflect the time value of money.

The major elements in determining pension income and expense are pension liability discount rates and the expected return on plan assets. We reference rates of return on high-quality, fixed income investments when estimating the discount rate, and the expected period over which payments will be made based upon historical

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experience. The long-term rate of return used to calculate the expected return on plan assets is the average rate of return estimated to be earned on invested funds for providing pension benefits.

In addition to pension benefits, we provide certain health care benefits for employees who meet age, participation and length of service requirements at retirement. We use explicit assumptions using the best estimates available of the plan's future experience. Principal actuarial assumptions include discount rates, present value factors, retirement age, participation rates, mortality rates, cost trend rates, Medicare reimbursement rates and per capita claims cost by age. Current interest rates, as of the measurement date, are used for discount rates in present value calculations.

Income Taxes

We operate within multiple taxing jurisdictions and are subject to tax filing requirements and audit within these jurisdictions. We use the asset and liability method in accounting for income taxes. Deferred tax assets and liabilities are recorded for temporary differences between the tax basis of assets and liabilities and their reported amounts in the financial statements, using statutory tax rates in effect for the year in which the differences are expected to reverse. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the results of operations in the period that includes the enactment date. We evaluate our deferred tax assets each period to ensure that estimated future taxable income will be sufficient in character (e.g., capital gain versus ordinary income treatment), amount and timing to result in their recovery. A valuation allowance is recorded to reduce the carrying amounts of deferred tax assets unless it is more likely than not that those assets will be realized. Considerable judgments are required in establishing deferred tax valuation allowances and in assessing exposures related to tax matters. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences and carryforward deferred tax assets become deductible or utilized. We consider the scheduled reversal of taxable temporary differences, projected future taxable income and tax-planning strategies in making this assessment. As events and circumstances change, related reserves and valuation allowances are adjusted to income at that time.

In determining the provision for income taxes, we provide deferred income taxes on income from foreign subsidiaries as such earnings are taxable upon remittance to the United States, to the extent that these earnings are considered to be available for repatriation. We do not provide income taxes on the cumulative unremitted earnings of foreign subsidiaries considered permanently reinvested. We establish contingent liabilities for possible assessments by taxing authorities resulting from uncertain tax positions including, but not limited to, transfer pricing, deductibility of certain expenses and other state, local, and foreign tax matters. We recognize a financial statement benefit for positions taken for tax return purposes when it will be more likely than not (greater than 50%) that the positions will be sustained upon tax examination, based solely on the technical merits of the tax positions, otherwise, no benefit is recognized. The tax benefits recognized are measured based on the largest benefit that has a greater than 50% likelihood of being realized upon ultimate settlement. We recognize potential accrued interest and penalties related to unrecognized tax benefits in income tax expense. Tax examinations are often complex as tax authorities may disagree with the treatment of items reported by us and may require several years to resolve. These accrued liabilities represent a provision for taxes that are reasonably expected to be incurred on the basis of available information but which are not certain.

Stock-Based Compensation

We grant stock-based compensation awards in connection with our stock incentive plan. Under the terms of the incentive plan, we are authorized to issue equity awards to our employees, directors and affiliates. The awards granted have taken the form of restricted stock and stock options. Restricted stock awards provide the recipient with shares of our stock subject to certain vesting requirements. Stock option awards provide the recipient the ability to purchase shares of our stock at a given strike price upon the satisfaction of certain vesting requirements.

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The vesting requirements associated with the awards include a mix of both service and performance conditions. Depending on the award and recipient, the service condition may reflect a cliff vesting provision (e.g., 100% vested upon four years of service) or a graded vesting provision (e.g., 33.3% vested each year over a period of three years). Awards issued with performance conditions vest based on the occurrence of a defined liquidity event upon which certain investment funds affiliated with CCMP receive proceeds exceeding certain thresholds. Although achievement of the performance condition is subject to continued service with us, the terms of awards issued with performance conditions stipulate that the performance vesting condition can be attained for a period of six months following separation from service.

We recognize compensation expense related to our equity awards with service conditions on a straight-line basis over the stated vesting period for each award. Expense related to our equity awards with performance conditions is recognized in the period in which it becomes probable that the performance target will be achieved. No compensation expense has been recognized to-date on any of our equity awards subject to vesting based on performance conditions, since a liquidity event triggering vesting of the awards has not occurred, nor is it considered probable.

The grant date fair value of restricted stock awards is based on the value of the respective underlying stock. The fair value of our equity is determined using a market approach that considers our stock's liquidation preferences, financial performance and leverage, as well as market multiples of companies in similar industries. The grant date fair value of stock option awards is estimated using a Black-Scholes option pricing model. Determining the fair value of stock option awards at the grant date requires judgment, including estimates of the average risk-free interest rate, dividend yield, volatility and expected term. Since we have limited experience with respect to historical exercise and forfeiture rates or patterns, as well as no public market for our stock as a private entity, we have estimated certain assumptions using acceptable simplified methods and through benchmarking to our peer group of companies.

Recently Issued Accounting Standards

See Note 2 to the Unaudited Consolidated Financial Statements of PQ Group Holdings Inc. and Subsidiaries included elsewhere in this prospectus for a discussion of recently issued accounting standards and their effect on us.

Quantitative and Qualitative Disclosures about Market Risk

Our major market risk exposure is potential losses arising from changing rates and prices regarding foreign currency exchange rate risk, interest rate risk, commodity price risk and credit risk. The audit committee of our board of directors regularly reviews foreign exchange, interest rate and commodity hedging activity and monitors compliance with our hedging policy. We do not use financial instruments for speculative purposes, and we limit our hedging activity to the underlying economic exposure.

Foreign Exchange Risk

Our financial results are subject to the impact of gains and losses on currency translations, which occur when the financial statements of foreign operations are translated into U.S. dollars. We operate a geographically diverse business with approximately 39% and 34% of our sales during the six months ended June 30, 2017 and the year ended December 31, 2016, respectively, coming from our international operations in currencies other than the U.S. dollar. Because consolidated financial results are reported in U.S. dollars, sales or earnings generated in currencies other than the U.S. dollar can result in a significant increase or decrease in the amount of those sales and earnings when translated to U.S. dollars. The financial statements of our operations outside the United States, where the local currency is considered to be the functional currency, are translated into U.S. dollars using the exchange rate in effect at each balance sheet date for assets and liabilities and the average exchange rate for each period for sales, expenses, gains, losses and cash flows. The exchange rates between these

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currencies and the U.S. dollar in recent years have fluctuated significantly and may continue to do so in the future. The foreign currencies to which we have the most significant exchange rate exposure include the Euro, British pound, Canadian dollar, Brazilian real and the Mexican peso. Sales in these top five currencies represented approximately 27% of our pro forma sales during the year ended December 31, 2016. A 10% change in these currencies would have impacted sales by approximately \$28.3 million, or 3% of pro forma sales assuming product pricing remained constant. The effect of translating foreign subsidiaries' balance sheets into U.S. dollars is included in other comprehensive income. The impact of gains and losses on transactions denominated in currencies other than the functional currency of the relevant operations are included in other non-operating expense. Income and expense items are translated at average exchange rates during the year. Net foreign exchange included in other expense was a \$3.6 million gain for the year ended December 31, 2016. The foreign currency loss realized in the year ended December 31, 2016 was primarily driven by the non-permanent intercompany debt denominated in local currency translated to U.S. dollars and was principally non-cash in nature.

Interest Rate Risk

We are exposed to fluctuations in interest rates on our Senior Secured Credit Facilities and on our Floating Rate Senior Unsecured Notes. Changes in interest rates will not affect the market value of such debt but will affect the amount of our interest payments over the term of the loans. Likewise, an increase in interest rates could have a material impact on our cash flow. As of December 31, 2016, a 100 basis point increase in assumed interest rates for our variable interest credit facilities, before impact of any hedges, would have an annual impact of approximately \$17.5 million on interest expense.

We hedge the interest rate fluctuations on debt obligations through interest rate cap agreements. We record the fair value of these hedges as assets or liabilities and the related unrealized gains or losses are deferred in stockholders' equity as a component of other comprehensive income (loss), net of tax. The interest rate caps had a fair value net asset of \$1.7 million and \$5.8 million at June 30, 2017 and December 31, 2016, respectively. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices.

In July 2016, we entered into interest rate cap agreements, paying a premium of \$1.6 million to mitigate interest rate volatility from July 2016 through July 2020 by employing varying cap rates ranging from 1.50% to 3.00% on \$1.0 billion of notional variable debt.

Commodity Risk

We purchase significant amounts of natural gas to supply the energy required in our production processes for our products in each of our segments. Since we are a producer of inorganic chemicals, natural gas provides an energy source for us but is not a direct feedstock for our products. Therefore, exposure to the volatility in energy prices is less than that of producers of organic petrochemicals. We purchase approximately 14 million MMBtu's of natural gas in a given year. Thus, a \$1 increase in the cost of natural gas would impact our cost of goods sold by approximately \$14 million absent hedging. Our purchase agreements with our customers typically provide for the pass through of natural gas price increases; however, there is no guarantee that we will continue to be able to pass through future price increases without loss of existing customers. We have implemented a hedging program in the United States which allows us to mitigate exposure to natural gas volatility with natural gas swap agreements. We also make forward purchases of natural gas related to our production at certain subsidiary locations.

The natural gas swap agreements had a fair value net asset of \$0.1 million and \$0.6 million at June 30, 2017 and December 31, 2016, respectively. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices of comparable contracts. The respective current and non-current assets are recorded in other current assets and other assets. The

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related unrealized gains or losses are recorded in stockholders' equity as a component of other comprehensive income (loss), net of tax. Realized gains and losses on natural gas hedges are included in production cost and subsequently charged to cost of goods sold in the consolidated statements of operations in the period in which inventory is sold.

Credit Risk

We are exposed to credit risk on financial instruments to the extent our counterparty fails to perform certain duties as required under the provisions of an agreement. We only transact with counterparties having an appropriate credit rating for the risk involved. Credit exposure is managed through credit approval and monitoring procedures.

Concentration of credit risk can result primarily from trade receivables, for example, with certain customers operating in the same industry or customer groups located in the same geographic region. Credit risk related to these types of receivables is managed through credit approval and monitoring procedures. In the year ended December 31, 2016, we wrote off \$0.2 million, or 0.02%, in bad debt on total sales of \$1,064.2 million.

Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

In August 2015, the board of directors of Eco Services Operations LLC ("Eco"), the accounting predecessor to PQ Group Holdings, discharged Deloitte & Touche LLP ("Deloitte") as its independent registered public accounting firm and determined that PricewaterhouseCoopers LLP ("PwC") would serve as its ongoing independent registered public accounting firm.

Deloitte has not issued any reports on PQ Group Holdings' financial statements for any period and has not issued any report on Eco for any period subsequent to December 31, 2014. Furthermore, during its engagement to audit Eco's 2014 consolidated financial statements, there were (a) no "disagreements" (as that term is defined in Item 304(a)(1)(iv) of Regulation S-K and related instructions) between Eco and Deloitte on any matter of accounting principles or practices, financial statement disclosure, or auditing scope or procedure, which disagreements, if not resolved to the satisfaction of Deloitte, would have caused Deloitte to make reference to the subject matter thereof in connection with its reports and (b) no "reportable events" (as that term is defined in Item 304(a)(1)(v) of Regulation S-K).

Prior to its engagement of PwC neither Eco or PQ Group Holdings, nor anyone on their behalf, consulted PwC regarding (i) the application of accounting principles to a specified transaction, either completed or proposed, or the type of audit opinion that might be rendered on Eco's or PQ Group Holdings' consolidated financial statements, and no written report or oral advice was provided to Eco or PQ Group Holdings by PwC that PwC concluded was an important factor considered by Eco or PQ Group Holdings in reaching a decision as to the accounting, auditing or financial reporting issue or (ii) any matter that was either the subject of a "disagreement" (as defined in Item 304(a)(1)(iv) of Regulation S-K and related instructions) or a "reportable event" (as defined in Item 304(a)(1)(v) of Regulation S-K).

PQ Group Holdings has provided Deloitte with a copy of this prospectus and requested that Deloitte furnish to PQ Group Holdings a letter addressed to the United States Securities and Exchange Commission stating whether Deloitte agrees with the above statements and, if not, stating the respects in which it does not agree. A copy of Deloitte's letter is attached as Exhibit 16.1 to the registration statement of which this prospectus forms a part.

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INDUSTRY

We compete in the specialty chemicals and materials industry. Our industry is characterized by constant development of new products and the need to support customers with new product innovation and technical services to meet their challenges. In addition, customers demand consistent product quality and a reliable source of supply. Products sold to our customers can be highly value-added even when they represent only a small portion of the overall end-product costs, and success can be achieved by helping customers improve their product performance, value, and quality. As a result, operating margins in this sector have historically been high and generally stable through economic cycles. In addition, many products in these specialty chemicals and materials industry benefit from economics that favor incumbent producers because the capital cost to expand existing capacity is typically significantly less than the capital cost necessary to build a new plant. The combination of attractive operating margins and moderate and generally predictable maintenance capital expenditure requirements can produce attractive cash flows. Our industry is also characterized by the need to produce consistent quality in a safe and environmentally sustainable manner.

Summary End Uses & Demand Drivers

The table below summarizes our key end uses and products as well as the significant growth drivers in those applications.

Key End Uses	2016 Pro Forma Sales and Zeolyst Joint Venture Total Net Sales(1)(2)	Significant Growth Drivers	Key PQ Products
Fuels & Emissions Controls	20%	<ul style="list-style-type: none"> • Global regulatory requirements to: <ul style="list-style-type: none"> • Remove nitrogen oxides from emissions • Remove sulfur from diesel and gasoline • Increase gasoline octane in order to improve fuel efficiency while lowering vapor pressure to regulated levels for premium fuels • Improve lubricant characteristics to improve fuel efficiencies 	<ul style="list-style-type: none"> • Refinery catalysts • Emissions control catalysts • Catalyst recycling services
Consumer Products	18%	<ul style="list-style-type: none"> • Substitution of silicate materials for less environmentally friendly chemical additives in detergent and cleaning end uses • Demand for improved quality and shelf life of beverages • Demand for improved oral hygiene and appearance 	<ul style="list-style-type: none"> • Silica gels for edible oil and beer clarification • Precipitated silicas and zeolites for the surface coating, dentifrice, and dishwasher and laundry detergent applications
Highway Safety & Construction	16%	<ul style="list-style-type: none"> • Demand for enhanced "dry and wet" visibility of road and airport markings to improve safety • Drive for weight reduction in cements 	<ul style="list-style-type: none"> • Reflective markings for roadways and airports • Hollow glass beads, or microspheres, for cement additives

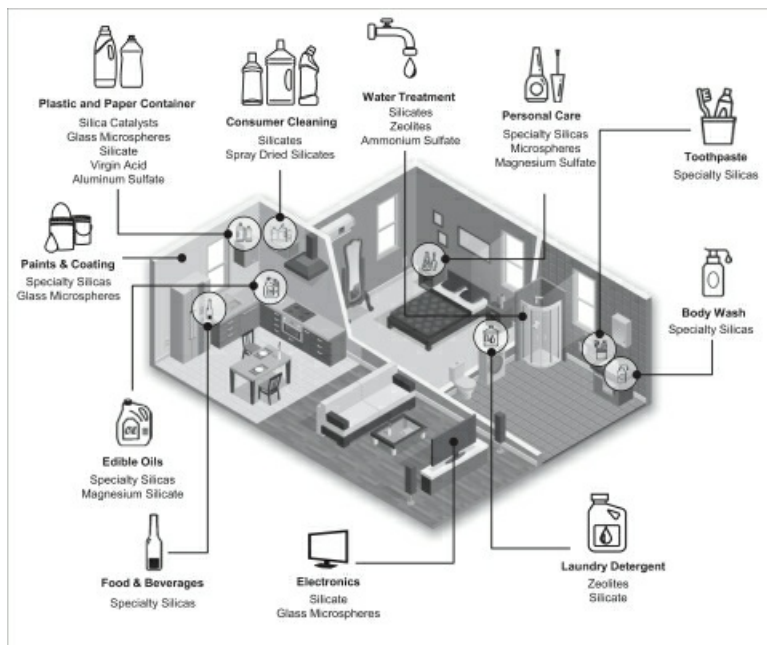
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	2016 Pro Forma Sales and Zeolyst Joint Venture Total Net Sales(1)(2)	Significant Growth Drivers	Key PQ Products
Packaging & Engineered Plastics	17%	<ul style="list-style-type: none"> • Demand for increased process efficiency and reduction of by-products in production of chemicals • Demand for high-density polyethylene lightweighting of automotive components • Enhanced properties in plastic composites for the automotive and electronics industries 	<ul style="list-style-type: none"> • Catalysts for high-density polyethylene and chemicals syntheses • Antiblocks for film packaging • Solid and hollow microspheres for composite plastics
Industrial & Process Chemicals	21%	<ul style="list-style-type: none"> • Demand in the tire industry for reduced rolling resistance • Usage of silicate in municipal water treatment to inhibit corrosion in aging pipelines • Growth in manufacturing in North America driving demand for metal finishing 	<ul style="list-style-type: none"> • Silicate precursors for the tire industry • Silicate for water treatment • Glass beads, or microspheres, for metal finishing end uses
Natural Resources	8%	<ul style="list-style-type: none"> • More environmentally friendly drilling fluids for oil and gas production • Recovery in global oil drilling / U.S. copper production • Growing demand for lighter weight cements in oil and natural gas wells 	<ul style="list-style-type: none"> • Silicates for drilling muds • Hollow glass beads, or microspheres, for oil well cements • Sulfur derivatives for copper mining • Bleaching aids for paper

- (1) Pro forma information gives effect to the consummation of the Business Combination and the related financing transactions as if they occurred on January 1, 2015.
- (2) Percentage calculations include \$131.3 million of total net sales attributable to our Zeolyst Joint Venture, which represents 50% of its total net sales for the year ended December 31, 2016. See footnote (4) to “Summary Historical and Unaudited Pro Forma Financial and Other Data” for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.

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The schematics below showcase certain applications that use our products.



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Fuels & Emissions Controls

Favorable industry dynamics in the fuels and emission controls industries are driving increased demand and the need for constantly evolving product specifications for our catalyst products. These growth dynamics include increasingly stringent global emission control standards for heavy- and light-duty vehicles regulatory standards regarding vehicle mileage and fuel composition, and increased supply of natural gas by-products driven by shale gas proliferation in the United States.

Emissions Control

Diesel Engine Standards. We believe demand for our zeolite-based catalyst will grow significantly due to continued tightening of global diesel emissions standards in both on-road and non-road diesel engines. Non-road diesel engines refer to heavy-duty diesel engines used in machinery or equipment, including locomotives and marine vessels. We believe that increased global awareness and the desire to reduce pollution from stationary and mobile pollution sources have increased the importance of emissions control catalysts.

On-Road Emissions Standards. Emission standards for heavy-duty diesel engines in the United States were first developed by the EPA in 1974. These emissions standards have progressively been tightened over time by a series of regulations called Tier 1 through Tier 3. The current emissions standard, Tier 3, for heavy-duty engines was phased in between 2007 and 2010. For example the standard for allowable nitrogen oxides emissions was 6.0 grams per brake horsepower-hour (“g/bhp-hr”) in 1990 versus the current 0.2 g/bhp-hr. Light-duty vehicles also have Tier 1 through Tier 3 standards that were originally part of the Clean Air Act of 1990. The current light-duty standard is Tier 3, which is to be phased in during 2017 and is scheduled to extend through 2025.

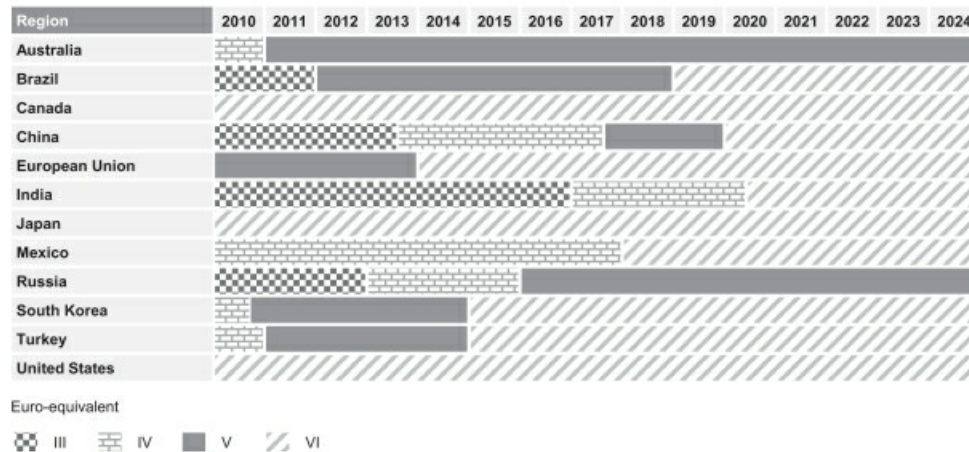
European emissions regulations for heavy-duty diesel engines are referred to as Euro I through Euro VI. Euro I standards were introduced in 1992 and the current Euro VI standards became effective in 2013 and 2014. An example of the increasingly stringent requirements for nitrogen oxides emissions is the standard of maximum allowable emissions of 8.0 grams per kilowatt-hour (“g/kWh”) under Euro I versus the current Euro VI maximum of 0.40 g/kWh. Light-duty vehicles have a similar set of increasingly stringent standards, called Euro 1 through Euro 6

Non-Road Emissions Standards. The EPA has adopted the standards for non-road diesel engines. Such standards were first adopted in 1994 and initially implemented between 1996 and 2000. These standards are known as Tier 1 through Tier 4 standards. The current standard, Tier 4, was phased in between 2008 and 2015. As an example, for larger engines, above 56 kW, the current Tier 4 nitrogen oxides standard is 0.40 g/kWh compared to the Tier 1 through Tier 3 standard of 9.2 g/kWh.

Likewise, the European Standards regulations for non-road engines have been structured as gradually more stringent tiers known as Stage I through V regulations. The first European legislation to regulate non-road engines was promulgated in 1997 and Stage I was implemented in 1999. The current Stage IV was implemented in 2014, and Stage V is expected to become effective in 2019 or 2020.

Global Emissions Standards. In many cases countries have established regulations that generally follow United States Environmental Protection Agency or European Union standards, but typically on a later implementation timeline. The chart below identifies each country’s regulatory requirements in relation to the most comparable European Union standard for ease of comparability. In addition, even more restrictive regulations are expected to be adopted in the future in many jurisdictions, such as EU VII, which would further reduce permitted emissions levels in the European Union. We believe that compliance with existing regulations as well as any future regulations provides us with opportunities to grow our sales of emissions control catalysts.

Timeline for Implementation of Regionwide Emissions Standards for Diesel Heavy-Duty Vehicles in European Union Equivalent Standards



Source: The International Council on Clean Transportation

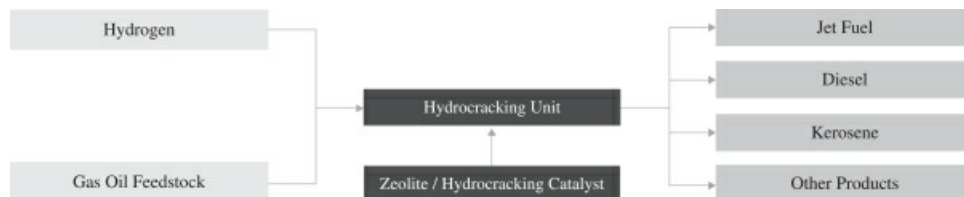
The demand for catalysts is also expected to grow due to the increasing use of these diesel engines, driven in part by the development and industrialization of emerging economies and anticipated global growth in gross domestic product. Heavy-duty vehicle production is expected to grow at a compound annual growth rate of 4.1% globally from 2015 to 2020, according to ACT Research. In addition, light-duty vehicle production is expected to grow at a compound annual growth rate of 2.8% from 2015 to 2020, according to LMC Automotive.

Fuels

Refining Dynamics—Hydrocracking. Sales of our hydrocracking catalysts are expected to grow due to the increasingly stringent demands for lower sulfur content in fuels and the continued global trend towards processing heavy sour crudes, which have a higher sulfur content.

A hydrocracking unit is fed gas oil, which is heavier and has a higher boiling point than distillate fuel oil, and cracks these heavy molecules into distillate and gasoline in the presence of hydrogen and a catalyst. The hydrocracking process upgrades low-quality heavy gas oils into high-quality jet fuel, diesel, and gasoline. The rate of cracking and the end-products produced are dependent on the operating parameters and design of the hydrocracking catalysts. Below is an overview of the hydrocracking process for the production of diesel and other refinery products.

Hydrocracking Process (Within a Refinery)



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The hydrocracking unit initially requires larger quantities of catalyst and then requires smaller replacement quantities of catalyst each year until an entire replacement of catalyst is needed every 2 to 4 years.

Refiners have been installing hydrocrackers in response to increasing global demand for jet fuel, diesel, and kerosene. The hydrocracker also converts high-sulfur materials (lower value) into low-sulfur fuels (higher value) for vehicles and airplanes. Many countries have enacted increasingly stringent environmental laws to require lower sulfur content in diesel fuels. As a result, we believe that more hydrocracking capacity will be required to remove increasing amounts of sulfur from diesel fuels, particularly with increased use of sour crude. The table below summarizes certain sulfur regulations for diesel fuel.

Standards Regulating Sulfur in Diesel Fuel

Regionwide Diesel Sulfur Limits (Parts per Million)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brazil	3,500	2,000		1,800-500 transition		500										
China	2,000			350			50			10						
European Union	50				10											
India	500				350											
Japan	50	10														
Russia	500				350			50	10							
South Africa	3,000	500 (50 in some markets)										10				
Thailand	150				50											
United States	500	15														

Source: International Council on Clean Transportation and DieselNet

Although the cost of hydrocracking catalysts are relatively small compared to the overall costs for operating a refinery, the consequence of a refiner using a low quality or contaminated catalyst could be significant. As a result, refiners generally choose to purchase high quality catalysts from well-known manufacturers and they typically value performance and reliability over price when making buying decisions.

Refining Dynamics—Alkylates. We believe our refining services products will benefit from regulations mandating higher vehicle fuel mileage and increasingly stringent fuel specifications. These trends create the need for higher octane in gasoline, which creates opportunities for our refining services product group. In addition, North American refineries are experiencing an increase in light olefins as a result of the increased use of shale oil and are therefore expected to increase demand for alkylation catalysts. We also expect that the relatively lower costs of gasoline will result in increased U.S. exports, which can help maintain refinery utilization in the U.S. gulf coast region.

The United States has regulated fuel economy for light-duty vehicles since the 1970s. The Corporate Average Fuel Economy (“CAFE”) standards were initially developed in 1975 and expanded in 2009 to include greenhouse gas emissions. Future standards are being considered for vehicle models developed between 2017 and 2025 which, if implemented as currently contemplated, would increase the fuel economy standard from 34.1 miles per gallon for vehicle models developed in 2016 to 49.6 miles per gallon for vehicle models developed in 2025.

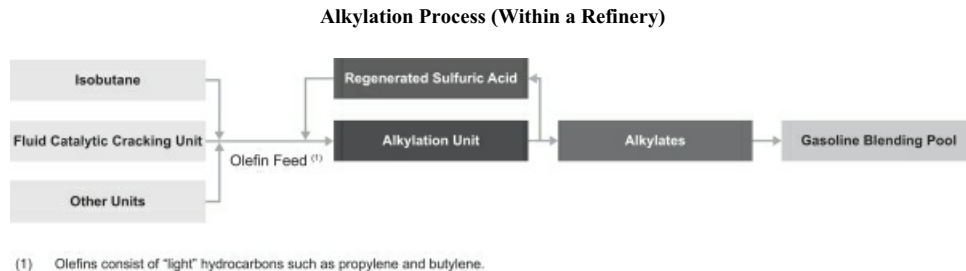
In order to adapt to these potential regulations, automakers are making a variety of design changes to vehicles. One of these changes is to use smaller, more efficient turbocharged engines to increase power to compensate for the increased fuel economy. In addition, as consumers move to these more efficient engines to save money or gain engine performance, gasoline needs to have higher octane in order to run these high compression engines and to prevent “knock” or premature detonation of the fuel in the cylinder, which can damage engines. According to the Energy Information Administration, these shifts in engine design are expected

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to continue as automakers increase the use of turbocharging as one of the strategies to comply with increasingly stringent fuel economy standards.

Alkylates are a preferred blending component for gasoline because they boost octanes, while lowering vapor pressure, at more environmentally friendly specifications relative to other octane sources such as ethanol and butane. The Environmental Protection Agency, through the Clean Water Act regulations has reduced the maximum allowable vapor pressure and aromatic, benzene, and sulfur content in fuel. Alkylates are high octane sources with low vapor pressures, no olefins, no aromatics, and low sulfur.

The alkylation unit is a conversion process in the refinery used to convert olefins and isobutane, volatile and light compounds, from the fluid catalytic cracking unit and other units into high octane gasoline blending components. The alkylate produced from the unit are used as a premium gasoline blending stock because of their anti-knock and clean burning characteristics.



Alkylation units in refineries use either sulfuric acid or hydrofluoric acid as the catalyst material. Sulfuric acid has been the preferred technology due to its lower maintenance costs, safer handling, more environmentally friendly profile, and product quality. Hydrofluoric acid also is a more hazardous substance that typically requires additional safety precautions. Sulfuric acid catalysts are consumed as part of the alkylation process, and therefore need to be continually replaced with fresh catalyst. Sulfuric acid is used in approximately half the refining capacity in the United States. We believe that government regulations as well as the characteristics of sulfuric acid compared to hydrofluoric acid will cause refiners to select sulfuric acid technology in building or converting new alkylation units.

There are significant shale natural gas deposits in the United States. The United States Energy Information Administration predicts that by 2035, 46% of the United States' natural gas supply will come from shale gas. The proliferation of shale gas has increased natural gas liquids production in the United States from 2.1 million barrels per day ("MMbbl/day") in 2010 to 3.6 MMbbl/day by February 2017 according to the Energy Information Administration. Alkylation units are used to upgrade natural gas liquids, which are light, lower value compounds, to higher value-added refined products that can be blended into the gasoline pool. The Organization of the Petroleum Exporting Countries expects 74% of oil production growth for 2017 in the United States to be driven by the expanding production of shale oil, which would result in higher production of refined products. In addition, these refined products are increasingly being exported due to the historically lower cost of natural gas in the United States. According to the Energy Information Administration, exports of refined gasoline products from the United States have increased from 2.0 MMbbl/day in 2010 to 3.0MMbbl/day in 2016.

According to the Energy Information Administration, the demand in the United States for premium gasoline, which has higher octane and alkylate content than regular gasoline, grew at a compound annual growth rate of 6.1% from 2011 to 2016 as a result of higher octane requirements in higher turbocharged compression engines. The number of turbocharged light-duty vehicles in the United States is expected to make up approximately 83% of all light-duty vehicles by 2025, a significant increase from approximately 18% in 2014, which we believe will increase the demand for higher-octane gasoline. Higher production of natural gas liquids and increased demand for premium gasoline is expected to drive higher alkylation utilization and capacity.

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Consumer Products

We sell a variety of our products as additives, ingredients, and precursors for consumer products. This industry generally has not exhibited as pronounced cyclicality as other industries because products such as cosmetics, toiletries, and cleaning products are vital to consumer's daily routines. Examples of such products include toothpaste, hair and skin care products, Epsom salt and automatic dishwashing detergents. We also address food and beverage applications such as materials for purification of beer and cooking oil. Growth in these end uses is expected to be driven by shifting consumer preferences, consumer demand for safer and more environmentally friendly products, and the increased demand for consumer products as a result of global demographic and development trends.

Consumer products companies compete by constantly investing to improve their product's quality and performance. This improvement is critical to maintain their competitive advantage and brand equity in a dynamic industry that is constantly responding to shifting consumer preferences. We produce additives and ingredients that allow these companies to develop new products. For example, we have collaborated with leading consumer products companies over a number of years to develop a family of gentle silica-based dentifrice abrasives that produce more effective cleaning toothpastes.

Another key trend has been the increased demand by consumers for more sustainable, safe, and environmentally friendly products. Consumer products manufacturers have been challenged to develop products that meet these constraints without compromising quality and performance. Consumers have an increased awareness of product safety through online resources such as government databases and social media. Products such as cosmetics and toiletries are now more often promoted with labeling indicating that the product is free from harmful ingredients. For example, some cosmetics include labeling that indicates no parabens, sulfates, silicones, or petroleum derivatives. In addition, some consumers are more concerned about the environmental impact and sustainability of the products they use as evidenced by consumer products companies' marketing campaigns and product branding addressing those issues. Our performance materials and chemicals business produces materials which are often being used as a substitute for other materials because our products are more environmentally friendly. For example, our specialty silicates are displacing phosphates in dish detergents and our silicate and silicate derivatives are recognized on the EPA's Safer Chemicals Ingredients List for its Safer Choice products program.

In addition, demographic shifts in developed economies and wealth proliferation in developing economies are also driving increased demand for consumer products. In addition, the growth of the middle class in countries such as China and India are also driving growth of consumer products. According to an industry source, the consumption of cosmetic chemicals is expected to grow on average at 3.8% globally, 7.9% in China, and 3.6% in other Asian countries (excluding Japan) between 2015 and 2020.

Highway Safety and Construction

Demand for our performance materials products is expected to grow due to favorable highway and construction industry dynamics including increased highway safety expenditures, product innovation in highway safety, and formulations shifts in adhesives, cements, and coatings.

Highway Safety. We produce highway and runway marking products that are used in the highway safety industry. Highway safety spending is generally predictable given the ongoing replacement and maintenance requirements as a result of road use. Road maintenance and road construction spending have historically been resilient during economic downturns as they are often used as a form of government stimulus.

Growth drivers in highway safety include the need to invest in the aging United States highways and local roadways, the aging of populations in developed economies which increases the need for greater pavement marking visibility, increased public awareness of the costs associated with road injuries and fatalities and to

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address concerns from autonomous vehicle manufacturers. We believe that our road marking products can be very cost effective investments to address these trends. Demand for road markings in excess of periodic maintenance and road construction is expected to come from the implementation of brighter lines, more roads with edge lines, wider lines and more use of double lines to improve safety. As a result of these trends, United States federal highway spending has increased in seven of the ten years between 2005 and 2015.

Highway safety spending in developing economies is expected to grow faster than in developed economies as a result of their faster pace of construction of road infrastructure. Road marking in Europe and Japan generally exceed those in the United States, which we believe is a growth opportunity for our highway safety products to the extent the United States seeks to achieve similar standards.

Construction. Our products are additives for many construction products such as adhesives, cements, grouts, and surface coatings. Trends in this sector include the need for improved performance in products to address construction and infrastructure challenges such as customer requirements for more reliable and longer lasting materials. In addition, the trend toward more environmentally friendly products is also driving new product development. Growth in these products is driven by construction for new residential, commercial, and institutional infrastructure and for maintenance of existing infrastructure. Adhesives and coatings make up a large portion of the demand. According to an industry source, the coatings industry is expected to grow at a compound annual growth rate of 4% from 2016 to 2021.

According to an industry source, demand for adhesives in North America, Western Europe and Japan is expected to grow at a compound annual growth rate of 1 to 3% from 2016 to 2021. In contrast, demand for adhesives in China is expected to grow at a compound annual growth rate of 6% from 2016 to 2021.

Additives into these applications are usually only a small portion of the overall product cost yet they are critical to product performance. For example, in coatings, additives seldom exceed 5% of the volume of the formulation versus higher volume components such as resins, solvents (if solvent-based versus water-based), and pigments. These additives are priced based on performance and generally have high and stable margins. For example, we produce products that act as matting agents in coatings that replace more expensive materials in the coating formulation such as strontium chromate while maintaining product performance.

Regulations and consumer preferences are driving our customers to develop more environmentally friendly products such as coatings that meet global and local volatile organic compounds (“VOC”) requirements. Our products are used in waterborne coatings that are growing as a result of this low VOC requirement trend. We also supply our silicates for use in geopolymer products, a more environmentally friendly alternative to portland cements. Our additives allow for the geopolymer products to be manufactured at room temperature from waste materials resulting in a lower carbon footprint at a lower cost for customers.

Packaging and Engineered Plastics

We believe our catalysts and performance materials product will benefit from the continued growth in plastics in consumable and durable end use applications. Specifically, sales of plastics, such as polyolefins, nylons, and acrylics, continue to grow by displacing traditional materials, such as metal, glass, and wood in packaging, container, display, and building product end uses among others. Engineered plastics are expected to continue displacing metal in automotive, aerospace, and electronics applications to lightweight vehicles in response to fuel mileage standards, such as CAFE standards, and increased performance and reliability trends. Engineered plastics also add increased chemical and weather resistance among other attributes as compared to substitute products.

Polyolefins. Our catalysts and catalysts supports are used in the production of HDPE, which is a high strength and high stiffness polyethylene used in packaging films, bottles, containers, and other molded applications. According to an industry source, North American HDPE capacity is expected to grow at a

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compound annual growth rate of 5.1% from 2016 to 2020, driven by general economic activity growth and the increased utilization of HDPE as a substitute for heavier and more expensive materials such as glass and metals. Further, we believe that we are well positioned to benefit from the increased HDPE capacity being built in the United States, due to our strong competitive position, and also as a result of ongoing investment in the United States by petrochemical companies given access to lower cost United States shale gas.

Engineered Plastics. Demand for acrylic plastics such as polymethyl methacrylate (“PMMA”), the polymer methyl methacrylate (“MMA”), is growing due to the displacement of glass in furniture, signage, and auto components. PMMA, also known as acrylic, is a clear scratch-resistant plastic used in sheet or molded form to replace glass and as a durable surface coating. A new MMA production facility requires an initial amount of catalyst and then requires smaller replacement amounts each year. According to an industry source, global MMA capacity is expected to grow at a compound annual growth rate of 3% from 2016 to 2021.

Composites. Composites are increasingly used as a component in the manufacture of automotive vehicles, given their lightweight properties in order to meet tightening mileage and performance standards. One type of composite is a plastic that is mixed while with a reinforcement material. Our solid and hollow microspheres are used as reinforcement material to produce composites that are lightweight and able to displace heavier plastics. These low-cost and anti-warping additives used in these composite formulations assist in the processing and use of plastics. In automobiles, composites are also displacing metal to reduce weight while performing to required standards. Given these trends, demand for composites in the United States is expected to grow at a compound annual growth rate of 4.9% from 2016 to 2022 according to Composites Manufacturing Magazine.

Industrial & Process Chemicals

Industrial and process chemicals encompass a combination of diverse end uses where our chemicals are used as ingredients, precursors, and additives into chemical and industrial company products and applications. Key end uses for our products include green tires where our silicate precursors assist in reducing rolling resistance, municipal water treatment, where our silicates are used to inhibit pipeline corrosion, and in global manufacturing, where our performance materials are used in metal finishing. In addition to any growth consistent with general economic growth, we believe that demand for our products will also benefit from the trend toward more environmentally friendly products, such as in the green tire end use.

Green Tire. Increasingly stringent fuel mileage standards for automobiles and deteriorating air quality are driving automobile manufacturers to use alternative products to reduce vehicle emissions. Green tires have been developed to perform with lower rolling resistance than standard tires to reduce fuel consumption and the resulting emissions. The performance is enabled by a formulation in which precipitated silica and silanes are added to replace carbon black to achieve up to an 8% savings of fuel consumption. The amount of precipitated silica in green tires is double the amount in standard tires. The demand for precipitated silica in green tires is expected to grow at a compound annual growth rate of 10.6% from 2015 to 2020, according to Notch Consulting.

Water Treatment. Our silicates are used in water treatment chemicals as an inorganic corrosion inhibitor. Silicates provide protection to iron and steel by prohibiting corrosion by forming a protective layer in the pipe. The water treatment industry has been relatively stable given the continual need for clean municipal water independent of business cycles. We believe this industry will grow as a result of increasing water purity standards worldwide.

Metal Finishing. Our performance materials products are cost-effective, highly reliable abrasives used in metal finishing processes used in cleaning, peening, finishing and deburring metals. Our products are also used to surface-treat wood, stone, ceramics and glass. The metal finishing process is most prevalent in the aerospace and defense, automotive, and general industrial manufacturing industries where metal surfaces are hardened, such as for compressor blades in aerospace and power generation industries. We believe that our performance materials products are a preferred substitute for other media such as industrial sand, aluminum oxide, iron, and steel,

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because they do not damage parts but do allow for better process control, limit surface contamination, and are more environmentally friendly.

Natural Resources

We supply products to the oil and gas industry as ingredients and additives into oilfield chemicals for completion materials and drilling fluids. Completion materials, such as cement, are used after drilling in order to set a well for production, i.e. extraction of the oil and gas. In addition, we supply materials that are used in the production of metals in the mining process, such as in copper mining.

The oil and gas industry in the United States experienced a significant downturn which began at the end of 2014, with the decline in oil prices. The drilling and completion of wells declined significantly in response to the weak oil price environment. According to Wood Mackenzie, drilling and completion spending in North America fell 68% from 2014 to 2016. Some of our products are used in the oil and gas industry as additives to the cement used in well completions and solid microspheres added in to oil-driving muds. Sales of our products to the oil and gas industry declined in line with the decline in activity levels in this industry. According to an industry source, North American rig counts have more than doubled since June 2016 with U.S. shale oil drilling activity in the United States experiencing a recovery as compared to 2016 levels. Drilling and completion activity is expected to continue to recover. According to an industry source, upstream exploration and production annual spending in North America is expected to reach \$233 billion in 2021, or 71% of 2014 peak spending levels, compared to \$131 billion expected for 2017.

In the mining industry, we sell sulfuric acid that is used by mining companies in the recovery and leaching of copper from ores. Global copper consumption has typically grown in line with gross domestic product, driven by the industrialization of developing economies, global urbanization, and increasing global power demand. Because our customers generally operate mines at predictable output volumes regardless of commodity price, as consumer consumption tends to be inelastic, our sulfuric acid sales have historically been relatively stable and predictable. Customers in the mining industry are one of the few types of sulfuric acid customers who can buy acid from any location. We supply large mines in the western United States. Given the proximity of our manufacturing locations to the mines, we are able to limit our freight costs for our virgin sulfuric acid.

BUSINESS

We are a global provider of catalysts, specialty materials and chemicals, and services with leading supply positions across our portfolio. We compete in the global specialty chemicals and materials industry where we seek to focus on attractive, high-growth applications. Our products and services provide critical performance to our customers' products and we are able to offer many of our customers regionally sourced materials to reduce costs and improve delivery logistics. We provide our customers with a combination of product technology and applications knowledge, global supply chain capabilities, and local production and logistical support. We have two reporting segments: environmental catalysts and services and performance materials and chemicals. In our environmental catalysts and services segment, we have three product groups: silica catalysts, zeolite catalysts, and refining services. In our performance materials and chemicals segment, we have two product groups: performance materials and performance chemicals. Through these product groups we serve a diverse set of end uses and geographies.

The table below summarizes certain information regarding our two reporting segments and our five product groups for the year ended December 31, 2016. For additional financial information regarding our reporting segments, please see Note 12 to the audited consolidated financial statements of PQ Group Holdings Inc. and subsidiaries included elsewhere in this prospectus.

(Dollars in millions) Segments and Product Groups	Year ended December 31, 2016									
	Sales	% of Total Sales	Pro Forma Sales(1)	Zeolyst Joint Venture Total Net Sales(2)	% of Total Pro Forma Sales and Zeolyst Joint Venture Total Net Sales(1)(2)(3)	Net Loss	Pro Forma Adjusted EBITDA(1)(2)	% of Total Pro Forma Adjusted EBITDA(1)(2)(4)	Estimated Supply Share Position(5)	
Environmental Catalysts and Services:										
Silica Catalysts	\$ 53.0	5.0%	\$ 84.2	\$ —	5.5%				#2	
Zeolite Catalysts	—	—	—	131.3	8.5%				Primarily #1 or #2	
Refining Services	373.7	35.0%	373.7	—	24.3%				#1	
Subtotal	\$ 426.7	40.0%	\$ 457.9	\$ 131.3	38.3%		\$ 221.8	48.9%		
Performance Materials and Chemicals:										
Performance Chemicals	\$ 437.5	41.0%	\$ 663.9	\$ —	43.2%				Primarily #1(6)	
Performance Materials	206.5	19.4%	291.3	—	19.0%				Primarily #1(7)	
Sales Eliminations	(5.0)	(0.4%)	(8.0)	—	(0.5%)					
Subtotal	\$ 639.0	60.0%	\$ 947.2	\$ —	61.7%		\$ 231.8	51.1%		
Eliminations / Corporate	(1.5)		(2.1)	—			(32.8)			
Total	\$ 1,064.2	100.0%	\$ 1,403.0	\$ 131.3	100.0%	\$(79.7)	\$ 420.8	100.0%		

- (1) Pro forma information gives effect to the consummation of the Business Combination and the related financing transactions as if they occurred on January 1, 2015.
- (2) Percentage calculations include \$131.3 million of total net sales attributable to our Zeolyst Joint Venture, which represents 50% of its total net sales for the year ended December 31, 2016. See footnote (4) to "Summary Historical and Unaudited Pro Forma Financial and Other Data" for a description of the treatment of our Zeolyst Joint Venture in our consolidated financial information.
- (3) Percentage calculations exclude \$2.1 million in intersegment sales eliminations.
- (4) Percentage calculations exclude \$32.8 million in corporate expenses.
- (5) Estimated supply share positions are based on management's estimates based on the 2016 sales volume and represent our estimated global supply share positions for each of our product groups, except that the estimated supply share position for our refining services product group reflects our estimate of only our supply share position in the United States and excludes volume attributable to manufacturers who produce primarily for their own consumption.
- (6) We believe we hold #1 supply share positions with respect to products that accounted for approximately 73% of our performance chemicals product group's 2016 pro forma sales, and that we hold #2 supply share positions with respect to products that accounted for the remaining approximately 27% of our performance chemicals product group's 2016 pro forma sales.

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- (7) We believe we hold #1 supply share positions with respect to products that accounted for approximately 89% of our performance materials product group's 2016 pro forma sales, and that we hold #2 supply share positions with respect to products that accounted for the remaining approximately 11% of our performance materials product group's 2016 pro forma sales.

Environmental Catalysts & Services

Our environmental catalysts and services business is a leading global innovator and producer of catalysts for the refinery, emissions control, and petrochemical industries and is also a leading provider of catalyst recycling services to the North American refining industry. We believe our products are mission critical for our customers in these growing applications and impart essential functionality in chemical and refining production processes and in emission control for engines. Our catalysts are highly technical and customized for our customers, and can require up to ten years of development and collaboration with customers in order to commercialize. Catalyst specifications are constantly evolving in order to address changing customer demands and requirements for lower cost and improved quality. As a result, we must continuously collaborate with our customers to create new and more efficient pathways for the production of chemicals and fuels. Our environmental catalysts and services business consists of three product groups: silica catalysts, zeolite catalysts, and refining services.

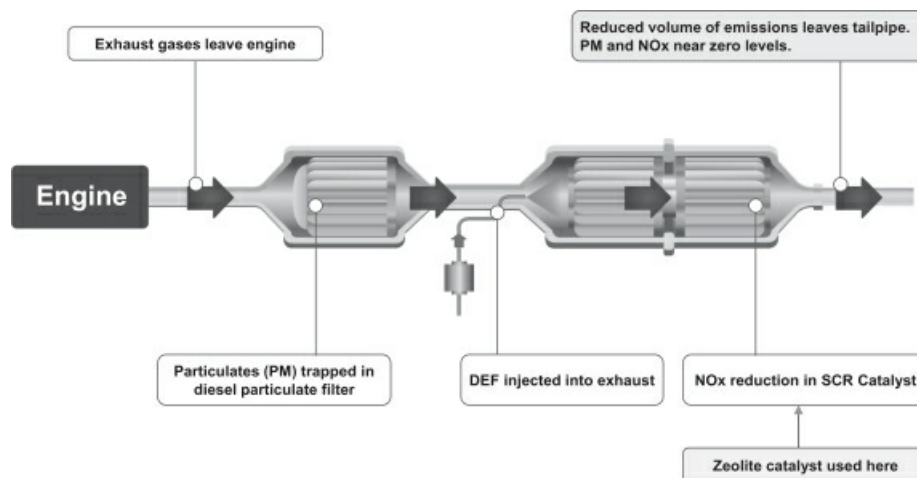
Silica Catalysts. In our silica catalysts product group, we sell both the finished catalyst and catalyst supports, which are critical catalyst components, for the production of HDPE, a high strength and high stiffness plastic used in packaging films, bottles, containers, and other molded applications. We also produce a catalyst that is used globally for the production of methyl methacrylate, the monomer for acrylic engineering resins, a clear scratch-resistant plastic used in sheet or molded form to replace glass and as a durable surface coating. Because these catalysts are highly technical and customized for our customers to produce resins with specific properties, they are often covered under long-term supply agreements and, in some cases, we are a customer's sole source supplier. In addition, we produce silicas products that are used to prevent opposite faces of polyolefin and polyester films from adhering to one another during manufacturing or otherwise.

Zeolite Catalysts. Our zeolite catalysts product group is a leading global supplier of emissions control catalysts as well as a supplier of specialty catalysts, precursors, and formulations to refineries and downstream petrochemicals and chemical companies. We operate this product group through our Zeolyst Joint Venture. These specialty zeolite-based catalysts are sold to the emissions control industry for use in diesel emission control units in both on-road and non-road diesel engines. In addition, our zeolite catalysts product group is a leading supplier to the hydrocracking catalyst industry as a direct seller and supplier to other catalyst suppliers.

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Our specialty zeolite catalysts are used in an advanced emission control technology called selective catalytic reduction. This process uses ammonia to react with engine exhaust gases via our catalysts in order to convert nitrogen oxides, a pollutant, into nitrogen and water. We believe that our zeolite catalysts can enable selective catalytic reduction technology to reduce the amount of nitrogen oxides in such exhaust gases by more than 90%. A schematic of a typical diesel emissions control system is below.

Representative Diesel Emissions Control System



We believe that this technology is one of the most cost-effective methods to reduce diesel engine emissions. Emissions control regulations have created demand for this technology and we believe that future regulations will generate additional growth and development opportunities for this technology and, as a result, our zeolite catalysts and precursors.

Our Zeolyst Joint Venture is a long-standing partnership dating back to 1988, which combines our expertise in zeolites supply and technology with our partner's expertise in global refinery catalyst sales and technology. We supply sodium silicates from our performance chemicals product group to the Zeolyst Joint Venture to make specialty zeolites, which are used as precursors in emissions control and custom catalysts. We also produce specialty zeolites that are precursors for the production of hydrocracking catalysts and other refinery and petrochemical catalysts that are used by our other product groups and sold to third parties. We manage the production of these specialty zeolites given our expertise in zeolite production. These catalysts include aromatic catalysts that upgrade aromatic by-product streams, dewaxing catalysts that improve lube oil performance and diesel cold flow performance, and paraffin isomerization catalysts that upgrade olefins to high octane gasoline blending components, for refinery and petrochemical customers.

Refining Services. Sulfuric acid is the primary catalyst used in the production of alkylates for gasoline production at refineries. Alkylates are a critical additive that increase octane in gasoline at low vapor pressure, which is needed in order for turbocharged engines to meet increasingly stringent fuel efficiency standards. Our refining services product group provides recycling and end-to-end logistics for refiners who use sulfuric acid in their alkylation units. These recycling units also produce virgin sulfuric acid and sodium bisulfate, which we sell into the water treatment, mining, and general industrial and chemicals industries.

After sulfuric acid is used in an alkylation unit, it becomes spent acid, which is diluted with water and hydrocarbons, and then needs to be recycled before it can be reused. Sulfuric acid regeneration enables refineries to manage their spent acid and obtain fresh acid for reuse in their alkylation processes. Because storage space for fresh

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and spent acid is typically limited, and the cost to refineries of interruption to their alkylation units would be significant, refineries seek to have a continuous and reliable source of supply for sulfuric acid. By providing regeneration services, as well as purchasing by-product sulfur from customers as a source of energy and for use in manufacturing virgin sulfuric acid, we believe that we provide our refining customers with a full solution for their sulfuric acid needs. Our refining services product group is highly regionalized due to shipping costs and our customer integration requirements. Our facilities are located near or, in some cases, within our customers' refineries and our products are often supplied directly to our customers by pipeline. In addition product can be shipped by barge, rail and truck. As a result, we believe that our integrated and strategically located network of facilities and logistics assets in the United States provides us with a significant competitive advantage and would be costly for our competitors to replicate.

We believe that we benefit from industry economics that favor incumbent producers because the capital cost to expand existing capacity is typically significantly less than the capital cost necessary to build a new plant and new plants can involve more challenges in obtaining the necessary local, regional and state permits. In addition, existing supply chains, including captive pipeline connections and other transportation logistics add to the competitive advantages available to incumbent producers. As a result, we believe that our integrated and strategically located network of facilities and end-to-end logistics assets in the United States provide us with a significant competitive advantage and would be costly for our competitors to replicate. In 2016 we estimate that our refining services product group had a regenerated sulfuric acid supply share in excess of 50% in the United States, which we believe is substantially larger than our closest competitor.

Sulfuric acid is created either through the burning of sulfur in furnaces, or as a by-product of other industrial processes, primarily the smelting of copper and other base metals. We produce a range of virgin sulfuric acid products by burning sulfur in our plants for supply to a diverse set of end uses. Sulfur-burned acid is generally considered to be of higher purity and quality than smelter-produced acid and, as a result, smelter-produced acid is not suitable for some industrial users including several of our larger customers who require higher quality and differentiated sulfuric acid products, such as super-saturated sulfuric acid (oleum) and other high purity specialty acids. Virgin sulfuric acid and regenerated sulfuric acid are manufactured in our regeneration plants using the same production equipment and, in addition, we have one facility in Houston, Texas that produces only virgin sulfuric acid from sulfur.

Sales & Marketing. Our sales and marketing strategy for our environmental catalysts and services business is based on a collaborative approach to working with our customers. We have a proven track record of working closely with customers to develop and manufacture highly technical and customized products for specific uses, which generally requires significant technical support and collaboration. In our catalyst product groups, the sales force and technical experts from our research and development facilities assist with the design and development of new products for a client's specific needs. This type of close working relationship often requires a non-disclosure agreement and joint development agreement and, in some cases, has enabled us to obtain exclusive supply arrangements for the developed product.

Our refining services product group relies on an experienced direct sales force to market our products and services. Our sales force and product stewardship staff remain engaged with our customers from the initial negotiation and implementation of a supply arrangement through the term of such supply arrangement and, in many cases, our sales force and product stewardship staff provide technical assistance to customers for the safe handling and storage of our products. We also rely on established chemical distributors to market and sell our virgin sulfuric acid and aluminum sulfate.

Our refining services product group is an end-to-end business model, taking spent acid from the back end of our customer's production processes and returning cleaned, regenerated sulfuric acid via barge, trucks, rail, and pipeline for reuse by our customers. Spent acid for our refining services is generally supplied to us as part of a long-term supply contract. Pipelines are typically owned by our customers, while rail, road and some barge assets are typically third-party leased, and most barges are generally owned by the company. Managing the logistics involved in this end-to-end business model is a critical part of our refining services.

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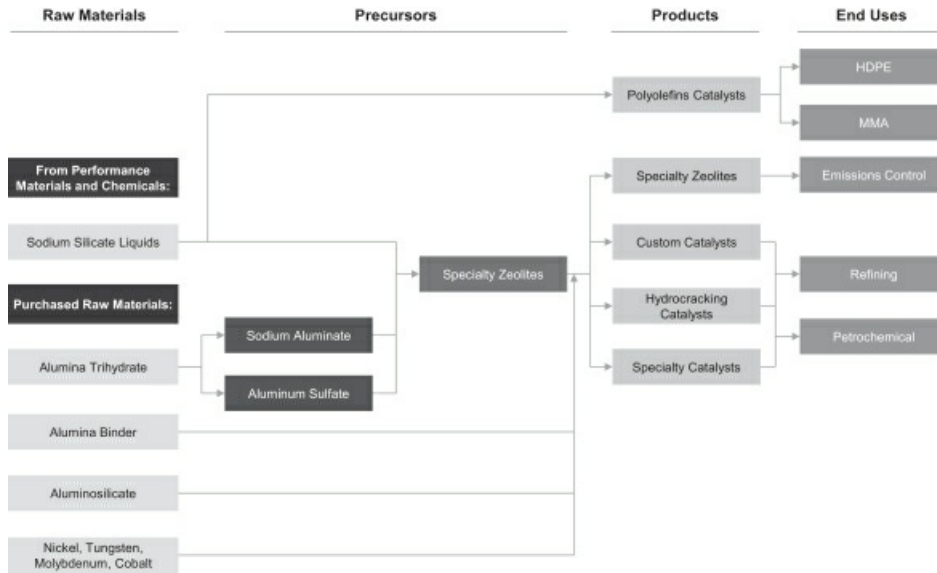
Most of our refining services contracts feature take-or-pay volume protection and/or quarterly price adjustments for commodity inputs, labor, the Chemical Engineering Plant Cost Index or natural gas. In 2016, approximately 94% of our refining services product group pro forma sales were sold under contracts that included some form of raw material pass-through clause. These price adjustments generally reflect our refining services actual cost structure in producing sulfuric acid, and tend to provide us with some protection against volatility in labor, fixed costs and raw material pricing. Freight expenses are generally passed through directly to customers. Excluding contracts with automatic evergreen provisions, approximately 60% of our sulfuric acid volume for the year ended December 31, 2016 was under contracts expiring at the end of 2019 or beyond.

Competition. Our silica catalysts and zeolite catalysts products groups are leading global catalyst platforms that primarily produce catalysts and services for customers in the petrochemicals and refining industries. In these areas we primarily compete with other global producers such as W.R. Grace, BASF, UOP, and Albemarle, as well as other niche competitors such as Tosoh, Axens, and Haldor Topsoe, and we typically compete on the basis of performance, product consistency, reliability, and responsiveness to changes in customer demand.

Refining services is a regional business due to shipping costs and customer integration requirements, and therefore our network of facilities is concentrated in the major areas of growth in sulfuric acid demand in the United States. These plants are located close to our major refining services customers and are typically integrated through well-established supply chain networks, including in some cases captive pipelines connecting us to our refining services customers. We compete in the North American refining services industry with competitors such as Chemtrade and Veolia and we compete on the basis of price, reliability, and responsiveness to changes in customer demand, which is a function of scale, proximity to customer locations and operational expertise. We estimate that our refining services product group holds the number one supply share position in the United States in sulfuric acid regeneration based on 2016 sales volume with an estimated 53% supply share. We also estimate that we had a 64% supply share in each of the West Coast and Gulf Coast regions based on 2016 sales volume, which we believe was greater than three times the supply share of our largest competitor.

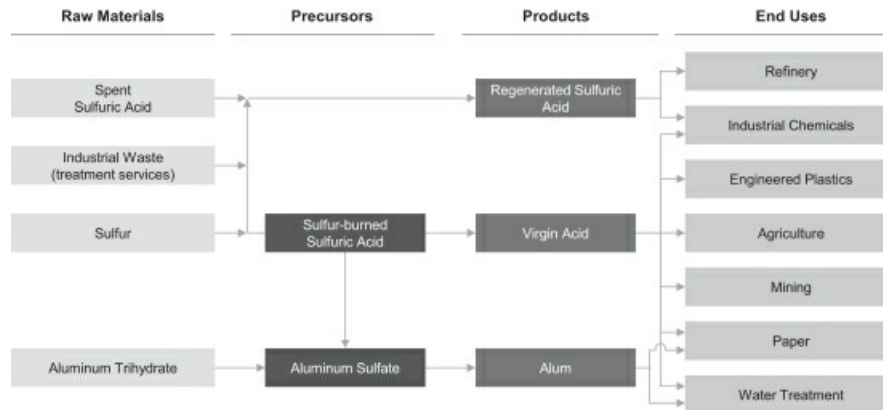
Manufacturing. We manufacture our zeolyst-based catalyst products using sodium silicates liquids from our performance chemicals product group to make specialty zeolite products, which are either used directly to produce catalysts or are sold as a precursor to other catalyst manufacturers.

Catalyst Manufacturing Platform



We produce regenerated sulfuric acid and virgin sulfuric acid through our furnace operations. Regenerated sulfuric acid is produced by breaking down the spent acid in our furnace into the usable components of sulfuric acid and water. Virgin sulfuric acid is produced by burning sulfur and certain sulfur-rich components at high temperatures within a furnace. The chart below summarizes the manufacturing platform for our refining services product group.

Refining Services Manufacturing Platform



Performance Materials & Chemicals

Our performance materials and chemicals business is a silicates and specialty materials producer with leading supply positions for the majority of our products sold in North America, Europe, South America, Australia and Asia (excluding China) serving diverse and growing end uses such as personal and industrial cleaning products, fuel efficient tires (“green tires”), surface coatings, and food and beverage. Our products are essential additives, ingredients, and precursors that are critical to the performance characteristics of our customers’ products, yet typically represent only a small portion of our customers’ overall end-product costs. We believe that our global footprint enables us to compete more effectively on a global basis due to the costs associated with shipping these products over extended distances. We believe that our network of strategically located manufacturing facilities allows us to serve our customers at a lower cost than our competitors and with quicker delivery times for our products. Our performance materials are also used in some cases as a substitute for less environmentally friendly materials. For example, specialty silicates are displacing phosphates in dish detergents, precipitated silicas are displacing carbon black in tires, and hollow and solid microspheres are displacing plastic volumes in transportation lightweighting applications. Our performance materials and chemicals business consists of two product groups: performance chemicals and performance materials.

Performance Chemicals. Our performance chemicals product group includes silicate products and derivatives, which are used in a variety of applications such as adsorbents for surface coatings, clarifying agents for edible oils and beverages, precursors for green tires, and additives for cleaning and personal care products. Silicates are a family of products manufactured primarily from readily available materials, such as industrial sand and soda ash. These raw materials are typically fused in a furnace and then dissolved in water under pressure to form water-soluble silicates for use in our downstream products, such as precipitated silica and silica gels. We sell our performance chemicals products to customers who use silicates as precursors, such as sodium silicates that are used in the growing precipitated silica end uses, as well as for downstream derivative products, such as silicas used as additives in toothpaste formulation and silica gels that are used as adsorbents in food and beverage manufacturing.

Our performance chemicals product group, which is the backbone across our additives and catalyst platform, is highly regionalized because of the expense of shipping sodium silicates extended distances due to their water content. As a result, our network of regional silicate plants is strategically located to support the customers that we serve. In addition, we maintain a few larger dedicated facilities to service our derivative products. Our performance chemicals product technology requires significant know-how and scale in order to be able to operate in a cost effective manner. We believe that we are the only global silicates producer who can supply all of the major regions and we estimate that we have three times the sodium silicates supply share as our nearest competitor based on 2016 sales volume. Key end uses for our performance chemicals products include catalyst precursors, food and beverage, personal care, cleaning products, coatings, tires, soil stabilization, paper de-inking, and sequestration.

Silicates. Silicates and their family of derivatives, such as silicas, have functional attributes that are used as additives and ingredients to enhance product performance as binders, fillers, flow control agents, and carriers in our customers’ products. Our silicates are used in a diverse range of applications. In detergents and cleaning products, silicates provide corrosion inhibition, alkalinity, emulsification, and deflocculation. In construction materials such as roofing granules, cement, ceramics, adhesives, and coatings, our products are used as a binding agent. In addition, our products are ingredients in the consumer products, which includes personal care and consumer cleaning products, where customers are seeking more environmentally friendly products without loss of effectiveness or performance. We believe that our products have the environmental and safety profile to address these evolving customer demands. Silicates and silicate derivatives are recognized on the Safer Chemicals Ingredients List of the EPA’s Safer Choice program, which we believe positively impacts our ability to compete in the consumer products applications.

Silica Derivatives. Silica derivatives include specialty silicas, zeolite products, spray dry silicates, magnesium silicate, and other specialty chemicals. Silica derivatives are used in personal care products as a

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binder in pharmaceutical products, and as a source of alkaline in cleaning products, such as industrial cleaners. In addition, our silica derivatives are used in natural resources applications such as in drilling fluids as a lubricant binder. Some of our silicas and zeolites are used by our environmental catalysts and services business to produce catalysts and catalyst precursors. We believe that this internal source of supply is a competitive advantage both for our performance chemicals product group, which can take advantage of opportunities to maximize the use of our sodium silicates production capacity and for our silica catalysts and zeolite catalysts product groups, which are able to access a consistent quality source of precursors.

Silica Gels. Silica gels are used as drying agents or adsorbents and desiccants for food and industrial products. For example, silica gels are used in the brewing industry to remove certain compounds that cause chilled beer to look cloudy, and are used as clarification agents for wines and fruit juices, and as an adsorbent of free fatty acid and other contaminants in the refining of cooking oils. In personal care, silica gels are used as carriers for vitamins and pharmaceuticals, and as a flow conditioner and an oil absorption agent in face powders. In industrial and engineered plastics, silica gels are used for gloss control in coil, wood, general industrial, leather and other high-performance surface coatings applications. In addition, highly-porous specialty silica gels are used in ink-receptive coatings for inkjet media. Some recently developed silica-based products are designed for ultraviolet-cured coatings and other low solvent formulations that offer more environmentally friendly characteristics. Silica gels are also used to create coatings that have significant capacity to absorb ink in order to allow for quick setting of colorants and faster ink dry times, which can improve color density and reduce ink bleed.

Precipitated Silicas. Precipitated silicas represent the largest volume of specialty silicate products based on 2016 sales volume, but are also concentrated among a limited number of suppliers. Precipitated silica applications include filler in rubber for green tire applications and gel dentifrice formulations used in toothpaste as an abrasive or thickener. Precipitated silicas are an alternative to calcium phosphates because of their compatibility with different fluorides and their softness. In addition, precipitated silicas are used as functional filler in polyethylene membranes for lead-acid batteries, which are used in most automobiles. In agricultural end uses, precipitated silicas are used as carriers for liquid ingredients in dry animal feeds and as a flow aid and dispersant in insecticide formulations for crop care. We continue to collaborate with our customers to innovate in this industry. For example, we recently worked with certain customers to deliver new products for whitening and desensitizing toothpaste applications that offer improved cleaning performance with low abrasion.

Zeolites. We produce zeolites by combining sodium silicate with aluminum trihydrate and other materials. These products are used as adsorbents and detergents. We also use these products to serve newer applications such as stabilizers in the production of polyvinylchloride, a titanium dioxide replacement for paints and coatings, and coatings applications for food grade paper.

Other Specialty Silicates. Other specialty silicates that we produce are used for a variety of industrial, personal care, and cleaning products. End uses include refractory, cleaning products, oil processing, hair bleach, fire retardants, water treatment, and adhesives. Our specialty silicate products are also used in drilling fluids for oil and gas wells to maintain drill hole integrity.

Performance Materials. Our performance materials product group includes specialty glass products, such as highly engineered microspheres made from either recycled glass or fresh batch material using our proprietary furnace operations. We believe that we are an industry leader in North America, Europe, South America, and Asia (excluding China) in microspheres. These products are used in the reflective markings used on roads and runways to enhance visibility at night and in poor weather to improve safety. Our microspheres, which can be solid or hollow, are also used as additives in plastics for lightweighting and in abrasive media, where they are used to clean,peen and debur metal surfaces, such as for turbine blades used in aerospace and power generation industries.

In the highway safety applications, our microspheres are used with a variety of binders, such as water- and solvent-borne paint, epoxy coatings, and thermoplastics. Our microspheres are mixed in with, or dropped into,

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these binders as pavement markings are being applied. These microspheres remain partly exposed after the markings dry and provide retroreflectivity that increases the visibility of the road markings at night and during inclement weather. We sell these microspheres primarily to federal and state government agencies, municipalities, highway contractors, binder manufacturers and airport agencies. Demand for our performance materials products has grown as a result of increased spending for maintenance and upgrading of existing roads and the construction of new roads around the world. Demand for our highway safety products is principally driven by replacement demand and new road construction and, as such, demand for these products has grown through economic cycles without exhibiting as pronounced cyclicity as other end uses. Highway safety budgets in the United States are typically funded by taxes on gasoline and are not typically tied to economic cycles or to the state and local government budgeting process. The United States federal government has taken an active role in implementing regulations and initiating infrastructure development in an effort to improve highway safety. In addition, the continuing need to maintain and upgrade an aging United States highway infrastructure, has translated into relatively consistent government expenditure in this area. The most recent innovation from our performance materials product group is our ThermoDrop product, which simplifies the road striping operations for our customers by using a new durable thermal plastic road marking material. We have also introduced a new faster-drying road marking system, Visilok, which can reduce traffic disruption during striping operations and improve road worker safety by reducing the amount of time needed to complete the road marking process.

We also sell highly specialized solid and hollow microspheres and metal coated particles for a variety of uses such as plastic additives, conductive applications, metal finishing, and other industrial and consumer applications. For metal finishing, our performance materials are propelled from blasting equipment to clean,peen,debur, and finish metal in industrial and process chemical end uses. Our performance material products offer the ability to design lighter parts while maintaining strength and reliability. Our performance materials are often a preferred substitute for other media such as industrial sand, aluminum oxide, iron and steel because they do not damage parts and they allow for better process control, limit surface contamination, and can be more environmentally friendly.

Other applications for our microspheres include additives into paints and coatings for thermal insulation, to reduce weight and ingredients in cosmetics to improve feel attributes and improve flow functionality. Our microspheres are also used in drilling fluids to provide lubrication and strength. Within the natural resources industry, our performance materials are used in oil-drilling muds to improve lubricity and reduce friction in horizontal drilling. In addition, our hollow microspheres are used as sensitizers for water-based industrial explosives in mining, quarrying, and construction. Sensitizers are also used in explosives to increase the energy of a detonation.

We believe that our industry leadership position, scale, and industry presence provides us with a competitive advantage over competitors who compete only in particular end uses. We believe that it would be costly and difficult for a new entrant or existing competitor to replicate our breadth or economies of scale in the production of microspheres.

Sales & Marketing. Our performance chemicals product group relies on a direct sales force to market our broad array of products. For most customers, our direct sales force calls on the customer, supported by our experienced technical staff. Our global sales force and technical staff employ a proactive and collaborative approach to the sales process. In many cases, particularly in our specialty products, our sales force assists our research and development team with the design and development of new products to meet a customer's specific needs. Our performance materials product group uses a technically-trained internal sales force to market our product offerings in the different geographies that we serve. We sell highway safety products directly to road striping contractors, binder manufacturers and original equipment manufacturers through regional sales managers in North America, Europe and Asia. We also sell these products directly to states and municipalities through a bidding process that is handled by our corporate staff. Our performance materials products outside of highway safety are sold through a direct sales force and a network of distributors. In addition to our direct sales force, we use chemical distributors to market and sell a smaller portion of our performance materials and chemicals products to smaller customers.

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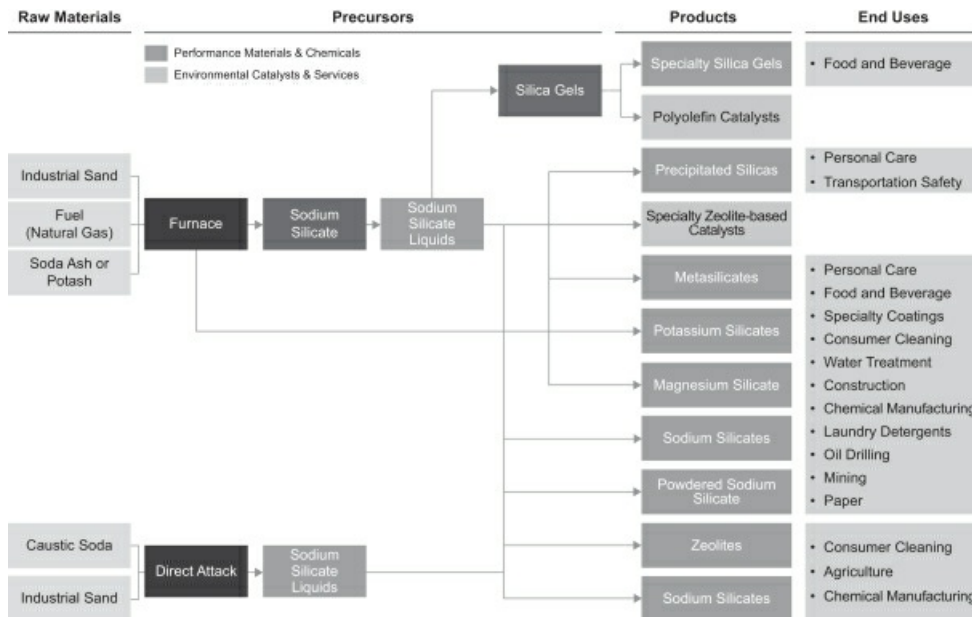
For the year ended December 31, 2016, approximately 45% of our North American silicate pro forma sales, which represented a significant portion of our performance chemicals product group sales, were derived from contracts that included raw material pass-through clauses. Under these contracts, there is usually a time lag of between three and nine months for price changes to pass-through, depending on the magnitude of the change, industry dynamics and the terms of the particular contract.

Competition. In our performance materials and chemicals business, we primarily compete with other global producers such as OxyChem, PPG and Evonik. We believe that we are the only global silicates producer with operations in North America, Europe, and Australia, and we believe that we have technical and cost advantages in all of these regions as compared to our competitors as a result of the scale and breadth of our product offerings and operations. We compete primarily on a regional basis due to the costs associated with shipping sodium silicates, and we estimate that we had approximately three times the sodium silicate supply share of our nearest competitor based on 2016 sales volume. Our network of regional silicate plants is strategically located to support the industries that we serve. In addition, we maintain a few larger dedicated facilities to service our derivative products. We believe that our network of strategically located manufacturing facilities allows us to serve our customers at a lower cost than our competitors and with quicker delivery times for our products. In the industry served by our performance materials and chemicals business, we compete primarily on the basis of performance, product consistency, quality, reliability, and ability to innovate in response to customer demands. Our competitors are primarily regional suppliers.

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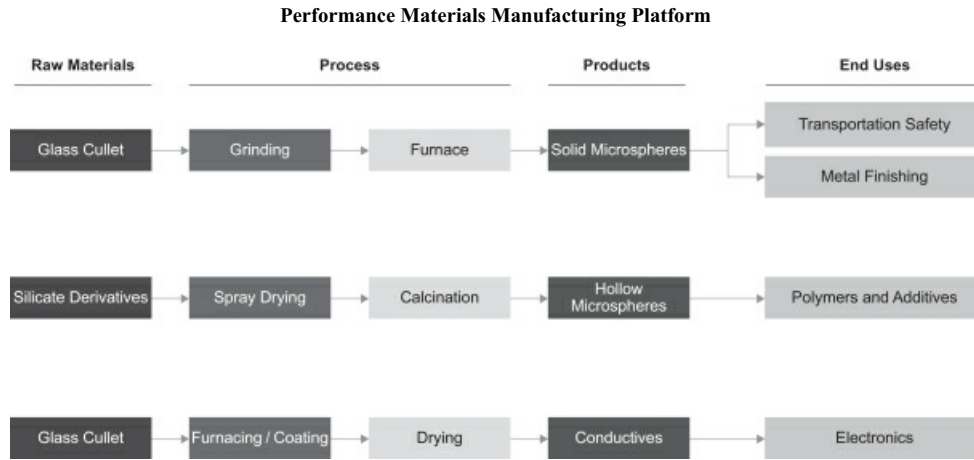
Manufacturing. Performance chemicals are produced through an integrated supply chain beginning with regional and large scale upstream production of sodium silicates and downstream derivatives. Sodium silicates are produced regionally because of the expense of shipping sodium silicates extended distances due to their water content. Our sodium silicates are produced by fusing industrial sand and soda ash in our proprietary furnace operations. We dissolve the molten silicate from the furnace into water and sell these products in liquid form. Downstream derivatives are produced through a variety of chemical operations that create aqueous, solid, and gel forms for our products.

Performance Chemicals Manufacturing Platform



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We produce our highway safety products and other microspheres by crushing raw materials, such as recycled glass or cullet, and then feeding these raw materials into a furnace. The product is coated or treated in other ways to meet particular customer and end use specifications. The beads are then bagged and stocked for shipment. The flowchart below outlines our performance materials’ production process.



Properties

Our operating headquarters are located in Malvern, Pennsylvania. As of June 30, 2017, we had 72 manufacturing facilities in 19 countries on six continents. We also had 14 administrative facilities and six research and development facilities located in 12 countries. Our joint ventures operated out of seven facilities located in six countries, including six manufacturing facilities. We also own or lease other properties, including office buildings, warehouses, testing facilities and sales offices.

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The table below presents summary information regarding our principal facilities as of June 30, 2017.

Location	Approximate Square Feet	Owned or leased	PM&C	EC&S
<i>Administrative facilities:</i>				
Amersfoort, Netherlands	7,481	Leased	X	
Lenexa, Kansas, United States	14,489	Leased	X	
Malvern, Pennsylvania, United States	33,000	Leased	X	X
<i>Research and development facilities:</i>				
Toronto, Canada	2,500	Leased	X	
St. Pourcain-sur-Sioule, France	30,916	Owned	X	
Eijsden, Netherlands	4,306	Owned	X	
Warrington, United Kingdom	14,155	Owned	X	X
Conshohocken, Pennsylvania, United States	74,968	Owned	X	X
<i>Manufacturing facilities:</i>				
Melbourne-Dandenong, Australia	48,378	Owned	X	
Jacana, Brazil	43,753	Owned	X	
Rio Claro, Brazil	193,750	Owned	X	X
Toronto, Canada	75,471	Owned	X	
Valleyfield, Canada	46,000	Owned	X	
Lamotte, France	130,567	Leased	X	
Wurzen, Germany	124,915	Owned	X	
Pasuruan, Indonesia	68,489	Owned	X	X
Guadalajara, Mexico	105,866	Owned	X	
Tlalnepantla, Mexico	136,209	Owned	X	
Eijsden, Netherlands	161,544	Owned/Leased ⁽¹⁾	X	
Maastricht, Netherlands	70,073	Leased	X	
Winschoten, Netherlands	134,548	Leased	X	
Delfzijl, Netherlands	38,373	Leased ⁽²⁾		X
Bangkok, Thailand	12,056	Owned	X	
Warrington, United Kingdom	371,063	Owned	X	X
Augusta, Georgia, United States (Plant 102/104)	65,178	Owned	X	
Augusta, Georgia, United States (Plant 500)	121,502	Leased	X	
Baltimore, Maryland, United States	19,852	Owned	X	
Baton Rouge, Louisiana, United States	13,503,600	Owned		X
Baytown, Texas, United States	348,480	Owned		X
Brownwood, Texas, United States	107,900	Owned	X	
Chester, Pennsylvania, United States	172,707	Owned	X	
Dominguez, California, United States	1,437,480	Owned		X
Gurnee, Illinois, United States	96,000	Owned	X	
Jeffersonville, Indiana, United States	29,052	Owned	X	
Joliet, Illinois, United States	168,657	Owned	X	
Hammond, Indiana, United States	1,132,560	Owned		X
Houston, Texas, United States	2,003,760	Owned		X
Kansas City, Kansas, United States	220,679	Owned ⁽³⁾		X
Martinez, California, United States	5,096,520	Owned		X
Muscatine, Iowa, United States	105,072	Owned	X	
Rahway, New Jersey, United States	124,035	Owned	X	
Paris, Texas, United States	147,158	Owned	X	
Pineville, Louisiana, United States	14,522	Owned	X	
Portland, Oregon, United States	1,176,120	Owned		X
Potsdam, New York, United States	88,798	Owned	X	
South Gate, California, United States	71,632	Owned	X	
St. Louis, Missouri, United States	44,034	Owned	X	

(1) Approximately 89,911 square feet is owned and approximately 75,939 square feet is leased.

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- (2) The facility is used by our Zeolyst Joint Venture under a ground lease that we entered into with a third party.
- (3) We lease a portion of the site to our Zeolyst Joint Venture.

Financial Information about Geographic Areas

For certain geographical financial information about our business, please see Note 12 to the audited consolidated financial statements of PQ Group Holdings Inc. and subsidiaries included elsewhere in this prospectus.

Raw Materials

We are able to negotiate our supply agreements for our key raw materials based on our leading industry position and global scale in an effort to achieve competitive pricing. We also maintain a raw material quality audit and qualification program to ensure that the material we purchase satisfies stringent quality requirements. The key raw materials for our silica catalysts and zeolite catalysts product groups are sodium silicates, acids, bases and certain metals. The key raw materials used in our refining services product group include spent sulfuric acid and sulfur, both of which have generally been widely available in the geographies in which we operate. The key raw materials used in our performance chemicals product group include soda ash, industrial sand, aluminum trihydrate and sodium hydroxide. The key raw materials used in our performance materials product group include cullet, which is glass sourced from glass recyclers around the world. Cullet has generally been available in sufficient supply from local recyclers in the regions in which we operate.

While natural gas is not a direct feedstock for any individual product, we use natural gas powered furnaces to heat raw materials and create the chemical reactions necessary to manufacture our products. We maintain multiple suppliers wherever possible and we seek to hedge our exposure to fluctuations in prices for natural gas through hedging activity in the United States, forward purchases of natural gas in the United States, Canada, and Europe, and the use of pass-through clauses for raw material and natural gas costs in our customer contracts. However, we may not be successful in passing through all increases in raw material costs or maintaining an uninterrupted supply of natural gas for all of our furnaces. See “Risk Factors—Risks Related to Our Business—If we are unable to pass on increases in raw material prices, including natural gas, to our customers or to retain or replace our key suppliers, our results of operations and cash flows may be negatively affected.”

Research and Development

We benefit from the highly-skilled technical capabilities of our employees dedicated to new product development. We operate six research and development facilities in the United States, Canada, the United Kingdom, the Netherlands and France. Our research and development activities are directed toward the development of new and improved products, processes, systems and applications for customers. Our research and development team is organized to support each of our operating businesses and staffed with experienced scientists, technical service representatives and process engineers with direct knowledge of our products. This business group and customer-oriented team structure provides strong links between our product development and manufacturing functions and our customer collaboration and specifications. These connections enable us to focus our development on timely and relevant products for our customers while remaining attentive to manufacturing considerations to enable us to produce new products profitably and in a timely manner. Product development activities are organized into research and development projects that are subject to regular reviews by the business teams in order to understand and address our customers’ evolving needs and invest in our growth by prioritizing innovation driven by these identified needs. In addition, we are improving the way our research and development team shares information by removing silos and holding regular senior-level project reviews to ensure best practices are shared and consistent metrics are used to determine a project’s merit and the size of the potential opportunity. Pro forma company-sponsored research and development expenses were approximately \$10.8 million for the year ended December 31, 2016 and \$10.3 million for the year ended December 31, 2015. Legacy Eco did not incur research and development expenses for the year ended December 31, 2014. Legacy PQ

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company-sponsored research and development expenses totaled \$9.1 million for such period. Such totals do not include the research and development expenses incurred by our Zeolyst Joint Venture, which totaled \$16.0 million, \$14.0 million and \$12.9 million for the years ended December 31, 2016, 2015 and 2014, respectively.

Our Joint Ventures

We have entered into several long-standing joint ventures to supplement our businesses and access other geographic locations, minimize costs and accelerate growth in areas we believe have significant business potential, including:

Zeolyst Joint Venture. Our Zeolyst Joint Venture is a long-standing partnership with CRI, that dates back to 1988 and is focused on the development, manufacture and sale of zeolite-containing catalysts through manufacturing facilities located in Kansas and The Netherlands. We have a 50% ownership stake in our Zeolyst Joint Venture.

PQ Holdings Mexicana S.A. de C.V. PQ Holdings Mexicana was established in 2000 as a joint venture with Solvay Alkalis, Inc. for the manufacture, marketing and sale of various chemicals, including sodium silicate and metasilicate, through manufacturing facilities in Tlalnepantla and Guadalajara, Mexico. We have an 80% ownership stake in PQ Holdings Mexicana.

Potters (Thailand) Limited. Potters (Thailand) Limited was established in 1988 as a joint venture with Mr. Sompong Dowpiset for the manufacture of high-quality microspheres for industrial and highway safety applications through a manufacturing facility in Bangkok, Thailand. We have an approximate 75% ownership stake in Potters (Thailand) Limited.

Quaker Chemicals South Africa Pty Ltd Quaker Chemicals South Africa was established in 1986 as a joint venture with the Quaker Chemical Corporation (“Quaker”) for the distribution and sale of specialty chemicals utilizing Quaker’s trademarks and incorporating Quaker’s formula and technical data through a manufacturing facility in Jacobs, South Africa. We have a 49% ownership stake in Quaker Chemicals South Africa.

PQ Silicates Limited. PQ Silicates was established in 1997 as a Taiwan joint venture with Mr. James Fang for the import and sale of sodium and potassium silicate. We have a 50% ownership stake in PQ Silicates.

Customers

We collaborate with multinational companies who often seek global solutions. Our customers include large industrial companies such as BASF, Honeywell and 3M and global catalyst producers such as Albemarle and W.R. Grace. We also supply catalysts to leading chemical and petrochemical producers such as BASF, Dow Chemical, Lucite, LyondellBassell and Shell. We supply personal care ingredients and additives to leading consumer products companies such as Unilever and Colgate-Palmolive. We have long-term relationships with our top ten customers, based on 2016 pro forma sales, that average more than 50 years. In addition, our customer base is diversified, with our top ten customers in 2016 representing approximately 24% of pro forma sales for the year ended December 31, 2016 and no customer representing more than 4% of our pro forma sales during such period.

Intellectual Property

We evaluate on a case-by-case basis how best to use patents, trademarks, copyrights, trade secrets and other available intellectual property protections in order to protect our products and our critical investments in research and development, manufacturing and marketing. We focus on securing and maintaining patents for certain inventions such as composition-of-matter, while maintaining other inventions such as process improvements as

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trade secrets, derived from our market-based business model, in an effort to maximize the value of our product portfolio and manufacturing capabilities and reinforce our competitive advantage. Our policy is to seek appropriate intellectual property protection for significant product and process developments in the major areas where the relevant products are manufactured or sold. Patents may cover products, processes, intermediate products and product uses. Patents extend for varying periods in accordance with the date of patent application filing and the legal life of patents in the various countries in which the patents are registered. The protection afforded, which may also vary from country to country, depends upon the type of subject matter covered by the patent and the scope of the claims of the patent.

In most industrial countries, patent protection may be available for new substances and formulations, as well as for unique applications and production processes. However, given the geographical scope of our business and our continued growth strategy, there are regions of the world in which we do business or may do business in the future where intellectual property protection may be limited and difficult to enforce. Moreover, we monitor our competitors' products and, if circumstances were to dictate that we do so, we would vigorously challenge the actions of others that conflict with our patents, trademarks and other intellectual property rights. We maintain appropriate information security policies and procedures reasonably designed to ensure the safeguarding of confidential information including, where appropriate, data encryption, access controls and employee awareness training.

We own or have rights to a number of patents relating to our products and processes. As of June 30, 2017, we owned 47 patented inventions in the United States, with approximately 300 patents issued in countries around the world and approximately 140 patent applications pending worldwide covering more than 25 additional inventions. As of June 30, 2017, we also had trademark rights in approximately 600 trademark registrations worldwide, including approximately 75 U.S. trademark registrations. We also have approximately 75 pending trademark applications, which include applications in the United States and worldwide. In addition to our registered and applied-for intellectual property portfolio, we also claim ownership of certain trade secrets and proprietary know-how developed by and used in our business. Including our joint ventures, we are party to certain arrangements whereby we license in the right to use certain intellectual property rights in connection with our business.

Employees

As of December 31, 2016, we had 2,949 employees worldwide, of which 1,394 were employed in the United States, 423 were employed in Canada, Mexico and Brazil, 833 were employed throughout Europe, 33 were employed in South Africa and 93 were employed in Indonesia. Our remaining employees are dispersed throughout Asia and Australia, primarily in Australia, China, Thailand and Japan. As of December 31, 2016, approximately 49% of our employees were represented by a union, works council or other employee representative body. We believe we have good relationships with our employees and their respective works councils, unions or other bargaining representatives. There have been no labor strikes or work stoppages in these locations in recent history.

Environmental Regulations

Obtaining, producing and distributing many of our products involve the use, storage, transportation and disposal of toxic and hazardous materials. We are subject to extensive, evolving and increasingly stringent national and local environmental laws and regulations, which address, among other things, the following:

- emissions to the air;
- discharges to soils and surface and subsurface waters;
- other releases into the environment;
- prevention, remediation or abatement of releases of hazardous materials into the indoor or outdoor environment;

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- generation, handling, storage, transportation, treatment and disposal of waste materials;
- maintenance of safe conditions in the workplace;
- registration and evaluation of chemicals;
- production, handling, labeling or use of chemicals used or produced by us; and
- stewardship of products after manufacture.

We apply the principles of the Environmental Management standard of the International Organization for Standardization (ISO 14001) at our facilities throughout the world. For chemical facilities in the United States, we also adhere to the Responsible Care RC14001 Technical Specifications of the American Chemistry Council.

We maintain policies and procedures to monitor and control environmental, health and safety risks, and to monitor compliance with applicable state, national, and international environmental, health and safety requirements. We have a strong environmental, health and safety organization. We have a staff of professionals who are responsible for environmental health, safety and product regulatory compliance. We have implemented a corporate audit program for all of our facilities. However, we cannot provide assurance that we will at all times be in full compliance with all applicable environmental laws and regulations. We expect that stringent environmental regulations will continue to be imposed on us and our industry in general. Evolving chemical regulation programs throughout the world could impose testing requirements or restrictions on our chemical raw materials and products. These programs include the 2016 amendments to the U.S. Toxic Substances Control Act, under which the EPA will prioritize and evaluate chemicals for regulation, the E.U. REACH regulations, which have ongoing registration and evaluation requirements with associated testing costs and potential restrictions, the Korea REACH law, which is requiring registration and potentially testing of chemicals, and similar programs being developed in Taiwan, Turkey, India, and elsewhere. Given knowledge of our chemicals and the various regulations promulgated to date, we do not anticipate costly testing requirements or severe restrictions, but cannot guarantee that we will be free of requirements for our products or raw materials that could materially affect our operations.

Environmental Remediation. Environmental laws and regulations require mitigation or remediation of the effects of the disposal or release of chemical substances. Under some of these regulations, as the current or former owner or operator of a property, we could be held liable for the costs of removal or remediation of hazardous substances on or under the property, without regard to whether we knew of or caused the contamination, and regardless of whether the practices that resulted in the contamination were permitted at the time they occurred. Many of our current or former production sites have an extended history of industrial use, and it is impossible to predict precisely what effect these laws and regulations will have on us in the future. Soil and groundwater contamination requiring investigation and remediation has been discovered at some of the sites, and might occur or be discovered at other sites. Several active and former facilities currently are undergoing investigation and remediation, including sites in Rahway, NJ; Dominguez, CA; Martinez, CA; and Tacoma, WA.

Environmental Programs. We have comprehensive environmental, health and safety compliance, auditing and management programs in place to assist in our compliance with applicable regulatory requirements and with internal policies and procedures, as appropriate. Each facility has developed and implemented specific critical occupational health, safety, environmental, security and loss control programs.

We also have implemented a Health, Safety and Environmental (“HSE”) organizational structure with executive committee level leadership and dedicated environmental experts. We have Regional HSE Specialists and Managers who are embedded in the field and provide HSE expertise and support to operating sites. Certain, larger sites may have dedicated environmental or safety personnel. We have an established Product Safety/Stewardship management system compliant with the RC14001 technical specification along with two Product Stewardship Managers, one of which is a REACH Specialist. We conduct Product Stewardship reviews as part of new product development and routinely evaluate product safety risk for raw materials, intermediates and products.

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Chemical Product Regulation

As a chemical company, we are subject to extensive and evolving regulations regarding the manufacture, processing, distribution, import, export, and labeling of our products and their raw materials. In the European Union, the REACH regulations went into effect in 2007 with implementation rolling out over time. REACH requires registration of chemicals, along with a dossier of toxicological and ecotoxicity test results, or a plan to conduct such tests if currently unavailable. Registered chemicals then can be subject to further evaluation and potential restrictions. Our high-volume chemicals have been registered under REACH; up to 15 lower-volume chemicals (mainly catalysts) will be registered by the 2018 deadline. To date, no testing has been required. A couple of our chemicals are being reviewed under REACH. Since the promulgation of REACH, other countries (e.g., China, Korea, Taiwan) have enacted and are in the process of implementing similar comprehensive regulation of chemicals. In the United States, legislation has been enacted that would require the EPA to review and require testing of certain chemicals. Given knowledge of our chemicals and the various regulations promulgated to date, we do not anticipate costly testing requirements or severe restrictions, but cannot guarantee that we will be free of requirements for our products or raw materials that could materially affect our operations. In particular, some of our products might be characterized as nanomaterials and then subjected to evolving new nanomaterial regulations.

Legal Proceedings

From time to time we may be subject to various legal claims and proceedings incidental to the normal conduct of business, relating to such matters as personal injury, product liability and warranty claims, waste disposal practices, release of chemicals into the environment and other matters that may arise in the ordinary course of our business. We currently believe that there is no litigation pending that is likely to have a material adverse effect on our business. Regardless of the outcome, legal proceedings can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

MANAGEMENT

Executive Officers and Directors

Below is a list of the names, ages as of June 30, 2017, and positions, and a brief account of the business experience, of the individuals who serve as our executive officers and directors as of the date of this prospectus. Our certificate of incorporation will provide that our board of directors will be divided into three classes of directors, with the classes as nearly equal in number as possible. As a result, approximately one-third of our board of directors will be elected each year. Upon completion of this offering, we expect that each of our directors identified below will serve in the class indicated. Subject to any earlier resignation or removal in accordance with the terms of our certificate of incorporation and by-laws, our Class I directors will serve until the first annual meeting of stockholders following the completion of this offering; our Class II directors will serve until the second annual meeting of stockholders following the completion of this offering; and our Class III directors will serve until the third annual meeting of stockholders following the completion of this offering.

<u>Name</u>	<u>Age</u>	<u>Position</u>
James F. Gentilcore	65	Chief Executive Officer, President and Director (Class director)
Michael Crews	50	Executive Vice President and Chief Financial Officer
Scott Randolph	55	Executive Vice President and Group President—Performance Materials and Chemicals
Paul Ferrall	60	Executive Vice President and Group President—Environmental Catalysts and Services
John Lau	62	Chief Technology Officer
Joseph S. Koscinski	51	Secretary, Vice President & General Counsel
William J. Sichko, Jr.	63	Chief Administrative Officer, Assistant Secretary and Vice President
Michael Boyce	68	Chairman of the Board of Directors (Class director)
Greg Brenneman	55	Director (Class director)
Timothy Walsh	54	Director (Class director)
Christopher Behrens	56	Director (Class director)
Mark McFadden	39	Director (Class director)
Robert Toth	56	Director (Class director)
Robert Coxon	69	Director (Class director)
Andrew Currie	61	Director (Class director)
Jonny Ginns	43	Director (Class director)
Kyle Vann	69	Director (Class director)
Martin S. Craighead	57	Director (Class director)
Kimberly Ross	52	Director (Class director)

James F. Gentilcore became a director and our President and Chief Executive Officer in July 2016. Mr. Gentilcore most recently served as an Executive Advisor to CCMP from April 2014 to June 2016. He previously served as Chief Executive Officer of Edwards Group Limited, a developer and manufacturer of vacuum products, abatement systems and related services, from March 2013 to January 2014, and as a director from December 2007 until January 2014. Prior to that, he was the Chief Executive Officer of EPAC Technologies Inc., a logistics technology solutions company, from January 2009 until March 2011. Mr. Gentilcore also served as Chief Operating Officer of Brooks Automation Inc., a position he held from November 2005 until November 2007, after leading the merger between Brooks and Helix Technology Corp., where he had been the Chief Executive Officer from December 2002 until October 2005. Prior to that,

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Mr. Gentilcore was the Chief Operating Officer of Advanced Energy Industries, Inc. Earlier in his career, he spent 10 years in the electronics materials industry with Air Products Inc., serving in various business development and operational roles. Mr. Gentilcore currently serves on the board of directors of Entegris, Inc. and Milacron Holdings Corp. and previously served as a member of the board of directors of KMG Chemicals Inc. from May 2014 to December 2016. Mr. Gentilcore was elected to serve as a member of our board of directors due to his more than 20 years of management experience and leadership of the company as our President and Chief Executive Officer.

Michael Crews became our Executive Vice President and Chief Financial Officer in August 2015. From 2008 to 2015, Mr. Crews was Executive Vice President and Chief Financial Officer at Peabody Energy, a private-sector coal company. From 1998 to 2008, Mr. Crews held various management positions at Peabody Energy including Vice President—Operations Planning, Assistant Treasurer and Director—Financial and Capital Planning. Mr. Crews began his career in KPMG’s audit function.

Scott Randolph became Executive Vice President and Group President—Performance Materials and Chemicals in December 2016. From March 2016 to December 2016, Mr. Randolph served as Vice President and President—Global Performance Chemicals after previously serving as Vice President and President—Performance Chemicals Americas and Australia and Performance Materials. From April 2005 to May 2016, Mr. Randolph served as President of Performance Materials. Mr. Randolph originally joined us as Senior Vice President Strategic Planning in February 2005. From 2000 to 2005, Mr. Randolph held the position of Chief Financial Officer with Peak Investments, LLC. From 1990 to 2000, Mr. Randolph held a number of management positions with Harris Chemical Group and IMC Global following IMC Global’s acquisition of Harris Chemical Group. Mr. Randolph’s last position with IMC Global was General Manager of the Worldwide Boron Business. From 1989 to 1990, Mr. Randolph held management positions with General Chemical. Prior to that, Mr. Randolph served as a nuclear trained naval officer from 1984 to 1989.

Paul Ferrall became Executive Vice President and Group President—Environmental Catalysts and Services in December 2016. Mr. Ferrall joined us in August 2005 as Senior Vice President of Global Plant Operations for the performance chemicals business and served as Vice President and President—Performance Chemicals Americas & Australia from November 2006 to August 2015, prior to transitioning to President of Refining Services in August 2015. Prior to joining us, Mr. Ferrall had been the president of Peak Chemical and Sulfur and, from 1995 to 2000, held several management positions with Harris Chemical Group and IMC Global, including Vice President of its Soda Products business. From 1978 to 1995, Mr. Ferrall held various positions of responsibility in engineering, operations, finance, sales and business management with Allied Chemical.

John Lau became Chief Technology Officer in January 2016. Dr. Lau joined us in July 1996 to lead our Exploratory Research department with the mission to develop new growth opportunities. Dr. Lau was appointed Vice President of Research and Development in 1998 and Vice President of Strategic Planning in 2005. In November 2006, Dr. Lau became Vice President and General Manager of Silica Catalysts and Zeolyst International and, in January 2011, became President of the Catalysts business. Prior to joining us, Dr. Lau held various research and management positions at W.R. Grace & Co. from 1984 to 1996. From 1982 to 1984, Dr. Lau was a research fellow at the University of California, Los Angeles.

Joseph S. Koscinski became Secretary, Vice President and General Counsel in November 2015. From August 1995 to November 2015, Mr. Koscinski was an attorney in the Business Services Group of Babst, Calland, Clements and Zonnir, P.C., a law firm in Pittsburgh, Pennsylvania, where he was named a shareholder in 2003 and where his corporate practice included mergers and acquisitions, real estate matters and commercial contracts. While in private practice, Mr. Koscinski served as outside corporate counsel to PQ Corporation since 2005.

William J. Sichko, Jr. became Chief Administrative Officer and Vice President in 2005. Mr. Sichko served as our Secretary from 2005 to November 2015, and is currently an Assistant Secretary. From 1998 through 2005,

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Mr. Sichko was Chief Administrative Officer with Peak Investments, LLC. From 1991 through 1998, he held management positions with Harris Chemical Group and IMC Global following IMC Global's acquisition of Harris Chemical, including serving as Senior Vice President of Human Resources from 1996 to 1998. From 1987 to 1991, Mr. Sichko was a manager with General Chemical.

Michael Boyce became the Chairman of our board of directors in 2005. From 2005 to April 2015, Mr. Boyce also served as our Chief Executive Officer. From 1998 to 2004, Mr. Boyce was the Chairman and Chief Executive Officer of Peak Investments, LLC. Prior to April 1998, he was President & Chief Operating Officer of Harris Chemical Group and Chief Executive Officer of Penrice Soda Products Pty. Ltd. in Australia. Before joining Harris Chemical Group, he was with General Chemical, where he spent two years as Vice President and General Manager of its Industrial Chemicals division. Prior to that, he was President of Catalyst Resources, Inc., a subsidiary of Phillips Petroleum Company that manufactures polypropylene and polyethylene polymerization catalysts. From 1983 through 1986, he was Vice President and General Manager of Sylvachem Corporation, a wholly owned subsidiary of SCM Corporation, a company active in specialty chemicals. Earlier in his career, he was with Union Carbide for 12 years, where he held a variety of positions in business management, sales & marketing and manufacturing. Mr. Boyce currently serves on the board of directors of AAR Corp. and Stepan Company. Mr. Boyce was elected to serve as a member of our board of directors due to his experience as our former Chairman and Chief Executive Officer, his insight into global manufacturing, supply and distribution practices and his international business experience.

Greg Brenneman became a director in 2014. Mr. Brenneman is the Executive Chairman of CCMP and is a member of the firm's Investment Committee. Prior to joining CCMP in October 2008, Mr. Brenneman served as the Chief Executive Officer of QCE Holdings LLC ("Quiznos"), a U.S. quick service restaurant chain, from January 2007 until September 2008 and as the President of Quiznos from January 2007 until November 2007. He also served as the Executive Chairman from 2008 to 2009. Prior to joining Quiznos, Mr. Brenneman was the Chairman and Chief Executive Officer of Burger King Corporation from 2004 to 2006. Prior to joining Burger King, Mr. Brenneman was named the President and Chief Executive Officer of PwC Consulting in June 2002. Mr. Brenneman joined Continental Airlines in 1995 as the President and Chief Operating Officer and as a member of its board of directors. In 1994, Mr. Brenneman founded Turnworks, Inc., his personal investment firm that focuses on corporate turnarounds. Prior to founding Turnworks, Mr. Brenneman was a Vice President for Bain and Company. Mr. Brenneman currently serves on the board of directors of Milacron Holdings Corp., The Home Depot, Inc. and Baker Hughes Incorporated. Mr. Brenneman previously served on the board of directors of Automatic Data Processing, Inc., from 2001 until 2014 and Francesca's Holding Corporation from 2010 until 2015. Mr. Brenneman was elected to serve as a member of our board of directors due to his leadership experience, over 20 years of business experience and extensive experience serving as a public company director.

Timothy Walsh became a director in 2014. Mr. Walsh is the President and Chief Executive Officer of CCMP and is a member of the firm's Investment Committee. Mr. Walsh focuses on making investments in the industrial sector. Prior to joining CCMP upon its formation in August 2006, Mr. Walsh was with J.P. Morgan Partners, LLC and its predecessors from 1993 until 2006. Prior to that, Mr. Walsh worked on various industry-focused client teams within The Chase Manhattan Corporation. Mr. Walsh currently serves on the board of directors of Milacron Holdings Corp. and previously served as a member of the board of directors of Generac Holdings Inc. from 2006 until 2016. Mr. Walsh was elected to serve as a member of our board of directors due to his knowledge of the industrial sector and his extensive experience in business and finance.

Christopher Behrens became a director in 2014. Mr. Behrens is a Managing Director of CCMP and a member of the firm's Investment Committee. Mr. Behrens focuses on making investments in the energy, industrial and distribution sectors. Prior to joining CCMP upon its formation in August 2006, Mr. Behrens was with J.P. Morgan Partners, LLC and its predecessors from 1994 until 2006. Prior to that, he was a Vice President in the Merchant Banking group of The Chase Manhattan Corporation. Mr. Behrens previously served as a member of the board of directors of Chaparral Energy, Inc. from 2010 until 2017. Mr. Behrens was elected to serve as a member of our board of directors due to his extensive experience in the energy, industrial and distribution sectors.

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Mark McFadden became a director in September 2016. Mr. McFadden is a Managing Director of CCMP and focuses on making investments in the industrial sector. Prior to joining CCMP upon its formation in August 2006, Mr. McFadden was with J.P. Morgan Partners, LLC between 2002 and 2006. Prior to that, Mr. McFadden was an investment banking analyst at Credit Suisse First Boston and Bowles Hollowell Conner. Mr. McFadden currently serves on the board of directors of Milacron Holdings Corp. Mr. McFadden was elected to serve as a member of our board of directors due to his extensive experience in the industrial sector and his significant experience in, and knowledge of, corporate finance and strategic development.

Robert Toth became a director in September 2016. Mr. Toth is a Managing Director of CCMP. Prior to joining CCMP in 2016, Mr. Toth served as the Chief Executive Officer and President of Polypore International, Inc., a leading global high technology filtration company specializing in microporous membranes, since 2005, during which time Polypore transitioned from a private to a public company via a successful IPO in 2007 and was ultimately acquired in 2015. Mr. Toth was previously the President and Chief Executive Officer and a member of the board of directors of CP Kelco ApS, a global leader in the specialty hydrocolloids market. Prior to joining CP Kelco in 2001, Mr. Toth spent 19 years at Monsanto Company and Solutia Inc. where he held a variety of managerial and executive roles. Mr. Toth currently serves on the board of directors of Materion Corporation. Mr. Toth previously served on the board of directors of Polypore International, Inc. from 2005 until 2015. Mr. Toth was elected to serve as a member of our board of directors due to his extensive leadership experience and past service as a public company director.

Robert Coxon became a director in 2007. Mr. Coxon was previously a Senior Advisor to The Carlyle Group, assisting buyout teams in Europe, the United States, the Middle East and Asia until 2013. In that role, he advised Carlyle in making and managing investments in the chemicals sector and was based in London. Prior to joining Carlyle, Mr. Coxon was the Senior Vice President of ICI and the Chief Executive Officer of Syntex, a world leading catalyst company. In addition to serving on our board of directors, Mr. Coxon is also the Chairman of the UK Center for Process Innovation, an international research center in printable electronics, bio-processing and low carbon energy. Mr. Coxon previously served on the board of directors of AZ Electronic Materials SA, Jiangsu Sinorgchem Technology Co., Ltd., Ensus Ltd. and Stahl Holdings BV. Mr. Coxon was elected to serve as a member of our board of directors due to his extensive experience in the chemicals sector.

Andrew Currie became a director in 2008. Mr. Currie has been a director of INEOS, since 1999, a partner of INEOS since 2000 and a director of INEOS AG since March 2010 when the ownership of the INEOS business was transferred to Switzerland. He was previously a Managing Director of Laporte Performance Chemicals, having served as a director of the Inspec Group from 1994 until the Laporte acquisition of Inspec in 1998. Mr. Currie spent the first 15 years of his career with BP Chemicals in various technical and business management functions. Mr. Currie was elected to serve as a member of our board of directors due to his experience in the chemicals sector and his significant core business skills, including financial and strategic planning.

Jonny Ginns became a director in 2010. Mr. Ginns joined INEOS in 2006 as the Group General Counsel, having worked as an external lawyer for a number of years before that. He has experience across a wide range of fields, including mergers & acquisitions, disposals, joint ventures, litigation, finance and employee benefits, and acts as a director for a number of INEOS entities. Mr. Ginns was elected to serve as a member of our board of directors due to his significant core business skills, including financial and strategic planning.

Kyle Vann became a director in 2014. Mr. Vann is an Executive Advisor to CCMP since October 2012 and has provided consulting services to Entergy Corporation since 2005. He served for 25 years in various senior leadership positions at Koch Industries including as the Chief Executive Officer of Entergy-Koch LP, a joint venture between Koch Industries and Entergy Corporation. Before joining Koch Industries, Mr. Vann worked at Humble Oil and Refining Company (which later became part of Exxon) as a refinery engineer. Mr. Vann currently serves on the board of directors of EnLink Midstream Partners LP and Legacy Reserves LP. Mr. Vann was elected to serve as a member of our board of directors due to his extensive experience in exploration and production, midstream, energy services and trading.

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Martin S. Craighead became a director in July 2017. Mr. Craighead served as the Chief Executive Officer of Baker Hughes Incorporated, a supplier of oilfield services, from 2012 to 2017. He has also served as Chairman of the board of directors of Baker Hughes Incorporated from 2013 to 2017 and has been a member of their board of directors since 2011. Mr. Craighead currently serves on the board of directors of Baker Hughes, a GE company, following the combination of Baker Hughes with GE's oil and gas business. He first joined Baker Hughes Incorporated in 1986 and was its Chief Operating Officer from 2009 to 2012 and Group President of drilling and evaluation from 2007 to 2009. He also served as President of INTEQ from 2005 to 2007 and President of Baker Atlas from February 2005 to August 2005. Mr. Craighead was elected to serve as a member of our board of directors due to his industry expertise in the energy sector and extensive management experience.

Kimberly Ross became a director in July 2017. Ms. Ross served as the Senior Vice President and Chief Financial Officer of Baker Hughes Incorporated, a supplier of oilfield services from 2014 to 2017. Prior to joining Baker Hughes Incorporated in October 2014, Ms. Ross served as the Executive Vice President and Chief Financial Officer of Avon Products Incorporated, a manufacturer of beauty products, from 2011 to 2014. Prior to joining Avon Products, Ms. Ross was an Executive Vice President and the Chief Financial Officer of Royal Ahold N.V., a food retailer, from 2007 to 2011 and held various other finance positions with Royal Ahold N.V. from 2001 to 2007. Ms. Ross serves on the board of directors and the audit committee of Chubb Limited. Ms. Ross was elected to serve as a member of our board of directors due to her extensive financial expertise and experience.

Code of Business Conduct and Ethics

We have adopted a Code of Business Conduct and Ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer and principal accounting officer or controller, or persons performing similar functions. Following this offering, a current copy of the code will be available on our website.

Board Structure and Committee Composition

Upon consummation of this offering, we will have an audit committee, a compensation committee and a nominating and corporate governance committee with the composition and responsibilities described below. Each committee will operate under a charter that will be approved by our board of directors. The composition of each committee will be effective upon the consummation of this offering. The members of each committee are appointed by the board of directors and serve until their successor is elected and qualified, unless they are earlier removed or resign. In addition, from time to time, special committees may be established under the direction of the board of directors when necessary to address specific issues.

Our board of directors evaluates any relationship of each director with the company and makes an affirmative determination whether or not such director meets the qualification requirements for being an independent director under applicable laws and the corporate governance listing standards of the New York Stock Exchange. Our board of directors reviews any transaction or relationship between each non-employee director or any member of his or her immediate family and the company. The purpose of this review is to determine whether there were any such relationships or transactions and, if so, whether they were inconsistent with a determination that the director was independent. As a result of this review, our board of directors has affirmatively determined that each of our directors, other than _____, are independent directors under the governance and listing standards of the New York Stock Exchange.

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Audit Committee

The purpose of the audit committee will be set forth in the audit committee charter. The audit committee's primary duties and responsibilities will be to:

- appoint or replace, compensate and oversee the outside auditors, who will report directly to the audit committee, for the purpose of preparing or issuing an audit report or related work or performing other audit, review or attest services for us;
- pre-approve all auditing services and permitted non-audit services (including the fees and terms thereof) to be performed for us by our outside auditors, subject to de minimis exceptions that are approved by the audit committee prior to the completion of the audit;
- review and discuss with management and the outside auditors the annual audited and quarterly unaudited financial statements, our disclosures under "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the selection, application and disclosure of critical accounting policies and practices used in such financial statements;
- review and approve all related party transactions; and
- discuss with management and the outside auditors any significant financial reporting issues and judgments made in connection with the preparation of our financial statements, including any significant changes in our selection or application of accounting principles, any major issues as to the adequacy of our internal controls and any special steps adopted in light of material control deficiencies.

Upon completion of this offering, the audit committee will consist of _____, _____ and _____, with _____ serving as the chairperson of the committee. Our board of directors has determined that each member of the audit committee, other than _____, meets the independence requirements of Rule 10A-3 under the Exchange Act and the governance and listing standards of the New York Stock Exchange. We intend to comply with the audit committee requirements of the Sarbanes-Oxley Act and the governance and listing standards of the New York Stock Exchange. Pursuant to such requirements, the audit committee must be composed of at least three members, a majority of whom must be independent within 90 days of the date of this prospectus, and all of whom must be independent within one year of the date of this prospectus. Our board of directors has determined that _____ is an "audit committee financial expert" within the meaning of the SEC regulations. Prior to the consummation of this offering, our board of directors will adopt a written charter under which the audit committee will operate. A copy of the charter, which will satisfy the applicable standards of the SEC and the New York Stock Exchange, will be available on our website.

Compensation Committee

The purpose of the compensation committee is to assist the board of directors in fulfilling its responsibilities relating to oversight of the compensation of our directors, executive officers and other employees and the administration of our benefits and equity-based compensation programs. The compensation committee reviews and recommends to our board of directors compensation plans, policies and programs and approves specific compensation levels for all executive officers. Upon completion of this offering, the compensation committee will consist of _____, _____ and _____, with _____ serving as the chairperson of the committee. Our board of directors has determined that each member of the compensation committee is independent as defined under the governance and listing standards of the New York Stock Exchange. Prior to the consummation of this offering, our board of directors will adopt a written charter under which the compensation committee will operate. A copy of the charter, which will satisfy the applicable standards of the SEC and the New York Stock Exchange, will be available on our website.

Nominating and Corporate Governance Committee

The purpose of the nominating and corporate governance committee is to identify individuals qualified to become members of the board of directors, recommend to the board of directors director nominees for the next

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annual meeting of shareholders, develop and recommend to the board of directors a set of corporate governance principles applicable to the company and oversee the evaluation of the board of directors and its dealings with management as well as appropriate committees of the board of directors. Upon completion of this offering, the nominating and corporate governance committee will consist of _____, _____ and _____, with _____ serving as the chairperson of the committee. Our board of directors has determined that each member of the nominating and corporate governance committee is independent as defined under the governance and listing standards of the New York Stock Exchange. Prior to the consummation of this offering, our board of directors will adopt a written charter under which the nominating and corporate governance committee will operate. A copy of the charter, which will satisfy the applicable standards of the SEC and the New York Stock Exchange, will be available on our website.

Compensation Committee Interlocks and Insider Participation

None of our executive officers serves as a member of the board of directors or compensation committee, or other committee serving an equivalent function, of any other entity that has one or more of its executive officers serving as a member of our board of directors or compensation committee. Upon the completion of this offering, our compensation committee will consist of _____ and _____. Each of _____ is employed by CCMP. For additional information regarding transactions between CCMP and its affiliates and us, see "Certain Relationships and Related Party Transactions."

EXECUTIVE AND DIRECTOR COMPENSATION

The following discussion and analysis of compensation arrangements should be read with the compensation tables and related disclosures set forth below. This discussion contains forward-looking statements that are based on our current plans and expectations regarding future compensation programs. Actual compensation programs that we adopt may differ materially from the programs summarized in this discussion.

Compensation Discussion and Analysis

This section discusses the principles underlying the material components of our executive compensation program for our executive officers who are named in the Summary Compensation Table and the factors relevant to an analysis of these policies and decisions. For the year ended December 31, 2016, our “named executive officers” included our principal executive officer, our principal financial officer and our next three most highly compensated executive officers and our former principal executive officer.

<u>Name</u>	<u>Title</u>
James Gentilcore ⁽¹⁾	President and Chief Executive Officer (since July 1, 2016)
Michael Crews	EVP and Chief Financial Officer
Scott Randolph	EVP and Group President Performance Materials & Chemicals
Paul Ferrall	EVP and Group President Environmental Catalysts & Services
Ray Kolberg ⁽²⁾	President, Catalyst Product Group
George Biltz ⁽³⁾	President and Chief Executive Officer (until June 24, 2016)

(1) Mr. Gentilcore joined PQ Group Holdings Inc. as the President and Chief Executive Officer on July 1, 2016.

(2) As a result of an internal restructuring of the company’s business units in 2016, Mr. Kolberg reports to Mr. Ferrall and is no longer an executive officer of the company.

(3) Mr. Biltz stepped down as President and Chief Executive Officer effective June 24, 2016 and terminated employment with the company effective July 31, 2016.

2016 Compensation Decisions

Our executive compensation programs are determined and approved by the Compensation Committee. During 2016, the Compensation Committee was responsible for the oversight, implementation and administration of all of our executive compensation plans and programs. None of the named executive officers are members of the Compensation Committee or otherwise had any role in determining the compensation of the other named executive officers. However, the Compensation Committee does consider the recommendations of our Chief Executive Officer in setting compensation levels for our executive officers other than our Chief Executive Officer. The Compensation Committee determined all of the components of the compensation of our Chief Executive Officer.

Executive Compensation Program Philosophy and Overview

Our compensation philosophy is to provide pay that:

- Aligns the interests of our named executive officers with our shareholders’ interests by rewarding performance that is tied to creating shareholder value; and
- Provides an amount and mix of total compensation for each of our named executive officers that we believe is competitive.

We seek to implement our pay philosophy by providing a total compensation package which includes three main components: base salary, annual performance-based bonus and long-term equity-based awards. The Compensation Committee has taken into account individual performance and competitive market practice in sizing the compensation package for each named executive officer. In assessing market competitive practices, the Compensation Committee has historically relied on its experience and knowledge of general industry practices.

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In conjunction with this offering, the Compensation Committee intends to make a more formal effort to compare executive officer compensation with market data. To that end, a compensation peer group has been formed, and is referenced in the discussion below. We will utilize a peer group as a tool in making compensation decisions for 2017, and expect to continue to utilize one when making compensation decisions going forward.

Base salary has been set with a view toward attracting and retaining executive officer talent.

Our annual incentive plan (the "PQIP") is a broad based plan which pays according to the achievement of annual EBITDA goals, either on a company-wide or individual division basis.

Our long-term equity-based awards consist of stock options and restricted stock that are subject to time and/or performance vesting conditions. The long-term equity based awards made prior to this offering were made in amounts intended to be competitive for private equity backed ventures in the specialty chemicals space. The size of grants already made was not determined with reference to public company market data.

Each of these elements of compensation is discussed in more detail, below.

We believe that our executive compensation program is strongly aligned with the interests of our shareholders:

- For several years before this offering our named executive officers and senior leadership team have been significant owners of the company, and we expect this to continue.
- Our named executive officers and senior leadership have been offered the opportunity to purchase equity in the company over the last several years, in addition to receiving equity as a form of incentive compensation.
- By providing a substantial portion of our named executive officers' total compensation package in the form of equity-based awards we have been able to create an incentive to build shareholder value over the long-term.
- By structuring the equity awards as time and performance vested stock options and full value restricted shares, we have built a strong pay for performance culture.
- Our annual performance-based bonus is contingent upon the achievement of financial performance metrics and the amount of compensation ultimately received for these awards varies with our annual financial performance, thereby providing an additional incentive to maximize shareholder value.

We intend to continue to promote share ownership and a strong pay for performance culture following this offering. We believe that this philosophy has been successful in motivating, retaining and incentivizing our named executive officers and providing value to our shareholders.

Compensation Consultant; Review of Relevant Compensation Data

The Compensation Committee has engaged Compensation & Benefit Solutions ("CBS") as the independent advisor to the Compensation Committee effective in 2017. The compensation consultant reviews the company's overall executive officer and director compensation in comparison to comparably-sized public companies in industries similar to the company's, helps the Compensation Committee identify the appropriate mix of compensation components for compensating our executive officers, and facilitates the Compensation Committee's determination of our executive officers' incentive based compensation. CBS does not provide any other services to the company or our management or have any other direct or indirect business relationships with us or our management. The Compensation Committee has assessed the independence of CBS and concluded that its work does not raise any conflicts of interest.

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Previously, the Compensation Committee did not utilize a peer group for purposes of determining executive compensation. In connection with this offering, the Compensation Committee selected a peer group of companies in the chemical and specialty chemical space with revenues ranging from approximately 50%-200% of the company's revenues. Compensation data drawn from the peer group will be a source of data which the company will draw on in 2017.

Albermarle Corporation	International Flavors & Fragrances, Inc.	Quaker Chemical Corporation
Cabot Corporation	Koppers Holdings Inc.	A. Schulman Inc.
Chemtura Corporation	Kraton Corporation	Sensient Technologies
FMC Corporation	Kronos Worldwide, Inc.	Stepan Company
GCP Applied Technology	Minerals Technologies, Inc.	Tronox Limited
H.B. Fuller Company	MPM Holdings Inc.	Valhi, Inc.
Innophos Holdings	Platform Specialty Products Corp.	W.R. Grace
Innospec, Inc.	PolyOne Corp.	Westlake Chemical Corp.

In 2017, the Compensation Committee intends to review competitive compensation practices and a variety of other factors to confirm that the current structure of our cash compensation and equity-based awards is consistent with our compensation philosophy. In addition, in conjunction with this offering, the Compensation Committee has begun reviewing compensation data provided by CBS in order to determine the appropriate mix between cash compensation and equity-based awards and the appropriate size of equity-based awards in light of this offering, the position of the company after giving effect to this offering and the need to retain the key leadership team following this offering.

Ongoing Role of the Compensation Committee and our Executive Officers in Setting Compensation

On an annual basis the Compensation Committee reviews compensation for the named executive officers in conjunction with performance discussions, salary increase recommendations, determination of bonus payouts, and deliberations regarding long term incentive grants. Going forward, the Compensation Committee will continue to conduct annual reviews of our executive compensation program to ensure that it remains aligned with our compensation philosophy.

Historically, our compensation has been highly individualized, the result of arm's-length negotiations and based on a variety of informal factors including, our financial condition and available resources, our need for a particular position to be filled and the compensation levels of our other executive officers.

Going forward, we expect that our Compensation Committee will make decisions taking into account good governance best practices regarding compensation. This would include reliance on market data for the chemical and specialty chemical industry and the other considerations mentioned in this Compensation Discussion and Analysis.

Elements of Compensation in 2016

For 2016, our compensation program for the named executive officers consisted of:

- Base salary;
- Annual performance based cash awards;
- Long-term equity incentive awards; and
- Other benefits (retirement, health, perquisites, etc.).

Base Salary

We provide an annual base salary to our named executive officers to induce talented executives to join or remain with our company, to compensate them for their services during the year and to provide them with a

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stable source of income. In 2016, each of our named executive officers had an employment agreement or offer letter in place which set his minimum level of annual base salary. In certain cases current base salary has been raised from the minimums specified in the offer letters and employment agreements.

The base salary levels of continuing named executive officers are reviewed annually by our Compensation Committee to determine whether an adjustment is warranted. The Compensation Committee may take into account numerous factors in making its determination, none of which are dispositive or individually weighted, including our financial performance, the state of our industry and local economies in which we operate, the executive officer's relative importance and responsibilities, the executive officer's performance and periodic reference to comparable salaries paid to other executives of similar experience in our industry in general, based on the Compensation Committee's expertise and knowledge of general industry practices. Commencing in 2017, the Compensation Committee will also take into account market data drawn from our peer group, referenced above.

The base salaries paid to our named executive officers during fiscal year 2016 are reported in the "Summary Compensation Table" below. The annual base salaries in effect for each of our named executive officers as of year end 2015 and year end 2016 are as follows:

<u>Name</u>	<u>YE 2015 Annual Salary</u>	<u>YE 2016 Annual Salary</u>
James Gentilcore ⁽¹⁾	—	\$ 825,000
Michael Crews	\$ 425,000	\$ 425,000
Scott Randolph	\$ 425,000	\$ 425,000
Paul Ferrall	\$ 425,000	\$ 425,000
Ray Kolberg ⁽²⁾	—	\$ 425,000
George Biltz ⁽³⁾	\$ 750,000	—

(1) Mr. Gentilcore's base salary actually paid was \$412,500 in 2016 because he joined the company on July 1, 2016.

(2) Mr. Kolberg was hired on January 1, 2016.

(3) Mr. Biltz stepped down as President and Chief Executive Officer effective June 24, 2016 and terminated employment with the company effective July 31, 2016. His actual 2016 salary was \$437,500.

Annual Performance-Based Cash Award – The PQIP

We provide our named executive officers with annual performance-based cash award opportunities linked to our annual financial performance. For 2016, the Compensation Committee chose adjusted EBITDA targets to measure our financial performance under the PQIP. For purposes of the PQIP, adjusted EBITDA is defined as earnings before interest and taxes with depreciation and amortization added back and adjusted for the following items: purchase accounting (or similar); losses (gains) on sale of or disposal of long-lived assets; foreign exchange(gains)/losses; revaluation of inventory, including LIFO adjustments; management advisory fees; transaction and other related costs; equity based and other non-cash compensation; restructuring, integration and business optimization expenses; and extraordinary, unusual and non-recurring expenses. These are referred to below as "EBITDA targets."

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The target annual performance-based cash award opportunity for each eligible executive was set as a percentage of annualized base salary (i.e., actual base salary paid during 2016). For 2016 the target award percentages were as follows:

Name	FYE 2016 Target Award
James Gentilcore	100%
Michael Crews	75%
Scott Randolph	75%
Paul Ferrall	75%
Ray Kolberg	75%
George Biltz	100%

The award payable for 2016 to Messrs. Gentilcore, Crews, and Biltz was based on the achievement of the EBITDA targets for each of the four divisions:

- Performance Chemicals – 25%
- Performance Materials – 25%
- Catalyst – 25%
- Refining Services – 25%

To the extent that a division achieved at least 95% of its annual EBITDA target, a threshold bonus of 25% of the targeted bonus attributable to that division was earned. To the extent that a division achieved at least 99% of its annual EBITDA target, the full portion of the executive’s target bonus attributable to that division was earned. Results between threshold and target were determined by linear interpolation.

To the extent that any of the divisions exceeded 100% of its annual EBITDA target, an above-target pool was created. The above target pool was a dollar amount equal to 25% of the EBITDA above target, if any, in each of the four divisions.

Executives who were eligible to participate in the above target pool were allocated a portion of the above target pool as follows:

Dollar value of executive’s target bonus	X	Sum of above target pools in each of the four divisions	=	Executive’s share
Dollar value of all participants’ target bonuses				

Depending on achieved performance levels, Messrs. Gentilcore, Crews and Biltz could earn zero bonus for below threshold performance, 25% of their target bonus opportunity for achievement of threshold performance, and 100% of their target bonus opportunity for achievement of 99% target performance, with no cap for the achievement of above target performance. Amounts earned based on achievement between threshold and target levels are determined by linear interpolation as described above. There is no adjustment of the objectively determined bonus payout based on individual performance. Actual bonus payouts were based on the below formula:

Salary Actually Paid in the Year	x	Target Bonus %, divided equally for each of the four divisions	x	EBITDA Performance Percentage for each of the four divisions	=	Bonus for Performance up to Target	+	Dollar of executive’s target bonus Dollar value of all participants’ target bonuses X Sum of the above target pools in each of the four divisions	=	Actual Bonus
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The award payable for 2016 for Mr. Randolph was based on the achievement of the Performance Chemicals division. To the extent that Performance Chemicals achieves at least 95% of its annual EBITDA target, a threshold bonus of 25% of the targeted bonus was earned. To the extent that Performance Chemicals achieves at least 99% of its annual EBITDA target, the full target bonus was paid. Results between threshold and target were determined by linear interpolation.

To the extent that Performance Chemicals exceeded its EBITDA target, an above target pool was created as determined in the manner described above. The above target pool was allocated to Mr. Randolph based on the dollar value of his target bonus divided by the dollar value of all participants' target bonuses in the Performance Chemicals group times the value of the above target pool. There is no cap on the percentage of target bonus opportunity for the achievement of above-target performance.

The award payable for 2016 for Mr. Ferrall was based on the achievement of Refining Services (formerly Eco Services). To the extent that Refining Services achieved at least 95% of its annual EBITDA target, a threshold bonus of 25% of the targeted bonus was earned. To the extent that Refining Services achieved at least 99% of its annual EBITDA target, the full target bonus was paid. Results between threshold and target were determined by linear interpolation.

To the extent that Refining Services exceeded 100% of its EBITDA target, an above target pool was created as determined in the manner described above. The above target pool was allocated to Mr. Ferrall based on the dollar value of his target bonus divided by the dollar value of all participants' target bonuses in Refining Services times the value of the above target pool. There is no cap on the percentage of target bonus opportunity for the achievement of above-target performance.

The award payable for 2016 for Mr. Kolberg was based on the achievement of the Catalyst division. To the extent that Catalyst achieved at least 95% of its annual EBITDA target, a threshold bonus of 25% of the targeted bonus was earned. To the extent that Catalyst achieved at least 99% of its annual EBITDA target, the full target bonus was paid. Results between threshold and target were determined by linear interpolation.

To the extent that Catalyst exceeded 100% of its EBITDA target, an above target pool was created as determined in the manner described above. The above target pool was allocated to Mr. Kolberg based on the dollar value of his target bonus divided by the dollar value of all participants' target bonuses in the Catalyst group times the value of the above target pool. There is no cap on the percentage of target bonus opportunity for the achievement of above-target performance.

Actual bonus payouts for Messrs. Randolph, Ferrall and Kolberg were based on the below formula:

Salary Actually Paid in the Year	x	Target Bonus %	x	=	EBITDA Performance Percentage for the division in which executive resides	=	Bonus for Performance up to Target	+	<u>Dollar of executive's target bonus</u> Dollar value of all participants' target bonuses in the executive's division X The above target pool in the executive's division	=	Actual Bonus
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Annual Performance Award Actually Earned in 2016

Annual performance award targets were based upon pro forma adjusted EBITDA for 2016 as set forth below. Actual pro forma adjusted EBITDA for 2016 is also set forth below.

<u>Divisions</u>	<u>Target</u>	<u>Actual</u>
Performance Chemicals	\$ 190.8 million	\$ 166.5 million
Performance Materials (Formerly Potters)	\$ 65.4 million	\$ 65.3 million
Catalyst	\$ 79.3 million	\$ 88.0 million
Refining Services	\$ 128.5 million	\$ 135.0 million

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Actual bonus payouts for each of our executive officers by business division were as follows:

Division	Percentage Earned*	James Gentilcore	Michael Crews	Scott Randolph(1)	Paul Ferrall	Ray Kolberg	George Biltz(2)
Performance Chemicals	87%	\$ 0	\$ 0	\$ 0	N/A	N/A	\$ 0
Performance Materials	100%	\$ 103,125	\$ 79,688	N/A	N/A	N/A	\$ 93,750
Catalyst	111%	\$ 265,374	\$ 205,062	N/A	N/A	\$ 820,246	\$ 241,249
Refining Services	105%	\$ 153,012	\$ 118,236	N/A	\$ 472,947	N/A	\$ 139,102
2016 Total Bonus Award		\$ 521,511	\$ 402,986	\$ 0	\$ 472,947	\$ 820,246	\$ 474,101

* Percentages have been rounded.

- (1) Mr. Randolph did not earn a bonus for 2016 under the terms of the PQIP, but was awarded a special bonus of \$200,000 by the Board for successfully combining Performance Chemicals Worldwide.
- (2) As further described below, in connection with his termination of employment, Mr. Biltz was paid a pro-rata amount of the bonus which he would otherwise have earned under the PQIP in 2016.

Plan Structure for 2017

Commencing in 2017, the PQIP will be structured to reflect our two operating segments:

- Performance Materials & Chemicals Group
- Environmental Catalysts & Services Group

For Messrs. Gentilcore and Crews, target annual performance-based cash incentive opportunities will be based on the achievement of the annual EBITDA targets for the two operating segments:

- Performance Materials & Chemicals Group – 50%
- Environmental Catalysts & Services Group – 50%

To the extent the company exceeds its EBITDA target, an above target pool will be created, as described above for 2016 bonuses but determined based solely on achievement of the company's EBITDA target. An individual executive will be allocated an amount equal to the dollar value of his or her target bonus as a percentage of the dollar amount of all participants' target bonuses, multiplied by the amount in the pool.

For Messrs. Randolph and Ferrall, target annual performance-based cash incentive opportunity will be based on the achievement of the EBITDA target for their respective operating segment:

- Mr. Randolph – 100% Performance Materials & Chemicals Group
- Mr. Ferrall – 100% Environmental Catalysts & Services Group

To the extent the company exceeds its EBITDA target, Messrs. Randolph and Ferrall will be eligible to receive amounts greater than their target bonuses in the same fashion as Messrs. Gentilcore and Crews.

Long-Term Equity Based Incentive Awards

Our equity incentive awards currently consist of restricted stock in the form of Class A Shares, options on Class A Shares, and restricted stock in the form of Class B Shares. Historically, executive officers have received other classes of equity, but over time all of those have been converted into restricted stock in the form of Class A Shares, options on Class A Shares, or restricted stock in the form of Class B Shares.

In keeping with our pay for performance culture, the options and restricted stock are partially time vested, partially performance vested and partially both time and performance vested. The terms of the performance vesting are described in more detail below.

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Our equity incentive awards have typically been made to our named executive officers at the time of hire, promotion into a new position, or as consideration for a change in the terms of an employment contract or offer letter. In addition to these, awards have been made for other specific reasons, including employment contract or offer letter provisions which provide for grants subsequent to hire.

The time vested restricted stock and stock options vest ratably over periods ranging from three to four years, subject to accelerated vesting upon a change in control. The performance based stock options and performance vested restricted stock currently outstanding are all unvested and will only vest upon the occurrence of either: (1) the receipt of aggregate net proceeds by investment funds affiliated with CCMP with respect to their shares of capital stock of the company, when divided by their equity investment in the company, resulting in a quotient equal to or greater than two; or (2) from and after the date of the consummation of this offering, the achievement with respect to shares of common stock of an average closing trading price equal or exceeding, in any 10 trading day period, the lowest amount which when multiplied by the number of shares of common stock then held by investment funds affiliated with CCMP and added to the aggregate net proceeds received by investment funds affiliated with CCMP with respect to their shares of capital stock of the company would yield a quotient of equal or greater than two when divided by the investment funds' affiliated with CCMP equity investment in the company. The quotients described under (1) and (2) above are referred to in this Compensation Discussion & Analysis as the "MOI Target."

Unvested equity awards at the time of this offering will continue to vest pursuant to their original terms following this offering, after giving effect to any conversion of the underlying common stock as a result of the Reclassification described above.

All of our named executive officers currently own vested and unvested equity awards from grants made in and prior to 2016 in the form of time and performance vested restricted stock and options.

Grants Made to Named Executive Officers in 2016

Long term equity based incentive awards were made in 2016 to Mr. Gentilcore, in connection with his joining the company. Mr. Gentilcore's 2016 equity grants were as follows:

Type of award	Shares	Strike price	Grant value(1)	Vesting Terms
Class B restricted	5,412	N/A	\$ 1,000,138	Three year ratable time vesting
Class A options	24,350	\$ 71.06	\$ 716,621	50% ratable three year time vesting and 50% on achievement of the MOI Target
Class B restricted	4,058	N/A	\$ 749,918	50% ratable three year time vesting and 50% on achievement of the MOI Target

- (1) Grant values for awards granted to our named executive officers have been calculated in accordance with SEC rules. See the "Stock Awards" and "Option Awards" columns of the Summary Compensation Table for additional information on how grant date values were determined.

Long term equity based incentive awards were made to Mr. Crews in 2016, in connection with the one year anniversary of his employment:

Type of award	Shares	Strike price	Grant value(1)	Vesting Terms
Class A options	10,349	\$ 71.06	\$ 304,571	50% ratable three year time vesting and 50% on achievement of the MOI Target
Class B restricted	1,725	N/A	\$ 318,780	50% ratable three year time vesting and 50% on achievement of the MOI Target

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Long term equity based incentive awards were made to Mr. Randolph in 2016, in connection with a corporate reorganization tied to the merger of the company with Eco Services. Mr. Randolph also received an additional cash payment in connection with this corporate reorganization in the amount of \$176,529.

Type of award	Shares	Strike price	Grant value(1)	Vesting Terms
Class A options	17,255	\$ 70.94	\$ 507,815	25% per year ratable time vesting with the first year deemed vested at the time of grant.

Long term equity based incentive awards were made to Mr. Ferrall in 2016, in connection with a corporate reorganization tied to the merger of the company with Eco Services. Mr. Ferrall also received an additional cash payment in connection with this corporate reorganization in the amount of \$176,529.

Type of award	Shares	Strike price	Grant value(1)	Vesting Terms
Class A options	17,255	\$ 70.94	\$ 507,815	25% per year ratable time vesting with the first year deemed vested at the time of grant.

Long term equity based incentive awards were made to Mr. Kolberg in 2016, in connection with the start of his employment, in accordance with his offer letter.

Type of award	Shares	Strike price	Grant value(1)(2)	Vesting Terms
Class A options	6,178	\$ 60.71	\$ 76,916	50% time vesting (1,544 options vesting on 1/1/18 and 1,545 options vesting on 1/1/20) and 50% - 3,089 options are performance and time vesting, on the earlier of achievement of the MOI Target or 1/1/20
Class B restricted	2,645	N/A	\$ 425,078	50% time vesting (661 shares vesting on 1/1/18 and 661 shares vesting on 1/1/20) and 50% - 1,323 shares are performance and time vesting, on the earlier of achievement of the MOI Target or 1/1/20

(2) Mr. Kolberg's awards in 2016 were made prior to the Business Combination. In connection with the Business Combination, Mr. Kolberg's awards were converted to awards of the company. For information on the valuation assumptions made in the calculation of the PQ Holding's awards exchanged in connection with the Business Combination, refer to Note 21 to the audited consolidated financial statements of PQ Group Holdings Inc. and subsidiaries included elsewhere in this prospectus.

Long term equity based incentive awards were made to Mr. Biltz in 2016, in connection with the one year anniversary of his employment, per his offer letter. However, as noted below, all of these awards, other than 1,555 of the time vesting restricted Class B shares, were forfeited as a result of Mr. Biltz's termination of employment and/or the failure of the performance vesting targets to be achieved.

Type of award	Shares	Strike price	Grant value(1)	Vesting Terms
Class A options	24,350	\$ 70.94	\$ 716,621	50% ratable three year time vesting and 50% on achievement of the MOI Target
Class B restricted	4,667	N/A	\$ 862,462	50% ratable three year time vesting and 50% on achievement of the MOI Target

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Grants Made to Mr. Gentilcore in 2017

Long term equity based incentive awards were made to Mr. Gentilcore in 2017, to correct a shortfall in his initial new hire grants (the grant date value of which had been initially determined using a target value that assumed a lower base salary than Mr. Gentilcore actually receives). The company granted Mr. Gentilcore an option to purchase 2,435 shares of Class A common stock and 406 restricted Class B shares. These awards have the same vesting terms as the grants of time and performance vested restricted stock and options made to Mr. Gentilcore in 2016.

We expect to adopt a schedule of regular periodic grants once our shares become publicly traded. We anticipate awarding a significant portion of the annual pay mix in equity incentive awards for our executive officers, in a manner that is consistent with our compensation philosophy and competitive with our peer group practices.

Additional Executive Benefits and Perquisites

We provide our named executive officers with certain executive benefits that the Compensation Committee believes are reasonable and in the best interests of the company and our shareholders. These are described in the footnotes to our 2016 Summary Compensation Table below. Consistent with our compensation philosophy, and subject to any revisions discussed below, we currently intend to continue to maintain our current benefits for our named executive officers, including executive physicals, life insurance and other benefits described in the footnotes below. The Compensation Committee, in its discretion, may revise, amend or add to an officer's executive benefits if it deems it advisable. We believe these benefits are generally equivalent to benefits provided by comparable companies based on our expertise and knowledge of general industry practices.

Health and Welfare Benefits

Our named executive officers have the option to participate in various employee welfare benefit programs, including medical, dental and life insurance benefits. These benefit programs are generally available to all employees.

Relocation Assistance

The company's business needs require it on occasion to relocate certain employees. To meet this need, we may, on a case by case basis, cover certain expenses, including temporary housing, relocation, living and travel expenses. Relocation payments made in 2016 are described in the footnotes to our 2016 Summary Compensation Table below.

Employment Agreements; Severance and Change in Control Benefits

The company has entered into employment agreements or offer letters with our named executive officers that provide benefits upon a termination of employment. The material terms of these agreements are summarized below under "—Narrative Disclosure to the Summary Compensation Table and Grants of Plan-Based Awards Table" and "—Potential Payments Upon Termination or Change in Control". We anticipate that in connection with this offering we will make changes to certain of the arrangements with our named executive officers, including terminating certain of these employment agreements and offer letters, as applicable, and entering into new severance agreements with certain of our named executive officers.

Severance Payments to Mr. Biltz

Mr. Biltz received certain payments and benefits upon his stepping down and termination of employment in 2016. In accordance with the terms of his offer letter, and in consideration of Mr. Biltz entering into a release and

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waiver of claims, and subject to his compliance with the restrictive covenants set forth in his offer letter, the company agreed to pay or provide Mr. Biltz the following: (i) base salary of \$750,000 plus target bonus of \$750,000, plus health benefits at active employee contribution rates in installments over a two year period beginning August 1, 2016 and (ii) a pro-rata amount of the annual performance bonus which would have been earned in 2016 (amount actually earned equal to \$474,101). Pursuant to his separation agreement, in exchange for Mr. Biltz entering into a release and waiver of claims, the company agreed not to repurchase Mr. Biltz's 17,111 vested restricted Class B shares and the 18,668 Class B shares purchased by Mr. Biltz in 2015.

At the time of Mr. Biltz's separation, in accordance with the terms of Mr. Biltz's equity awards, Mr. Biltz had the right to vest in: (a) 37,125 Class A options provided the MOI Target was achieved on or before the six month anniversary of his last work date of June 24, 2016 and (b) 15,556 Class B restricted shares, provided the MOI Target was achieved on or before the six month anniversary of his separation date of July 31, 2016. The MOI Target for these options and shares was not met on the specified dates, and those shares and options were forfeited. In addition, in accordance with the terms of Mr. Biltz's equity awards, at the time of his termination of employment, he was entitled to accelerated vesting of those time-based restricted shares that would have vested during the two year period following his separation date, which resulted in vesting of 10,371 of his unvested time vesting Class B restricted shares granted in 2015 and 1,555 of his unvested time vesting Class B restricted shares granted in 2016.

Accounting and Tax Considerations

In determining which elements of compensation are to be paid, and how they are weighted, on a going forward basis, we expect to take into account whether a particular form of compensation will be deductible under Section 162(m) of the Code. Section 162(m) generally limits the deductibility of compensation paid to our named executive officers (other than our Chief Financial Officer) to \$1 million during any fiscal year unless such compensation is "performance-based" under Section 162(m). However, under a Section 162(m) transition rule for compensation plans or agreements of corporations which are privately held and which become publicly held in an initial public offering, compensation paid under a plan or agreement that existed prior to the initial public offering, will not be subject to Section 162(m) until the earliest of (1) the expiration of the plan or agreement, (2) a material modification of the plan or agreement, (3) the issuance of all employer stock and other compensation that has been allocated under the plan, or (4) the first meeting of shareholders at which directors are to be elected that occurs after the close of the third calendar year following the year of the initial public offering, (the "Transition Date"). After the Transition Date, rights or awards granted under the plan, other than options and stock appreciation rights, will not qualify as "performance-based compensation" for purposes of Section 162(m) unless such rights or awards are granted or vest upon pre-established objective performance goals and certain other requirements are met.

Going forward, our intent generally is to design and administer executive compensation programs in a manner that will preserve the deductibility of compensation paid to our executive officers. However, we reserve the right to design programs that recognize a full range of performance criteria important to our success, even where the compensation paid under such programs may not be deductible. The Compensation Committee will continue to monitor the tax and other consequences of our executive compensation program as part of its primary objective of ensuring that compensation paid to our executive officers is reasonable, performance-based and consistent with the goals of the company and its shareholders.

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Summary Compensation Table

The following table sets forth certain information with respect to compensation earned by or paid to our named executive officers for the year ended December 31, 2016.

Name and Principal Position	Year	Salary (\$)	Bonus \$(3)	Stock Awards \$(4)	Option Awards \$(4)	Non-Equity Incentive Plan Compensation \$(5)	All Other Compensation \$(6)(7)(8)	Total (\$)
James Gentilcore(1) <i>Chief Executive Officer</i>	2016	412,500	—	1,750,056	716,621	521,511	17,940	3,418,628
Michael Crews <i>Chief Financial Officer</i>	2016	425,000	—	318,780	304,571	402,986	94,924	1,546,261
Scott Randolph <i>President PM&C Group</i>	2016	425,000	200,000	—	507,815	—	232,853	1,365,668
Paul Ferrall <i>President EC&S Group</i>	2016	425,000	—	—	507,815	472,947	217,696	1,623,458
Ray Kolberg <i>President Catalyst Group</i>	2016	425,000	200,000	437,883	162,881	820,246	99,563	2,145,573
George Biltz(2) <i>Former Chief Executive Officer</i>	2016	437,500	—	862,462	716,621	474,101	650,696	3,141,380

- (1) Mr. Gentilcore became our Chief Executive Officer on July 1, 2016. Compensation reported for Mr. Gentilcore is with respect to the portion of fiscal year 2016 following this date.
- (2) Mr. Biltz stepped down as President and Chief Executive Officer effective June 24, 2016 and he terminated employment with the company effective July 31, 2016.
- (3) Mr. Randolph was awarded a special bonus of \$200,000 by our board of directors for successfully combining Performance Chemicals Worldwide. Mr. Kolberg was awarded a \$200,000 sign on bonus.
- (4) The amounts shown reflect the aggregate grant date fair value of time- and performance-based restricted stock and stock options granted in 2016, computed in accordance with ASC Topic 718, disregarding the effects of estimated forfeitures. These amounts reflect our cumulative accounting expense over the vesting period and do not correspond to the actual value that may be realized by the named executive officers. As discussed above under “—Grants Made to Named Executive Officers in 2016”, Mr. Kolberg’s awards were converted to awards of the company in connection with the Business Combination. Accordingly, the amounts reported in the table for Mr. Kolberg’s awards reflect the grant date fair value of the awards (\$76,916 for the stock options and \$425,078 for the restricted stock) and the incremental fair value of the awards (\$85,965 for the stock options and \$12,805 for the restricted stock), computed as of the modification date in accordance with FASB ASC Topic 718 with respect to the modified awards. For information on the valuation assumptions made in the calculation of these amounts, refer to Note 21 to the audited consolidated financial statements of PQ Group Holdings Inc. and subsidiaries included elsewhere in this prospectus. With respect to stock options and restricted stock awards subject to performance-based vesting conditions, the aggregate grant date fair value was determined based on the probable outcome of the performance conditions associated with such awards at the date of grant. For performance-based stock options, the aggregate grant date fair value of these awards, assuming the maximum level of performance is achieved, is: Mr. Gentilcore, \$358,311, Mr. Crews, \$152,300, and Mr. Biltz, \$358,311. For performance-based restricted stock awards, the aggregate grant date fair value of these awards, assuming the maximum level of performance is achieved, is: Mr. Gentilcore, \$374,959, Mr. Crews, \$159,482 and Mr. Biltz, \$431,323.
- (5) Represents amounts paid under the company’s performance-based annual incentive plan, the PQIP.
- (6) This column includes matching and other contributions made under the company’s 401(k) plan and perquisites and other personal benefits, as set forth in the below table.
- (7) Mr. Randolph and Mr. Ferrall each received additional cash compensation in the amount of \$176,529 related to an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services.
- (8) Includes \$633,882 in severance related payments and benefits received by Mr. Biltz in 2016.

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Name	401(k) Plan Company Match (\$)	401(k) Plan Company 4% Contribution (\$)	PRA SERP Company Contributions (\$)	Tax Prep Services (\$)	Executive Physical (\$)	Relocation Expense (\$)	Life Insurance (\$)
James Gentilcore	—	10,600	5,900	—	—	—	1,440
Michael Crews	7,950	10,600	7,728	—	—	67,422	1,224
Scott Randolph	7,950	10,600	15,005	21,545	—	—	1,224
Paul Ferrall	7,950	10,600	8,551	12,842	—	—	1,224
Ray Kolberg	6,888	10,600	6,400	—	—	74,451	1,224
George Biltz	7,950	—	—	—	3,596	5,268	—

2016 Grants of Plan-Based Awards

The following table summarizes plan-based awards granted to our named executive officers for the year ended December 31, 2016.

Name	Grant Date	Estimated Future Payouts Under Non-Equity Incentive Plan Awards			Estimated Future Payouts Under Equity Incentive Plan Awards	All Other Stock Awards: Number of Shares of Stock or Units	All Other Awards: Number of Securities Underlying Options	Exercise or Base Price of Option Awards	Grant Date Fair Value of Stock and Option Awards
		Threshold (\$)(1)	Target (\$)(1)	Maximum (\$)(2)	(#)(2)	(#)(3)	(#)(3)	(\$/Sh)	(\$)(4)
James Gentilcore	July 1	103,125	412,500	N/A	—	—	—	—	—
	June 30	—	—	—	12,175	—	12,175	71.06	716,621
	June 30	—	—	—	—	5,412	—	—	1,000,138
Michael Crews	June 30	—	—	—	2,029	2,029	—	—	749,918
	Jan 1	79,688	318,750	N/A	—	—	—	—	—
	June 30	—	—	—	5,175	—	5,174	71.06	304,571
Scott Randolph	June 30	—	—	—	863	862	—	—	318,780
	Jan 1	79,688	318,750	N/A	—	—	—	—	—
	May 4	—	—	—	—	—	17,255	70.94	507,815
Paul Ferrall	Jan 1	79,688	318,750	N/A	—	—	—	—	—
	May 4	—	—	—	—	—	17,255	70.94	507,815
Ray Kolberg	Jan 1	79,688	318,750	N/A	—	—	—	—	—
	Jan 1	—	—	—	3,089	—	3,089	60.71	162,881
	Jan 1	—	—	—	1,323	1,322	—	—	437,883
George Biltz	Jan 1	109,375	437,500	N/A	—	—	—	—	—
	May 31	—	—	—	12,175	—	12,175	70.94	716,621
	May 31	—	—	—	2,334	2,333	—	—	862,462

- Represents potential payments pursuant to the PQIP, the company's performance-based annual bonus plan. Payments under the PQIP are based on a percentage of the base salary actually paid to each named executive officer during 2016. There is no cap on the amount of bonuses that may be earned under the PQIP. See "Annual Performance-Based Cash Award – The PQIP" in the Compensation Discussion and Analysis section above.
- Reflects restricted stock or options to purchase shares of our common stock, which will immediately vest in full upon the occurrence, of either: (1) the receipt of aggregate net proceeds by investment funds affiliated with CCMP with respect to their shares of capital stock of the company, when divided by their equity investment in the company, results in the MOI Target being satisfied; or (2) from and after the date of the

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consummation of this offering, the achievement with respect to shares of common stock of an average closing trading price equal or exceeding, in any 10 trading day period, the lowest amount which when multiplied by the number of shares of common stock then held by investment funds affiliated with CCMP and added to the aggregate net proceeds received by investment funds affiliated with CCMP with respect to their shares of capital stock of the company, when divided by their equity investment in the company, would yield a quotient of equal or greater than the MOI Target.

- (3) Reflects restricted stock or options to purchase shares of our common stock, which will vest subject to the time vesting conditions described under *Grants Made to Named Executive Officers in 2016* in the Compensation Discussion and Analysis section above.
- (4) As required by SEC rules, amounts shown in the column “Grant Date Fair Value of Stock and Option Awards” present the aggregate grant date fair value of stock and option awards granted in the fiscal year in accordance with ASC Topic 718, disregarding the effects of estimated forfeitures. See note (4) to the Summary Compensation Table above. As discussed above under “—Grants Made to Named Executive Officers in 2016”, Mr. Kolberg’s awards were converted to awards of the company in connection with the Business Combination. Accordingly, the amounts reported in the table for Mr. Kolberg’s awards reflect the grant date fair value of the awards (\$76,916 for the stock options and \$425,078 for the restricted stock) and the incremental fair value of the awards (\$85,965 for the stock options and \$12,805 for the restricted stock), computed as of the modification date in accordance with FASB ASC Topic 718 with respect to the modified awards.

Narrative Disclosure to the Summary Compensation Table and Grants of Plan-Based Awards Table

Employment Agreements

We have entered into employment agreements or offer letters with each of our named executive officers, which were in effect during fiscal year 2016. The material terms of the agreements or offer letters, as applicable, with Messrs. Gentilcore, Crews, Randolph, Ferrall and Kolberg are described below. In addition, each of the agreements or offer letters, as applicable, with Messrs. Gentilcore, Crews, Randolph, Ferrall and Kolberg provides for certain payments and benefits upon terminations of employment, as described below under “—Potential Payments Upon Termination or Change in Control.” As discussed above, Mr. Biltz terminated employment with the company on July 31, 2016.

James Gentilcore

Pursuant to his offer letter, dated June 15, 2016, Mr. Gentilcore is entitled to an annual base salary of \$825,000, subject to periodic review by our board of directors or the Compensation Committee. Mr. Gentilcore is also eligible for an annual incentive bonus with a target of 100% of his annual base salary, subject to the company’s achievement of EBITDA goals established by our board of directors or the Compensation Committee. Mr. Gentilcore’s offer letter provides for his participation in the company’s equity plan, including a 2016 annual equity grant consisting of stock options and restricted stock, which awards were granted to Mr. Gentilcore in 2016 subject to the vesting conditions described above under “—Grants Made to Named Executive Officers in 2016”. Mr. Gentilcore is entitled to participate in any employee benefit plans and programs maintained by the company, subject to the terms of such plans.

Michael Crews

Pursuant to his offer letter, dated June 27, 2015, Mr. Crews is entitled to an annual base salary of \$425,000, subject to adjustment by the Compensation Committee. Mr. Crews is also eligible for an annual incentive bonus with a target of 75% of his annual base salary, based on the company’s achievement of financial performance goals established by our board of directors or the Compensation Committee. Mr. Crews’ offer letter provides for his participation in the company’s equity plan and any employee benefit plans and programs maintained by the company, subject to the terms of such plans.

Scott Randolph

Pursuant to his employment agreement, dated January 1, 2013, and amended as of April 30, 2015, Mr. Randolph is entitled to an annual base salary of \$341,000, subject to annual review and increase by our board

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of directors or the Compensation Committee. As described above, Mr. Randolph's annual base salary has been subsequently increased to \$425,000. Mr. Randolph is also eligible for an annual incentive bonus with a target of 50% of his annual base salary, which has subsequently been increased to 75% of his annual base salary, based on the company's achievement of performance goals established by our board of directors or the Compensation Committee. Mr. Randolph is entitled to participate in the standard benefit plans and programs available to the company's employees generally, subject to the terms and conditions of such plans. The initial term of Mr. Randolph's employment agreement is five years, subject to renewal for one or more additional one-year periods upon mutual agreement.

Paul Ferrall

Pursuant to his employment agreement, dated January 1, 2013, and amended as of April 30, 2015, Mr. Ferrall is entitled to an annual base salary of \$341,000, subject to annual review and increase by our board of directors or the Compensation Committee. As described above, Mr. Ferrall's annual base salary has been subsequently increased to \$425,000. Mr. Ferrall is also eligible for an annual incentive bonus with a target of 50% of his annual base salary, which has subsequently been increased to 75% of his annual base salary, based on the company's achievement of financial performance goals established by our board of directors or the Compensation Committee. Mr. Ferrall is entitled to participate in the standard benefit plans and programs available to the company's employees generally, subject to the terms and conditions of such plans. The initial term of Mr. Ferrall's agreement is five years, subject to renewal for one or more additional one-year periods upon mutual agreement.

Raymond Kolberg

Pursuant to his offer letter, dated December 8, 2015, Mr. Kolberg is entitled to an annual base salary of \$425,000, subject to adjustment by the Compensation Committee. Mr. Kolberg is also eligible for an annual incentive bonus with a target of 75% of his annual base salary, based on the company's achievement of financial performance goals established by our board of directors or the Compensation Committee. Mr. Kolberg's offer letter provides for his participation in the company's equity plan and provided for a one-time sign-on 2016 equity grant consisting of stock options and restricted stock, subject to the vesting conditions described above under "*Grants Made to Named Executive Officers in 2016*". Mr. Kolberg's offer letter also provided for a one-time sign-on cash bonus of \$200,000, to be paid on or before March 15, 2016, and for the reimbursement of moving expenses in connection with his relocation to Pennsylvania. Mr. Kolberg is entitled to participate in any employee benefit plans and programs maintained by the company, subject to the terms of such plans.

2016 Outstanding Equity Awards at Fiscal Year-End

The following table sets forth certain information with respect to outstanding equity awards held by our named executive officers as of December 31, 2016.

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Name	Grant Date	Option Awards					Stock Awards			
		Number of securities underlying unexercised options (#) exercisable	Number of securities underlying unexercised options (#) unexercisable	Equity incentive plan awards: number of securities underlying unexercised unearned options (#)	Option exercise price (\$)	Option expiration date	Number of shares or units of stock that have not vested (#)	Market value of shares or units of stock that have not vested (\$)	Equity incentive plan awards: number of unearned shares, units or other rights that have not vested (#)	Equity incentive plan awards: market or payout value of unearned shares, units or other rights that have not vested (\$)(14)
James Gentilcore	6/30/2016 ⁽¹⁾	—	—	—	—	—	5,412	1,044,462	—	—
	6/30/2016 ⁽¹⁾⁽²⁾	—	—	—	—	—	2,029	391,577	2,029	391,577
	6/30/2016 ⁽³⁾⁽⁴⁾	—	12,175	12,175	71.06	6/30/2026	—	—	—	—
Michael Crews	8/1/2015 ⁽⁵⁾⁽⁶⁾	—	—	—	—	—	3,500	675,465	3,500	675,465
	8/1/2015 ⁽⁷⁾⁽⁸⁾	—	3,089	3,089	60.71	8/1/2025	—	—	—	—
	6/30/2016 ⁽¹⁾⁽²⁾	—	—	—	—	—	862	166,357	863	166,550
	6/30/2016 ⁽³⁾⁽⁴⁾	—	5,174	5,175	71.06	6/30/2026	—	—	—	—
Scott Randolph	9/19/2007 ⁽⁹⁾	—	—	—	—	—	—	—	5,966	1,151,378
	2/24/2010 ⁽⁹⁾	—	—	—	—	—	—	—	3,652	704,799
	4/30/2015 ⁽¹⁾	—	—	—	—	—	4,149	800,176	—	—
	5/4/2016 ⁽¹⁰⁾	—	8,628	—	70.94	5/4/2026	—	—	—	—
	5/4/2016 ⁽¹¹⁾	8,627	—	—	70.94	5/4/2026	—	—	—	—
Paul Ferrall	9/19/2007 ⁽⁹⁾	—	—	—	—	—	—	—	5,966	1,151,378
	2/24/2010 ⁽⁹⁾	—	—	—	—	—	—	—	3,652	704,799
	4/30/2015 ⁽¹⁾	—	—	—	—	—	4,149	800,176	—	—
	5/4/2016 ⁽¹⁰⁾	—	8,628	—	70.94	5/4/2026	—	—	—	—
	5/4/2016 ⁽¹¹⁾	8,627	—	—	70.94	5/4/2026	—	—	—	—
Ray Kohlberg	1/1/2016 ⁽¹²⁾	—	3,089	3,089	60.71	1/1/2026	—	—	—	—
	1/1/2016 ⁽¹³⁾	—	—	—	—	—	1,322	255,133	1,323	255,326

- (1) Time-based Class B restricted shares will vest in three equal installments, beginning on the first anniversary of the grant date, provided the named executive officer is still employed on the vesting date by us or one of our subsidiaries.
- (2) Performance-based Class B restricted shares will vest on achievement of the MOI Target.
- (3) Time-based Class A options will vest in three equal installments, beginning on the first anniversary of the grant date, provided the named executive officer is still employed on the vesting date by us or one of our subsidiaries.
- (4) Performance-based Class A options will vest on the achievement of the MOI Target.
- (5) Time-based Class B restricted shares will vest in two equal installments, with 50% vesting on the second anniversary of grant date and 50% vesting on the fourth anniversary of grant date, provided the named executive officer is still employed on the vesting date by us or one of our subsidiaries.
- (6) Performance-based Class B restricted shares will vest on the earlier of the achievement of the MOI Target or August 1, 2019.
- (7) Time-based Class A options will vest in two equal installments, with 50% vesting on the second anniversary of grant date and 50% vesting on the fourth anniversary of grant date, provided the named executive officer is still employed on the vesting date by us or one of our subsidiaries.
- (8) Performance-based Class A options will vest on the earlier of the achievement of the MOI Target or August 1, 2019.
- (9) Performance-based Class A restricted shares will vest on the achievement of the MOI Target.

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- (10) Time-based Class A options will vest in four equal installments, beginning on the first anniversary of the grant date, provided the named executive officer is still employed on the vesting date by us or one of our subsidiaries. These options were granted in an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services.
- (11) These options to purchase shares of our Class A common stock became exercisable on May 4, 2016 (4,313 shares) and December 1, 2016 (4,314 shares). These options were granted in an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services.
- (12) These Class A options are 50% time-vesting only (1,544 options vesting on January 1, 2018 and 1,545 options vesting on January 1, 2020) and 50% are performance- and time-vesting (3,089 options vesting on the earlier of achievement of the MOI Target or January 1, 2020).
- (13) These Class B restricted shares are 50% time-vesting only (661 shares vesting on January 1, 2018 and 661 shares vesting on January 1, 2020) and 50% performance- and time-vesting (1,323 shares vesting on the earlier of achievement of the MOI Target or January 1, 2020).
- (14) Fair market value has been determined based on an estimated fair market value per share of Class B common stock of \$192.99, as of December 31, 2016.

Option Exercises and Stock Vested in 2016

The following table shows amounts realized by our named executive officers upon the vesting of restricted stock during the year ended December 31, 2016. Messrs. Gentilcore, Crews and Kolberg did not have any restricted stock vesting in 2016. None of our named executive officers exercised any stock options during 2016.

Name	Stock Awards	
	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting (\$)(1)
James Gentilcore	—	—
Mike Crews	—	—
Scott Randolph	2,074	383,275
Paul Ferrall	2,074	383,275
Ray Kolberg	—	—
George Biltz	17,111	3,162,113

- (1) Amounts reflect the aggregate dollar amount realized upon vesting by multiplying the number of shares of stock that vested by the fair market value of the underlying stock on the applicable vesting date.

Retirement Plan Benefits

We maintain a tax-qualified 401(k) defined contribution plan in which substantially all of our full-time U.S. employees, including our named executive officers, are eligible to participate. We currently provide an employer contribution equal to 4% of qualifying earnings and an employer matching contribution equal to 50% of a participant's contributions up to 6% of qualifying earnings, subject to limits established by the Code. In addition, our named executive officers participate in the PQ Corporation Non-Qualified Personal Retirement Account Excess Savings Plan, an excess benefit plan designed to provide supplemental Personal Retirement Account contributions that cannot be provided under our 401(k) plan due to Code limits. We believe these plans provide our named executive officers with an opportunity for tax-efficient savings and long-term financial security.

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Nonqualified Deferred Compensation

All of our named executive officers participate in the PQ Corporation Non-Qualified Personal Retirement Account Excess Savings Plan, or the PRA SERP. The PRA SERP is an excess benefit plan designed to provide supplemental Personal Retirement Account contributions that cannot be provided under the PQ Corporation Savings Plan due to Code limits. The plan is administered by a committee appointed by our board of directors.

Contributions - There are no executive contributions under the PRA SERP. Each plan year, we credit to participant accounts under the PRA SERP the excess of (a) the amount that would have been credited for that year to the participant's Personal Retirement Account under our 401(k) plan disregarding the dollar limits imposed by the Code for maximum annual compensation over (b) the amount that was actually so credited. The plan administrator may from time to time also elect to make special contributions to participant accounts.

Earning and losses - Participant accounts are deemed to be invested in Vanguard target retirement funds based on a participant's age. At the end of each calendar quarter, we adjust participant accounts with earnings/losses equal to that calendar quarter's return for the applicable target retirement fund.

Vesting and distributions - Participants vest in their accounts under the PRA SERP upon completion of three years of service or, if earlier, death or disability or a change in control. The value of a participant's vested account balance is paid in a lump sum on the first to occur of the participant's separation from service or disability, provided that distributions to "key employees" within the meaning of Section 416(i) of the Code as of the date of the participant's separation from service will not be made until six (6) months after the participant's separation from service or, if earlier, the participant's death.

The following table provides information regarding participation by our named executive officers in the PRA SERP during the year ended December 31, 2016.

Executives do not contribute to the PRA SERP plan.

Name	Executive Contributions in Last FY (\$)	Registrant Contributions in Last FY \$(1)	Aggregate Earnings in Last FY \$(2)	Aggregate Withdrawals/Distributions (\$)	Aggregate Balance at Last FYE \$(3)
James Gentilcore	—	5,900	—	—	—
Michael Crews	—	7,728	—	—	—
Scott Randolph	—	15,005	10,602	—	154,761
Paul Ferrall	—	8,551	6,434	—	101,824
Ray Kolberg	—	6,400	—	—	—
George Biltz	—	—	—	—	—

- (1) Represents company contributions with respect to 2016 that were credited in 2017.
- (2) Earnings are credited quarterly, based on the returns of the appropriate Vanguard Retirement Fund.
- (3) Represents balances under the PRA SERP plan as of December 31, 2016 and does not include amounts attributable to company contributions made with respect to 2016 but not credited until 2017.

Potential Payments Upon Termination or Change in Control

The employment agreements or offer letters with each of Messrs. Gentilcore, Crews, Randolph, Ferrall and Kolberg provide for the following severance payments and benefits in connection with specified termination events, subject to the named executive officer's execution and nonrevocation of a release of claims and continued compliance with the restrictive covenants described below. The terms "cause", "good reason" and "disability" are each defined in the applicable agreements.

As noted above, Mr. Biltz terminated his employment with the company in 2016 and became entitled to receive the benefits described above under "—Severance Payments to Mr. Biltz".

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James Gentilcore

If Mr. Gentilcore's employment is terminated by the company without cause or by him for good reason, he will receive: (i) his base salary and target annual incentive bonus for a two-year period following termination, paid in equal installments in accordance with the normal payroll practices of the company, (ii) continuation of any health benefits at active employee rates for 24 months (or until he otherwise becomes eligible for health benefits as the result of commencing new employment), and (iii) a pro rata amount of any annual incentive bonus that would have been payable in the year of termination based on actual achievement of the applicable performance goals, paid in a lump sum at the time annual bonuses are normally paid. If CCMP no longer controls more than 50% of the voting shares of the company and Mr. Gentilcore does not enter into a new employment agreement with the new owner of the company within 90 days of the date that CCMP no longer controls such percentage of shares, Mr. Gentilcore will be entitled to receive these same severance payments. This provision does not apply in connection with an initial public offering, and will cease to apply following this offering.

If Mr. Gentilcore's employment is terminated due to his death or disability, Mr. Gentilcore (or his estate) will receive a pro rata amount of his target annual incentive bonus.

Michael Crews

If Mr. Crews' employment is terminated by the company without cause or by him for good reason, he will receive: (i) his base salary and target annual incentive bonus for an 18-month period following termination, paid in equal installments in accordance with the normal payroll practices of the company, (ii) continuation of any health benefits at active employee rates for 18 months (or until he otherwise has access to substantially equivalent health benefits as the result of commencing new employment), and (iii) a pro rata amount of any annual incentive bonus that would have been payable in the year of termination based on actual achievement of the applicable performance goals, paid in a lump sum at the time annual bonuses are normally paid.

Scott Randolph

If Mr. Randolph's employment is terminated by the company without cause or by him for good reason, he will receive: (i) two times the sum of his base salary and target annual incentive bonus, paid in a lump sum in accordance with the terms of the employment agreement, (ii) continuation of any health benefits at active employee rates for two years to the extent permitted by the applicable benefit plan, or equivalent reimbursement of the costs for coverage under COBRA, (iii) a pro rata amount of any annual incentive bonus that would have been payable in the year of termination, paid in a lump sum at the time bonuses are normally paid, and (iv) any earned but unpaid annual incentive bonus from prior years, paid in a lump sum at the time bonuses are normally paid.

If Mr. Randolph's employment is terminated due to his death or disability, Mr. Randolph (or his estate or beneficiaries) will be entitled to the COBRA benefits described above and will receive a pro rata amount of the bonus that would have been earned for the year of termination based on actual performance.

Paul Ferrall

If Mr. Ferrall's employment is terminated by the company without cause or by him for good reason, he will receive: (i) two times the sum of his base salary and target annual incentive bonus, paid in a lump sum in accordance with the terms of the employment agreement, (ii) continuation of any health benefits at active employee rates for two years to the extent permitted by the applicable benefit plan, or equivalent reimbursement of the costs for coverage under COBRA, (iii) a pro rata amount of any annual incentive bonus that would have been payable in the year of termination, paid in a lump sum at the time bonuses are normally paid, and (iv) any earned but unpaid annual incentive bonus from prior years, paid in a lump sum at the time bonuses are normally paid.

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If Mr. Ferrall's employment is terminated due to his death or disability, Mr. Ferrall (or his estate or beneficiaries) will be entitled to the COBRA benefits described above and will receive a pro rata amount of the bonus that would have been earned for the year of termination based on actual performance.

Raymond Kolberg

If Mr. Kohlberg's employment is terminated by the company without cause, he will receive: (i) his annual base salary and target annual incentive bonus for a 12-month period following his termination, paid in equal installments in accordance with the regular payroll practices of the company, (ii) continuation of any health benefits at active employee rates for 12 months (or until he otherwise has access to substantially equivalent health benefits as the result of commencing new employment), and (iii) a pro rata amount of any annual incentive bonus that would have been payable in the year of termination based on actual achievement of the applicable performance goals, paid in a lump sum at the time annual bonuses are normally paid.

Restrictive Covenants

The employment agreements with each of our named executive officers contain certain restrictive covenants for the benefit of the company. Pursuant to the terms of their employment agreements, each of Messrs. Gentilcore, Crews, Kolberg, and Biltz entered into a Confidentiality, Non-Competition, Non-Solicitation and Intellectual Property Agreement, which contains, among other provisions, a 24-month post-termination non-compete and non-solicitation covenant. Our employment agreements with Messrs. Randolph and Ferrall also contain 24-month post-termination non-compete and non-solicitation covenants, as well as a prohibition of disclosure of confidential information.

Equity Awards

Equity awards subject to time vesting will vest and, as applicable, become exercisable upon a change of control of the company. Equity awards subject to performance vesting based on the MOI Target will vest and, as applicable, become exercisable upon a change of control only if such change of control results in the MOI Target being satisfied. Upon a termination of the named executive officer's employment due to death, disability, retirement, without cause, or for good reason (if applicable), restricted stock awards subject to time vesting that would otherwise have vested in the two year period following termination of employment will vest on such termination of employment, and equity awards subject to performance vesting based on the MOI Target will vest, and as applicable, become exercisable, only if the MOI Target is satisfied on or before the six month anniversary of the termination of employment.

Pursuant to the terms of their respective offer letter, employment agreement or equity award agreement, as applicable, each of Messrs. Gentilcore, Crews, Randolph, Ferrall and Kolberg would have been entitled to the following severance payments and benefits in connection with a termination of his employment and/or the occurrence of a change in control on December 31, 2016. The amounts reflected in the first table for Mr. Biltz reflect the values of the severance payments and benefits he was entitled to receive in connection with his termination of employment in 2016.

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Termination without Cause or for Good Reason without a Change of Control				
Name	Severance Pay (\$ (1))	Benefits (\$ (2))	Equity Acceleration (\$ (3))	Total (\$)
James Gentilcore	3,300,000	29,749	957,230	4,286,979
Michael Crews	1,115,625	30,587	448,509	1,594,721
Scott Randolph	1,487,500	40,782	800,716	2,328,998
Paul Ferrall	1,487,500	40,244	800,716	2,328,998
Ray Kolberg	743,750	20,391	127,566	891,707
George Biltz(4)	3,474,101	40,782	2,203,925	5,718,808

Change of Control Only				
Name	Severance Pay (\$ (1))	Benefits (\$ (2))	Equity Acceleration (\$ (3))	Total (\$)
James Gentilcore	—	—	2,400,907	2,400,907
Michael Crews	—	—	1,496,665	1,496,665
Scott Randolph	—	—	1,484,485	1,484,485
Paul Ferrall	—	—	1,484,485	1,484,485
Ray Kolberg	—	—	499,935	499,935

Termination due to Death or Disability				
Name	Severance Pay (\$ (1))	Benefits (\$ (2))	Equity Acceleration (\$ (3))	Total (\$)
James Gentilcore	—	—	957,230	957,230
Michael Crews	—	—	448,509	448,509
Scott Randolph	—	40,782	800,716	841,498
Paul Ferrall	—	40,244	800,716	840,960
Ray Kolberg	—	—	127,566	127,566

Termination due to Retirement				
Name	Severance Pay (\$ (1))	Benefits (\$ (2))	Equity Acceleration (\$ (3))	Total (\$)
James Gentilcore	—	—	957,230	957,230
Michael Crews	—	—	448,509	448,509
Scott Randolph	—	—	800,716	800,716
Paul Ferrall	—	—	800,716	800,716
Ray Kolberg	—	—	127,566	127,566

- (1) Represents the cash severance amounts that would be payable as a result of the event described in the table above, based on the named executive officer's base salary and target bonus amount in effect as of December 31, 2016, as applicable, and without including any accrued but unpaid compensation, paid time-off or any bonus earned with respect to 2016 performance (pro rata or otherwise). The cash severance amounts that would be payable to each of our named executive officers in connection with a termination of employment under various circumstances is described in more detail above.
- (2) Represents the estimated value of the company paid portion of the premium for executive's medical and dental for the applicable period.
- (3) Reflects the accelerated vesting of any unvested stock options and restricted shares that would have vested upon termination or a change of control pursuant to the terms of the award agreements governing such unvested awards outstanding as of December 31, 2016, assuming a price per share of our Class A common stock of \$79.25 and our Class B common stock of \$192.99, which is the estimated fair market value as of December 31, 2016. No amounts have been included in respect of performance-based stock options or restricted shares since the MOI Target associated with such awards would not have been satisfied at these shares prices.

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- (4) Reflects the payments and benefits Mr. Biltz became entitled to in connection with his termination of employment pursuant to the terms of his severance agreement, as described above.

Director Compensation

The following table sets forth certain information with respect to cash compensation and stock awards granted to our directors in 2016. Directors who are employees of CCMP or INEOS do not receive compensation for their service on our board. Mr. Gentilcore did not receive any compensation for his service as a director. For information on the compensation that he received in his capacity as President and Chief Executive Officer, please see the Summary Compensation Table above.

Name	Fees Earned or Paid in Cash (\$)	Stock Awards(2) (3)	Option Awards (2)(3)	Non-Equity Incentive Plan Compensation (4)	All Other Compensation (\$)	Total (\$)
Michael Boyce	357,500(1)	357,588	1,269,434	451,976	525,082(5)	2,877,789
Christopher Behrens	—	—	—	—	—	—
Greg Brenneman	—	—	—	—	—	—
Bob Coxon	60,000	—	—	—	—	60,000
Andy Currie	—	—	—	—	—	—
Jonny Ginns	—	—	—	—	—	—
Mark McFadden	—	—	—	—	—	—
Robert Toth	—	—	—	—	—	—
Kyle Vann	50,000	—	101,622	—	35,320(6)	186,942
Timothy Walsh	—	—	—	—	—	—

- (1) Mr. Boyce receives compensation for his service as Chairman pursuant to an employment agreement, which expires on January 1, 2018, described below.
- (2) The amounts shown reflect the aggregate grant date fair value of stock and stock options granted in 2016, computed in accordance with ASC Topic 718, disregarding the effects of estimated forfeitures. These amounts reflect our cumulative accounting expense over the vesting period (in the case of stock options) and do not correspond to the actual value that may be realized by the directors. For information on the valuation assumptions made in the calculation of these amounts, refer to Note 21 to the audited consolidated financial statements of PQ Group Holdings Inc. and subsidiaries included elsewhere in this prospectus.
- (3) As of December 31, 2016, the following directors held outstanding stock options: Mr. Boyce, 43,134, and Mr. Vann, 3,452, and the following directors held outstanding restricted Class A shares: Mr. Boyce 48,090, and Mr. Coxon, 2,886.
- (4) Represents amounts paid to Mr. Boyce under the company's performance-based annual incentive plan, the PQIP. Pursuant to the terms of his employment agreement, as described below, Mr. Boyce's target annual bonus for 2016 was 100% of his 2016 base salary. The actual award payable for 2016 to Mr. Boyce was based on the achievement of the EBITDA targets for each of the company's four divisions pursuant to the same formula and based on the same financial targets and achievement levels under which Messrs. Gentilcore, Crews and Biltz earned their PQIP awards, all as discussed above under "Annual Performance-Based Cash Award – The PQIP".
- (5) Includes the company's matching contribution under the 401(k) plan (\$7,950), the company's 4% contribution under the 401(k) plan (\$10,600), the company's contribution to the PRA SERP (\$9,063), amounts in respect of tax preparation services (\$55,148) and an additional cash payment related to an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services (\$442,321).
- (6) Represents an additional cash payment related to an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services.

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Director Compensation

In 2016, each of our independent directors was paid an annual cash fee of \$50,000, paid in equal quarterly installments, for his service on our board of directors. Mr. Coxon received an extra \$10,000 retainer in respect of his position as chair of the Health, Safety and Environment Committee of our board of directors.

Mr. Vann received additional cash compensation as a result of an exchange of equity in connection with a corporate reorganization tied to the merger of the company with Eco Services and each of Messrs. Boyce and Vann received options to purchase Class A common stock in connection with this corporate reorganization. These options vest in equal installments on each of the first four anniversaries of the date of grant. Mr. Boyce also received a grant of fully vested Class B shares. Other than Mr. Boyce, we do not pay any additional remuneration for director service to any of our directors who are either our officers or who are employees of CCMP or employees of INEOS. However, all directors are reimbursed for reasonable travel and lodging expenses incurred to attend meetings of our board of directors or a committee thereof.

In connection with this offering we intend to adopt a non-employee director compensation policy that would set forth the compensation of our independent non-employee directors following this offering. Pursuant to such policy, it is currently expected that each of our non-employee directors who is not an employee of CCMP or INEOS would be compensated as follows:

- Each eligible non-employee director is expected to receive an annual cash retainer of \$50,000. The chairperson of the audit committee is expected to receive an additional annual cash retainer of \$20,000. The chairperson of each other committee, to the extent eligible for compensation under the policy, is expected to receive an additional annual cash retainer of \$15,000. Each annual retainer is expected to be paid quarterly in arrears.
- Each eligible non-employee director is expected to receive an annual equity grant in the form of restricted stock with a grant date fair value of \$200,000. The terms of each such award will be set forth in a written award agreement between each director and us, which will generally provide for vesting after one year of continued service as a director.

All cash and equity awards granted under the non-employee director compensation policy will be granted under, and subject to the limits of, the 2017 Plan (described below).

Arrangement with Mr. Boyce

Mr. Boyce is party to an employment agreement with the company, dated January 1, 2013, which remains in effect following his resignation as our Chief Executive Officer in April 2015 and sets forth his compensation as the Chairman of our board of directors. The term of Mr. Boyce's employment agreement expires on January 1, 2018. Pursuant to his employment agreement, Mr. Boyce is entitled to receive an annual base salary of \$357,500, which is equal to 50% of the annual base salary he received at the time of his resignation as Chief Executive Officer, as well as an annual incentive bonus with a target of 100% of his annual base salary, based on the company's achievement of financial performance goals established by our board of directors or the Compensation Committee. As noted above, Mr. Boyce's annual base salary and target annual incentive bonus for 2016 were as provided in his employment agreement as negotiated in 2013, and have not been subsequently increased or changed. As a member of our board of directors, Mr. Boyce participates in the determination of the objective financial targets upon which payments under the PQIP are based, but Mr. Boyce does not otherwise participate in determining the level of compensation he is awarded. Mr. Boyce also remains eligible to participate in any employee benefit plans and programs maintained by the company, to the extent permitted under the applicable plans. Any equity awards he held at the time he ceased to be our Chief Executive Officer continue to vest based on his services as Chairman.

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2016 Stock Incentive Plan

The PQ Group Holdings, Inc. Stock Incentive Plan (the “2016 Plan”) authorizes our Compensation Committee to grant options, stock appreciation rights, restricted shares, deferred stock units or other share based awards to selected employees. The 2016 Plan is administered by the Compensation Committee of the board of directors. The Compensation Committee determines the recipients of awards, the types of awards to be granted and the applicable terms, provisions, limitations and performance requirements of such awards. The Compensation Committee also has the authority to conclusively interpret the 2016 Plan and any award agreements under the plan.

The company has reserved 908,189 of our shares of Class A common stock for issuance pursuant to the 2016 Plan. The number of shares of Class B common stock that may be issued under the Plan will be determined by our board of directors from time to time. To the extent any award under the 2016 Plan is cancelled, terminated or forfeited, then the number of shares of common stock covered by the award so cancelled, terminated or forfeited will again be available for awards under the 2016 Plan. As of , 2017, awards with respect to shares of Class A common stock have been issued under the 2016 Plan.

The number of shares of common stock available for grants or subject to outstanding awards shall be proportionally adjusted in the event of any dividend payable in capital stock of the company, and any stock split, share combination, cash dividend, recapitalization, reorganization, merger, consolidation, split-up, spin-off, combination, exchange of shares or other similar event.

The Compensation Committee, in its sole discretion, may determine that an award will be immediately vested in whole or in part, or that all or any portion may not be vested until a date, or dates, subsequent to its grant date, or until the occurrence of one or more specified events, subject in any case to the terms of the 2016 Plan. The Compensation Committee may impose on any award such additional terms and conditions as the Compensation Committee determines, including terms requiring forfeiture of awards in the event of a participant’s termination of service. Unless otherwise determined by the Compensation Committee or unless substitute or alternative awards are provided for, upon a change in control, time-based awards granted under the 2016 Plan will vest in full.

The Compensation Committee generally may terminate, suspend or amend the 2016 Plan in a manner that does not adversely affect outstanding awards at any time. The 2016 Plan will expire on September 28, 2024, unless earlier terminated, and thereafter will continue to govern outstanding awards granted under it.

2017 Omnibus Incentive Plan

In connection with this offering, our board of directors intends to adopt the PQ Group Holdings Inc. 2017 Omnibus Incentive Plan (the “2017 Plan”), and, following this offering, all equity-based awards will be granted under the 2017 Plan. The following summary describes what we anticipate will be the material terms of the 2017 Plan. This summary of the 2017 Plan is not a complete description of what we anticipate the provisions of the 2017 Plan to be and is qualified in its entirety by reference to the 2017 Plan, which will be filed as an exhibit to the registration statement of which this prospectus is a part.

Administration. The 2017 Plan will be administered by the Compensation Committee, or such other committee, which, to the extent deemed necessary by our board of directors, will be comprised of no fewer than two members of our board of directors, appointed by our board of directors, or our full board of directors (any of the foregoing, as applicable, the “Committee”). The Committee has the authority to, among other things, interpret the 2017 Plan and the terms of awards, determine eligibility, prescribe the restrictions, terms and conditions of all awards, determine the form of settlement of awards (whether in cash, shares of our common stock and/or other property), accelerate the vesting or exercisability of any award, and do all things necessary or appropriate to administer the 2017 Plan. The Committee’s determinations under the 2017 Plan are final, conclusive, and binding. The Committee shall have the right to delegate to one or more of its members, members of our board of directors or officers of the company the authority of the Committee to grant and determine the terms and

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conditions of awards granted under the 2017 Plan, subject to applicable laws, and to any appropriate officer or employee the responsibility for performing certain ministerial functions under the 2017 Plan.

Eligibility. Employees, directors, consultants and personal service providers of the company and our subsidiaries are eligible to participate in the 2017 Plan. Eligibility for stock options intended to be incentive stock options (“ISOs”) is limited to our employees.

Authorized shares. Subject to adjustment, as described below, the maximum number of shares of our common stock that are reserved for issuance under the 2017 Plan is _____ shares, plus any shares remaining available for grant under the PQ Group Holdings Inc. Stock Incentive Plan (the “SIP”) at the time the 2017 Plan is approved. The maximum amount of shares of our common stock that may be issued in satisfaction of incentive stock options under the 2017 plan is _____ shares.

To the extent awards granted under the 2017 Plan expire, or are canceled, forfeited, settled in cash, settled by delivery of fewer shares than the number underlying the award, or are otherwise terminated without delivery of shares, or are withheld by us in payment of the exercise price, purchase price, or taxes relating to an award granted under the 2017 Plan, or are not issued or delivered as a result of the net settlement of an outstanding stock option or stock appreciation right (“SAR”), the shares retained by or returned to us, in each case, will not be deemed to have been delivered under the 2017 Plan, will be available for future awards under the 2017 Plan and will increase the number of shares reserved for issuance under the 2017 Plan by one share for each share that is retained or returned to us. In addition, any shares of that become available for issuance pursuant to the 2016 Plan as a result of the forfeiture, cancellation or termination for no consideration will not be available for future awards under the 2016 Plan, but will be available for future awards under the 2017 Plan and increase the number of shares reserved for issuance under the 2017 Plan by one share for each share that is retained or returned to us, subject to a maximum of _____ shares.

Individual limits. The maximum number of shares of our common stock subject to restricted stock awards and restricted stock units that, in each case, vest in full or in part based on the attainment of performance goals, stock options and SARs that may be granted to any participant (other than a non-employee director) in any calendar year is, in each case, _____ shares. The maximum number of shares of our common stock subject to restricted stock awards and restricted stock units that, in each case, vest in full or in part based on continued employment over a stated period of time, that may be granted to any participant (other than a non-employee director) in any calendar year is, in each case, _____ shares. The maximum number of shares of our common stock subject to stock awards that may be granted to any participant (other than a non-employee director) in any calendar year is _____ shares. The maximum amount that may become payable to any participant (including any non-employee director) under all cash awards in any calendar year is \$ _____. The foregoing limits are subject to adjustment as described below. If an award is settled in cash, the shares on which the award is based will count toward the annual cash limit and not the individual share limits described above (or below, in the case of non-employee directors).

Non-employee director limits. Subject to adjustment as described below, the maximum number of shares of our common stock subject to stock options, SARs, restricted stock awards, restricted stock units, and stock awards that may be granted to any non-employee director in any calendar year is 250,000 shares for all such award types in the aggregate.

Types of awards. The 2017 Plan provides for awards of stock options, SARs, restricted stock awards, restricted stock units, including performance stock units, cash awards and stock awards. Dividend equivalents may also be provided in connection with an award under the 2017 Plan on terms and subject to conditions established by the Committee.

- Stock options and SARs. SARs may be granted in tandem with a stock option or without any related stock option. The per share exercise price of a stock option, and the base price against which a SAR granted without any related stock option is to be measured, may not be less than the fair market value

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of a share of our common stock on the date of grant. The Committee may impose conditions on the time or times at which stock options or SARs become exercisable and the terms on which such awards remain exercisable and may provide that SARs are automatically payable upon a specified date or event.

- Restricted stock awards. A restricted stock award is an award of shares of our common stock subject to vesting and transfer restrictions.
- Restricted stock units. A restricted stock unit award is an unfunded and unsecured contractual right, denominated in shares of our common stock, which entitles the participant to receive shares of our common stock or cash measured by the value of shares of our common stock in the future.
- Performance stock unit. A performance stock unit is a restricted stock unit, paid or distributed based on or conditioned upon the attainment of pre-established business and/or individual performance goals.
- Cash awards. A cash award is an award denominated in cash, which may be payable based on or conditioned upon the attainment of pre-established business and/or individual performance goals.
- Stock awards. Stock awards are awards of shares of our common stock issued free of transfer restrictions and forfeiture conditions.

Performance awards. The 2017 Plan permits the grant of awards that are based upon, and subject to achieving, specified performance goals relating to performance criteria. Performance criteria with respect to those awards that are intended to qualify as “performance-based compensation” for purposes of Section 162(m) of the Code (“Section 162(m)”) consist of one or any combination of the following, for the company or any identified subsidiary or business unit (with associated performance goals applied on an absolute basis or relative to an identified index, peer group, or one or more competitors or other companies): (a) net earnings; (b) earnings per share; (c) net debt; (d) revenue or sales growth; (e) net or operating income; (f) net operating profit; (g) return measures (including, but not limited to, return on assets, capital, equity or sales); (h) cash flow (including, but not limited to, operating cash flow, distributable cash flow and free cash flow); (i) earnings before or after taxes, interest, depreciation, amortization and/or rent; (j) share price (including, but not limited to growth measures and total or relative stockholder return); (k) expense control or loss management; (l) customer satisfaction; (m) market share; (n) economic value added; (o) working capital; (p) the formation of joint ventures or the completion of other corporate transactions; (q) gross or net profit margins; (r) revenue mix; (s) operating efficiency; (t) product diversification; (u) market penetration; (v) measurable achievement in quality, operation or compliance initiatives; (w) quarterly dividends or distributions; (x) employee retention or turnover; or (y) any combination of or a specified increase in any of the foregoing.

We intend awards under the 2017 Plan to be exempt from the deduction limitations of Section 162(m) by reason of the post-initial public offering transition rule under Section 162(m) to the maximum extent possible.

Vesting. The Committee has the authority to determine the vesting terms and schedule applicable to each award, and to accelerate the vesting or exercisability of any award.

Termination of employment or service. The Committee will determine the effect of a termination of employment or service on an award. Unless otherwise determined by the Committee, all unvested awards will terminate upon a termination of employment or service, all awards will terminate upon a termination for cause, and participants will have a period of three months following termination to exercise any vested stock options (12 months in the case of a termination due to death or disability).

Non-transferability of awards. Awards under the 2017 Plan may not be transferred other than by the laws of descent and distribution, unless, for awards other than ISOs, otherwise provided by the Committee.

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Certain transactions; certain adjustments. In the event of a recapitalization, reclassification, stock dividend, extraordinary cash dividend, stock split, reverse stock split or other distribution with respect to shares of common stock or any merger, reorganization, consolidation, combination, spin-off, stock purchase or other similar corporate change or any other change affecting our common stock, the Committee will make appropriate adjustments to the maximum number and kind of shares of common stock that may be delivered under the 2017 Plan, the individual share limits described above, and will also make appropriate adjustments to the number and kind of shares, units, or other rights subject to outstanding awards, the exercise price or base price of such awards, the maximum amount payable under cash awards, or any other terms of awards affected by such change.

In the event of a change in control, unless otherwise provided in an award agreement, the Committee can make adjustments in the terms and conditions of outstanding awards, including: (a) continuation or assumption of outstanding awards, (b) substitution of awards with substantially the same terms for awards granted under the plan, (c) accelerated exercisability, vesting and/or payment under outstanding awards in connection with such transaction or a termination of employment following the transaction and (d) a cash payment in exchange for cancellation of awards or a requirement to exercise awards prior to such transaction, in the event of certain change in control transactions.

No Repricing. The repricing of stock options and SARs (other than in connection with certain corporate transactions) is prohibited without prior approval of the company's stockholders.

Recoupment. If the company is required to prepare an accounting restatement due to the material noncompliance of the Company, as a result of misconduct, with any financial reporting requirement under the securities laws, then any participant who is subject to automatic forfeiture under Section 304 of the Sarbanes-Oxley Act of 2002 will be required to reimburse the company for the amount of any awards received under the 2017 Plan in the 12-month period following the first public issuance or filing of the financial document required to be restated. The company may also recover awards and payments under any award in accordance with any applicable company clawback or forfeiture policy, as amended and in effect from time to time, or as otherwise required by applicable law or applicable stock exchange listing standards.

Amendment; termination. Our board of directors will be able to amend, modify, suspend, or terminate the 2017 Plan, except to the extent that such amendments, modification, suspension, or termination would adversely affect an award granted pursuant to the 2017 Plan without the participant's consent (except to comply with Section 162(m) or Section 422 of the Code). Our board of directors may seek shareholder approval for any amendment, modification, suspension or termination to the 2017 Plan in its discretion for purposes of compliance with Section 162(m) or Section 422 of the Code, stock exchange listing requirements or for any other purpose.

2017 PQ Corporation Incentive Plan

As described above, we provide our named executive officers with annual performance-based cash award opportunities linked to our annual financial performance under the PQIP. A description of the performance metrics and terms of the PQIP as it relates to 2017 is included in the Compensation Discussion and Analysis above under "*Annual Performance-Based Cash Award – The PQIP – Plan Structure for 2017.*"

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

Consulting Agreements

CCMP Consulting Agreement

In December 2014, PQ Holdings and PQ Corporation entered into a consulting agreement with CCMP, pursuant to which CCMP agreed to provide PQ Holdings and its subsidiaries with certain financial advisory, consulting and other services in exchange for its pro rata portion of a \$1.25 million quarterly consulting fee to be shared with INEOS AG pursuant to the INEOS AG consulting agreement described below under “—INEOS Consulting Agreement,” and the reimbursement of reasonable out-of-pocket expenses incurred in connection with the performance of services under the agreement. The agreement also provides for payment to CCMP of a transaction fee to be shared on a pro rata basis with INEOS AG in connection with any merger, recapitalization, reorganization or other similar transaction in an amount calculated based on the total transaction value.

We paid advisory fee payments totaling \$5.8 million and \$1.1 million during the year ended December 31, 2016 and the six months ended June 30, 2017, respectively, and reimbursement payments totaling \$0.2 million during each of the years ended December 31, 2016 and 2015.

The consulting agreement provides for customary exculpation and indemnification provisions in favor of CCMP and its affiliates. The agreement is terminable by CCMP at any time upon 30 days prior written notice. In connection with this offering, the consulting agreement will be terminated in exchange for a payment to CCMP of accrued and unpaid fees in the amount of approximately \$ million. The indemnification and exculpation provisions in favor of CCMP and its affiliates will survive such termination.

INEOS Consulting Agreement

In December 2014, PQ Holdings and PQ Corporation entered into an amended and restated consulting agreement with INEOS AG, an affiliate of INEOS, pursuant to which INEOS AG agreed to provide PQ Holdings and its subsidiaries with certain financial advisory, consulting and other services in exchange for its pro rata portion of a \$1.25 million quarterly consulting fee to be shared with CCMP pursuant to the CCMP consulting agreement described above under “—CCMP Consulting Agreement,” and the reimbursement of reasonable out-of-pocket expenses incurred in connection with the performance of services under the agreement. The agreement also provides for payment to INEOS AG of a transaction fee to be shared on a pro rata basis with CCMP in connection with any merger, recapitalization, reorganization or other similar transaction in an amount calculated based on the total transaction value. The amended and restated consulting agreement with INEOS AG amended and restated the prior consulting agreement with INEOS Capital Partners, an affiliate of INEOS, which was entered into in July 2008 on substantially similar terms.

We paid advisory fees totaling \$2.2 million, \$2.3 million, \$2.5 million and \$1.1 million during the years ended December 31, 2016, 2015 and 2014 and the six months ended June 30, 2017, respectively.

The amended and restated consulting agreement provides for customary exculpation and indemnification provisions in favor of INEOS AG and its affiliates. The agreement is terminable by INEOS AG at any time upon 30 days prior written notice. In connection with this offering, the amended and restated consulting agreement will be terminated in exchange for a payment to INEOS AG of accrued and unpaid fees in the amount of approximately \$ million. The indemnification and exculpation provisions in favor of INEOS AG and its affiliates will survive such termination.

Amended and Restated Stockholders Agreement

In connection with the Business Combination, in May 2016, we entered into an amended and restated stockholders agreement with certain stockholders, including investments funds affiliated with CCMP, INEOS,

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our directors and officers who hold shares of our common stock and certain other investors relating to rights and obligations with respect to ownership of our common stock, including the designation of certain director nominees, certain corporate governance rights, drag along rights, tag along rights, preemptive rights, demand and piggyback registration rights and related lockup obligations. In connection with the consummation of this offering, we intend to further amend and restate the stockholders agreement. The stockholders agreement, as so further amended and restated, will provide affiliates of CCMP with certain demand registration rights, including shelf registration rights, following the expiration of the 180-day lockup period in respect of shares of our common stock held by them and will also provide that, in the event that we register additional shares of our common stock for sale to the public following completion of this offering, we will be required to give notice of such registration to such affiliates of CCMP and certain other stockholders, and, subject to certain limitations, include shares of our common stock held by them in such registration. In addition, we will be required to bear the registration expenses, other than underwriting discounts and commissions and transfer taxes, associated with any registration of shares described above and to indemnify such stockholders and certain other persons against certain liabilities that may arise under the Securities Act in connection with any such offering and sale of our shares.

Floating Rate Senior Unsecured Notes Investment

In connection with the offering by PQ Corporation of \$525.0 million aggregate principal amount of Floating Rate Senior Unsecured Notes due 2022 in May 2016, Andrew Currie, a member of our board of directors, purchased \$4 million in principal amount of such notes. Interest accrues on the notes at an annual rate equal to three-month LIBOR plus 10.75%, with a 1.0% LIBOR floor, payable and reset quarterly. Mr. Currie received interest payments in respect of the notes totaling \$0.3 million and \$0.2 million during the year ended December 31, 2016 and the six months ended June 30, 2017, respectively, and has not received any repayment in respect of the principal amount of such notes. We intend to redeem approximately \$ million in aggregate principal amount of the Floating Rate Senior Unsecured Notes with the net proceeds from this offering. As a result, Mr. Currie may receive a portion of the net proceeds from this offering. See “Use of Proceeds” and “Description of Certain Indebtedness—Floating Rate Senior Unsecured Notes due 2022.”

Advisory Services Agreement

In December 2014, Eco Services Group Holdings LLC, Eco Services Intermediate Holdings LLC and Eco (collectively, the “Eco Entities”) entered into an advisory services and monitoring agreement with CCMP and Boyce Eco Investment LLC (“Boyce Eco”). Certain of our executive officers are members of Boyce Eco. Pursuant to the terms of the agreement, the Eco Entities made a one-time payment of \$8 million and \$1.6 million to each of CCMP and Boyce Eco, respectively, in return for advisory services performed in connection with the 2014 Acquisition. Pursuant to a payment direction and subscription agreement, in lieu of the Eco Entities making the \$1.6 million payment to Boyce Eco, Boyce Eco agreed to contribute the \$1.6 million transaction fee to the capital of Eco Services Group Holdings LLC. Eco Services Group Holdings LLC contributed this fee to Eco Services Intermediate Holdings LLC, who in turn contributed the amount to Eco, increasing Eco’s additional paid-in capital by \$1.6 million.

In addition, CCMP agreed to provide the Eco Entities with certain financial advisory services in exchange for an annual consulting fee of \$0.5 million and the reimbursement of reasonable out-of-pocket expenses incurred in connection with the performance of services under the agreement. The agreement provided for customary exculpation and indemnification provisions in favor of CCMP, Boyce Eco and each of their respective affiliates. The agreement terminated pursuant to its terms in May 2016 in connection with the Business Combination. The indemnification and exculpation provisions in favor of CCMP, Boyce Eco and each of their respective affiliates survived such termination.

CCMP received consulting fees totaling \$0.3 million and \$0.5 million during the years ended December 31, 2016 and 2015, respectively.

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INEOS Silicas Purchase Agreement

In July 2008, PQ Corporation entered into a purchase agreement with certain affiliates of INEOS pursuant to which PQ Corporation acquired certain assets and liabilities from, and certain stock of, the entities that comprised INEOS Silicas. In connection with such acquisition, PQ Corporation agreed to make certain future payments to INEOS Silicas Limited, an affiliate of INEOS, in an amount based on PQ Corporation's U.K. taxable results. PQ Corporation paid INEOS Silicas Limited \$2.3 million, \$2.3 million, \$1.1 million and \$1.6 million during each of the years ended December 31, 2016, 2015 and 2014 and the six months ended June 30, 2017, respectively. INEOS Silicas Limited is entitled to additional payments totaling \$0.3 million in the future.

Related Party Transactions Policy

In connection with this offering, we will adopt a policy with respect to the review, approval and ratification of related party transactions. Under the policy, the audit committee will be responsible for reviewing and approving related party transactions. The policy will apply to transactions, arrangements and relationships (including any indebtedness or guarantee of indebtedness) or any series of similar transactions, arrangements or relationships in which the aggregate amount involved will, or may be expected to, exceed \$120,000 with respect to any fiscal year, and where we (or one of our subsidiaries) are a participant and in which a related party has or will have a direct or indirect material interest. In the course of reviewing potential related party transactions, the audit committee will consider the nature of the related party's interest in the transaction; the presence of standard prices, rates or charges or terms otherwise consistent with arms-length dealings with unrelated third parties; the materiality of the transaction to each party; the reasons for the company entering into the transaction with the related party; the potential effect of the transaction on the status of a director as an independent, outside or disinterested director or committee member; and any other factors the audit committee may deem relevant.

PRINCIPAL STOCKHOLDERS

The following table shows information as of _____, 2017 regarding the beneficial ownership of our common stock (1) prior to this offering and (2) as adjusted to give effect to this offering by:

- each person or group who is known by us to own beneficially more than 5% of our common stock;
- each member of our board of directors and each of our named executive officers; and
- all members of our board of directors and our executive officers as a group.

Unless otherwise indicated below, the address for each listed director, officer and stockholder is c/o PQ Group Holdings Inc., 300 Lindenwood Drive, Valleybrooke Corporate Center, Malvern, Pennsylvania 19355. Beneficial ownership has been determined in accordance with the applicable rules and regulations promulgated under the Exchange Act. The information is not necessarily indicative of beneficial ownership for any other purpose. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting or investment power and any shares as to which the individual or entity has the right to acquire beneficial ownership within 60 days after _____, 2017 through the exercise of any option, warrant or other right. For purposes of calculating each person's or group's percentage ownership, shares of common stock issuable pursuant to options exercisable within 60 days after _____, 2017 are included as outstanding and beneficially owned for that person or group but are not treated as outstanding for the purpose of computing the percentage ownership of any other person or group. The inclusion in the following table of those shares, however, does not constitute an admission that the named stockholder is a direct or indirect beneficial owner. To our knowledge, except under applicable community property laws or as otherwise indicated, the persons named in the table have sole voting and sole investment control with respect to all shares shown as beneficially owned. For more information regarding the terms of our common stock, see "Description of Capital Stock." For more information regarding our relationship with certain of the persons named below, see "Certain Relationships and Related Party Transactions."

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The numbers listed below are based on _____ shares of our common stock outstanding as of _____, 2017 after giving effect to the Reclassification as if it had occurred on that date. As of _____, 2017, prior to giving effect to the Reclassification, we had outstanding _____ shares of Class A common stock and _____ shares of Class B common stock. The actual number of shares of common stock to be issued to each holder of Class B common stock in the Reclassification is subject to change based on any changes to the initial public offering price. See “The Reclassification.”

Name of Beneficial Owner	Shares Owned Before this Offering		Shares Owned After this Offering (no option exercise)		Shares Owned After this Offering (full option exercise)	
	Number	Percentage	Number	Percentage	Number	Percentage
Beneficial owners of more than 5% of our common stock:						
CCMP Capital Investors III, L.P. and related investment funds ⁽¹⁾						
INEOS Investments Partnership ⁽²⁾						
Directors and Named Executive Officers:						
James F. Gentilcore ⁽³⁾						
Michael Boyce ⁽⁴⁾						
Greg Brenneman ⁽⁵⁾						
Timothy Walsh ⁽⁵⁾						
Christopher Behrens ⁽⁵⁾						
Mark McFadden ⁽⁵⁾						
Robert Toth ⁽⁵⁾						
Robert Coxon ⁽⁶⁾						
Andrew Currie ⁽⁷⁾						
Jonny Ginns						
Kyle Vann ⁽⁸⁾						
Martin S. Craighead						
Kimberly Ross						
Michael Crews ⁽⁹⁾						
Scott Randolph ⁽¹⁰⁾						
Paul Ferrall ⁽¹¹⁾						
Ray Kolberg ⁽¹²⁾						
George Biltz ⁽¹³⁾						
All executive officers and directors as a group (20 persons) ⁽¹⁴⁾						

* Indicates less than one percent.

(1) Includes _____ shares of our common stock held by CCMP Capital Investors III, L.P. (“CCMP Capital Investors”), _____ shares of our common stock held by CCMP Capital Investors III (Employee), L.P. (“CCMP Employee”), _____ shares of our common stock held by CCMP Capital Investors III (AV-7), L.P. (“CCMP AV-7”), _____ shares of our common stock held by CCMP Capital Investors III(AV-8), L.P. (“CCMP AV-8”), _____ shares of our common stock held by CCMP Capital Investors III (AV-9), L.P. (“CCMP AV-9”), _____ shares of our common stock held by CCMP Capital Investors III(AV-10), L.P. (“CCMP AV-10” and, together with CCMP Capital Investors, CCMP Employee, CCMP AV-7, CCMP AV-8 and CCMP AV-9, the “CCMP Capital Funds”) and _____ shares of our common stock held by Quartz Co-Invest, L.P. (“Quartz” and, together with the CCMP Capital Funds, the “CCMP Investors”). The general partner of the CCMP Capital Funds is CCMP Capital Associates III, L.P. (“CCMP Capital Associates”). The general partner of CCMP Capital Associates is CCMP Capital Associates III GP, LLC (“CCMP Capital Associates GP”). The general partner of Quartz is CCMP Co-Invest III A GP, LLC (“CCMP Co-Invest GP”). CCMP Capital Associates GP and CCMP Co-Invest GP are each wholly owned by CCMP Capital, LP. The general partner of CCMP Capital, LP is CCMP Capital GP, LLC (“CCMP Capital GP”). CCMP Capital GP ultimately exercises voting and investment power over the shares of our

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common stock held by the CCMP Investors. As a result, CCMP Capital GP may be deemed to share beneficial ownership with respect to the shares of our common stock held by the CCMP Investors. The investment committee of CCMP Capital GP with respect to the shares of our common stock consists of Messrs. Behrens, Brenneman and Walsh, each of whom serves as a director of the company. Each of the CCMP entities has an address of c/o CCMP Capital Advisors, LP, 277 Park Avenue, New York, New York 10172.

- (2) The partners of INEOS Investments Partnership are James A. Ratcliffe, John Reece, Andrew Currie and INEOS Silicas Holdings Limited. Mr. Ratcliffe, as the majority owner of INEOS Investments Partnership, has the power to control the voting and disposition of the shares of our common stock held by INEOS Investments Partnership. The address of INEOS Investments Partnership is Avenue des Uttins, 3, CH-1180, Rolle Switzerland.
- (3) Includes shares of our common stock held by Mr. Gentilcore that can be acquired upon the exercise of outstanding options and shares of our common stock and shares of our restricted common stock subject to vesting conditions held by a trust for which Mr. Gentilcore is the grantor.
- (4) Includes shares of our common stock that can be acquired upon the exercise of outstanding options.
- (5) Does not include shares of our common stock held by the CCMP Investors. The address of each of Messrs. Behrens, Brenneman, McFadden, Toth and Walsh is c/o CCMP Capital Advisors, LP, 277 Park Avenue, New York, New York 10172.
- (6) Includes shares of our restricted common stock subject to vesting conditions.
- (7) Does not include shares of our common stock held by INEOS Investments Partnership.
- (8) Includes shares of our common stock that can be acquired upon the exercise of outstanding options.
- (9) Includes shares of our common stock that can be acquired upon the exercise of outstanding options and shares of our restricted common stock subject to vesting conditions held by Mr. Crews and shares of our common stock held by a revocable trust for which Mr. Crews is the grantor.
- (10) Includes shares of our common stock that can be acquired upon the exercise of outstanding options and shares of our restricted common stock subject to vesting conditions.
- (11) Includes shares of our common stock that can be acquired upon the exercise of outstanding options and shares of our restricted common stock subject to vesting conditions.
- (12) Includes shares of our common stock that can be acquired upon the exercise of outstanding options and shares of our restricted common stock subject to vesting conditions.
- (13) Includes shares of our common stock and shares of our restricted common stock subject to vesting conditions held by a trust for which Mr. Biltz is the grantor. Mr. Biltz stepped down as our President and Chief Executive Officer effective June 24, 2016 and terminated employment with us on July 31, 2016.
- (14) Includes shares of our common stock that can be acquired upon the exercise of outstanding options and shares of our restricted common stock subject to vesting conditions.

DESCRIPTION OF CERTAIN INDEBTEDNESS

The following is a summary of certain of our indebtedness that is currently outstanding. The following descriptions do not purport to be complete and are qualified in their entirety by reference to the agreements and related documents referred to herein, copies of which have been filed as exhibits to the registration statement of which this prospectus forms a part, and may be obtained as described under “Where You Can Find More Information” in this prospectus.

Senior Secured Credit Facilities

Overview

In connection with the Business Combination, on May 4, 2016, PQ Corporation entered into (a) a \$200.0 million asset-based lending facility (the “ABL Facility”) with Citibank, N.A., as administrative agent and collateral agent (the “ABL Agent”), and the lenders from time to time party thereto and (b) a \$1,200.0 million term loan facility (the “Term Loan Facility”) and, together with the “ABL Facility,” the “Senior Secured Credit Facilities”) consisting of a U.S. dollar-denominated tranche in the amount of \$900.0 million and a Euro-denominated tranche in the amount of approximately \$300.0 million (or €265.0 million) with Credit Suisse AG, Cayman Island Branch, as administrative agent and collateral agent (the “Term Loan Agent”), and the lenders from time to time party thereto. On November 14, 2016, PQ Corporation entered into a repricing amendment to the Term Loan Facility, which increased the U.S. dollar-denominated tranche to a total amount of \$927.8 million and the Euro-denominated tranche to a total amount of €283.3 million. On August 7, 2017, PQ Corporation entered into a second repricing amendment to the Term Loan Facility to lower the applicable interest rate margin for each of the U.S. dollar-denominated tranche and the Euro-denominated tranche.

ABL Facility. The ABL Facility consists of a \$150.0 million U.S. revolving credit facility available in U.S. dollars and such other currencies acceptable to the revolving lenders (the “U.S. ABL Facility”), a \$10.0 million Canadian revolving credit facility available in Canadian dollars, U.S. dollars and such other currencies acceptable to the revolving lenders (the “Canadian ABL Facility”) and a \$40.0 million UK and Netherlands revolving credit facility available in Euros, Pounds Sterling, U.S. dollars and such other currencies acceptable to the revolving lenders (the “European ABL Facility”), in each case, providing for loans and letters of credit thereunder and subject to certain borrowing base limits. Proceeds from the ABL Facility are available to finance the working capital needs and other general corporate purposes of PQ Corporation and its subsidiaries, including investments, restricted payments and any other purpose not prohibited thereby. A portion of the ABL Facility not to exceed \$60 million is available for the issuance of letters of credit.

The ABL Facility provides the ABL Agent customary discretion to impose reserves or availability blocks, which could materially impair the amount of borrowings that would otherwise be available and may require repayment of certain amounts outstanding under the ABL Facility.

The ABL Facility provides that PQ Corporation may request increases to the ABL Facility in an aggregate principal amount not to exceed (w) the greater of (1) \$50 million and (2) the amount by which the borrowing base exceeds the aggregate commitments then outstanding, so long as the total net leverage ratio does not exceed 5.80:1.00 after giving pro forma effect to any such increase plus (x) in the case of any incremental facilities that serve to effectively replace any commitment under the ABL Facility that is terminated under the “yank-a-bank” provisions, an amount equal to the portion of the relevant terminated commitment plus (y) the amount of any permanent voluntary reduction of the commitments under the ABL Facility and/or any incremental revolving facility. The lenders are not obligated to provide such additional commitments, and any increase in commitments is subject to customary conditions precedent.

Additional borrowings under the ABL Facility will be subject to the satisfaction of customary conditions, including absence of events of default and availability.

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Term Loan Facility. The Term Loan Facility provides that PQ Corporation may (a) request increases to the Term Loan Facility and add one or more incremental term loan facilities and (b) add one or more incremental cash-flow revolving facilities and increase commitments under any then existing incremental cash-flow revolving facilities in an aggregate principal amount not to exceed (w) \$200 million less any other incremental borrowings incurred in reliance on that amount, plus (x) in the case of any incremental facilities that serve to effectively extend the maturity of any term loans or commitments or effectively replace any incremental cash-flow revolving facility, an amount equal to the reductions in the term loans or commitments to be replaced thereby or the terminated incremental cash-flow revolving facility, plus (y) the amount of certain voluntary prepayment of any term loans and any permanent reduction of the commitments under any incremental cash-flow revolving facility, plus (z) an unlimited amount so long as (1) if such incremental indebtedness is secured by a lien on the collateral on a *pari passu* basis with the Senior Secured Credit Facilities, we are in compliance on a pro forma basis with a senior secured net leverage ratio of no greater than 3.95:1.00, (2) if such incremental indebtedness is secured by a lien on the collateral by a lien that is junior to the lien securing the Senior Secured Credit Facilities, we are in compliance on a pro forma basis with a secured net leverage ratio of no greater than 4.70:1.00 or (3) if such incremental indebtedness is unsecured, we are in compliance on a pro forma basis with a total net leverage ratio of no greater than 5.80:1.00. The lenders are not obligated to provide such additional commitments, and the incurrence of any incremental indebtedness is subject to customary conditions precedent.

Interest rate and fees

ABL Facility: The interest rate applicable to loans under the ABL Facility denominated in (a) U.S. dollars is equal to an applicable interest rate margin, plus, at our option, either (1) a base rate determined by the reference to the highest of (A) the prime commercial lending rate publicly announced by the ABL Agent as the “prime rate” in effect on such day, (B) the federal funds effective rate, plus 0.50%, and (C) the one-month LIBOR rate determined by reference to the cost of funds for U.S. dollar deposits, plus 1.00%, or (2) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the specified interest period, as adjusted for certain statutory reserve requirements, (b) Canadian dollars is equal to an applicable interest rate margin, plus, at our option, either (1) the average rate applicable to Canadian dollar bankers’ acceptances (the “B/A Equivalent Rate”) or (2) the highest of (A) the prime commercial lending rate publicly announced by the ABL Agent in Canada as its “prime rate” as in effect on such day or (B) one-month B/A Equivalent Rate plus 1.0% per annum, or (c) Euros or Pounds Sterling is equal to an applicable interest rate margin, plus a LIBOR rate determined by reference to the costs of funds for the applicable currency deposits for the specified interest period, as adjusted for certain statutory reserve requirements.

A commitment fee is charged on the average daily unused portion of the ABL Facility, adjusted quarterly, of (a) 0.375% per annum if the average daily unused portion of the non-defaulting revolving lenders commitments is less than 50% or (b) 0.25% per annum if the average daily unused portion of the non-defaulting revolving lenders commitments is equal to or greater than 50%.

Term Loan Facility. Borrowings under the Term Loan Facility (x) denominated in U.S. dollars bear interest at a rate per annum equal to, at our option (1) a margin of 2.25% plus a base rate determined by reference to the highest of (A) the federal funds effective rate in effect on such day, plus 0.50%, (B) the one-month LIBOR rate determined by reference to the cost of funds for U.S. dollar deposits, plus 1.00%, (C) the prime commercial lending rate publicly announced by the Term Loan Agent as the “prime rate” in effect and (D) 2.00% (solely with respect to initial term loans) or (2) a margin of 3.25% plus a LIBOR rate (subject to a floor of 0%) determined by reference to the cost of funds for U.S. dollar deposits, as adjusted for certain statutory reserve requirements (or, if no interbank rate that is broadly accepted by the syndicated loan market exists, a successor or alternative index rate as the Term Loan Agent and PQ Corporation may determine with the consent of the required lenders under the Term Loan Facility), and (y) denominated in Euros bear interest at a rate per annum equal to, at our option (1) a margin of 2.25% plus a base rate determined by reference to the highest of (A) the federal funds effective rate in effect on such day plus, 0.50%, (B) the one-month LIBOR rate determined by reference to the cost of funds for Euro deposits, plus 1.00%, (C) the prime commercial lending rate publicly announced by the Term Loan Agent as the “prime rate” in effect and (D) 2.00% (solely with respect to initial term loans) or (2) a margin

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of 3.25% plus a EURIBOR rate (subject to a floor of 0.75%) determined by reference to the cost of funds for Euro deposits, as adjusted for certain statutory reserve requirements (or, if no interbank rate that is broadly accepted by the syndicated loan market exists, a successor or alternative index rate as the Term Loan Agent and PQ Corporation may determine with the consent of the required lenders under the Term Loan Facility).

Mandatory prepayments

ABL Facility. If at any time the aggregate amount of outstanding loans, unreimbursed letter of credit drawings and outstanding letters of credit under either the U.S. ABL Facility, the Canadian ABL Facility or the European ABL Facility exceeds the lesser of (i) the applicable commitment amount under such facility and (ii) the then applicable borrowing base for such facility, PQ Corporation must repay the outstanding loans under such facility (and cash collateralize outstanding letters of credit) in an aggregate amount equal to such excess. If at any time the aggregate amount of outstanding loans, unreimbursed letter of credit drawings and outstanding letters of credit under the ABL Facility exceeds the lesser of (i) the sum of all commitments under the ABL Facility and (ii) the then-applicable U.S. Borrowing Base plus the then-applicable Canadian Borrowing Base plus the then-applicable European Borrowing Base, PQ Corporation must repay the outstanding loans under such facility (and cash collateralize outstanding letters of credit) in an aggregate amount equal to such excess.

Term Loan Facility. The Term Loan Facility requires PQ Corporation to prepay, subject to certain exceptions, outstanding term loans with:

- 100% of net cash proceeds of any incurrence of debt, other than the net cash proceeds of certain debt permitted under the Term Loan Facility;
- 100% of net cash proceeds above a threshold amount of certain asset sales, subject to reinvestment rights and certain other exceptions; and
- 50% (subject to step-downs to 25% and 0% based upon pro forma senior secured net leverage ratio levels of 3.50:1.00 and 3.00:1.00, respectively) of our annual excess cash flow.

Voluntary prepayment

We may voluntarily reduce the unutilized portion of the commitment amount and repay outstanding loans under the Senior Secured Credit Facilities at any time without premium or penalty other than customary “breakage” costs with respect to LIBOR borrowings.

Amortization and final maturity

All outstanding revolving loans under the ABL Facility are due and payable in full upon the expiration of its five-year term. In the case of the term loans borrowed under the Term Loan Facility, PQ Corporation is required to make scheduled quarterly payments equal to 0.25% of the original principal amount of the term loans made on the closing date of the Business Combination, with the balance due on the 6.5 year anniversary of such closing date, which date may be accelerated to six months prior to the maturity date of the 8.5% Senior Notes (as defined below) unless the 8.5% Senior Notes have been refinanced or repaid prior to such time.

Guarantees and Security

All obligations under the Senior Secured Credit Facilities are unconditionally guaranteed jointly and severally on a senior basis by: (i) in the case of the Term Loan Facility, PQ Holdings, certain of PQ Corporation’s existing and future direct and indirect wholly-owned domestic subsidiaries (collectively, the “U.S. Guarantors”); (ii) in the case of the U.S. ABL Facility, the U.S. Guarantors (other than any such person in its capacity as a primary obligor in respect of the relevant obligation); (iii) in the case of the Canadian ABL Facility, by each of the Canadian ABL Facility borrower’s wholly-owned Canadian subsidiaries (subject to customary exceptions), PQ Corporation and the U.S. Guarantors; and (iv) in the case of the European ABL Facility, by each of the European ABL Facility borrower’s wholly-owned subsidiaries organized under the laws of the Netherlands or the United Kingdom (subject to customary exceptions), PQ Corporation and the U.S. Guarantors.

All obligations under the Senior Secured Credit Facilities, and the guarantees of those obligations, are secured, subject to certain exceptions, by substantially all of the assets of the borrowers under each such facility and the assets of the respective guarantors under each such facility.

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The assets securing the U.S. ABL Facility, the Canadian ABL Facility and the European ABL Facility (the “ABL Collateral”) include a first priority (subject to permitted liens and other exceptions) security interest in personal property consisting of accounts receivable, inventory, cash and cash equivalents (other than cash and cash equivalents constituting proceeds of Term Loan Collateral (as defined below), cash collateral subject to certain permitted liens or certain identifiable tax and trust funds), deposit accounts and securities accounts (other than any deposit account or securities account established solely to hold identified proceeds of Term Loan Collateral), and general intangibles, instruments, chattel paper, documents, commercial tort claims, letter of credit rights and supporting obligations related to the foregoing (other than capital stock and intellectual property), intellectual property to the extent attached to or necessary to sell the foregoing and books and records to the extent related to the foregoing, and, in each case, proceeds thereof, subject to customary exceptions.

The Term Loan Facility is secured by a second priority lien on and security interest in the ABL Collateral securing the U.S. ABL Facility.

The assets securing the Term Loan Facility (the “Term Loan Collateral”) include a first priority security interest (subject to permitted liens and other exceptions) on 100% of the present and future capital stock in PQ Corporation and the subsidiary guarantors’ direct subsidiaries (but limited in the case of the voting capital stock of any first-tier foreign subsidiary and any direct or indirect domestic subsidiary of which substantially all of its assets consist of the equity and/or debt of one or more direct or indirect foreign subsidiaries, to 65% of such capital stock), substantially all of PQ Corporation’s and the subsidiary guarantors’ material owned real property and equipment and all other personal property of PQ Corporation and the subsidiary guarantors to the extent not constituting collateral securing the ABL Facility on a first priority basis, including, without limitation, contracts (other than those relating to collateral securing the ABL Facility on a first priority basis), patents, copyrights, trademarks, other general intangibles, intercompany notes and proceeds of the foregoing, subject to customary exceptions.

The ABL Facility is secured by a second priority lien on and security interest in the Term Loan Collateral.

Certain Covenants and Events of Default

The Senior Secured Credit Facilities contain a number of restrictive covenants that, among other things and subject to certain exceptions, restrict the ability of PQ Corporation and the ability of its subsidiaries to:

- incur additional indebtedness;
- pay dividends on capital stock or redeem, repurchase or retire capital stock;
- make investments, acquisitions, loans and advances;
- create negative pledge or restrictions on the payment of dividends or payment of other amounts owed from subsidiaries;
- engage in transactions with affiliates;
- sell, transfer or otherwise dispose of assets, including capital stock of subsidiaries;
- materially alter the conduct of the business;
- modify certain material documents;
- change the fiscal year;
- consolidate, merge, liquidate or dissolve;
- incur liens; and
- make prepayments of subordinated or junior debt.

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PQ Holdings is also subject to a “passive holding company” covenant under the Senior Secured Credit Facilities.

In addition, the ABL Facility contains a financial covenant requiring PQ Corporation to maintain a 1.0:1.0 minimum trailing four quarter fixed charge coverage ratio, to be tested at any time that either (a) excess availability under the ABL Facility decreases to a level below the greater of 10% of the Line Cap (as defined below) and \$20 million or (b) availability under the U.S. ABL Facility is less than \$15 million, until the date on which (x) excess availability exceeds the greater of 10% of the Line Cap and \$20 million for 30 consecutive days and (y) availability under the U.S. ABL Facility for each day over a 30 consecutive day period has been equal to or greater than \$15 million. As used herein “Line Cap” means the lesser of (i) the aggregate commitments under the ABL Facility and (ii) the sum of the then-applicable U.S. borrowing base, the then-applicable Canadian borrowing base and the then-applicable European borrowing base.

The Senior Secured Credit Facilities also contain certain customary representations and warranties, affirmative covenants and reporting obligations. In addition, the lenders under the Senior Secured Credit Facilities are permitted to accelerate the loans and terminate commitments thereunder or exercise other specified remedies available to secured creditors upon the occurrence of certain events of default, subject to certain grace periods and exceptions, which include, among others, payment defaults, breaches of representations and warranties, covenant defaults, cross-defaults to certain material indebtedness, certain events of bankruptcy, certain events under the Employee Retirement Income Security Act of 1974, as amended, material judgments and changes of control.

6.75% Senior Secured Notes due 2022

Overview

In connection with the Business Combination, PQ Corporation issued \$625.0 million aggregate principal amount of 6.75% Senior Secured Notes due 2022 (the “6.75% Senior Secured Notes”). Interest on the 6.75% Senior Secured Notes is payable semi-annually on May 15 and November 15 of each year. The 6.75% Senior Secured Notes will mature and be due in full on November 15, 2022.

Guarantees and collateral

The 6.75% Senior Secured Notes are guaranteed, jointly and severally, on a senior secured basis by CPQ Midco I Corporation, the direct parent of PQ Corporation (“CPQ”), and on a senior unsecured basis by PQ Holdings, in each case to the extent such entities are guarantors under the Term Loan Facility. The 6.75% Senior Secured Notes are also guaranteed, jointly and severally, on a senior secured basis by each of PQ Corporation’s existing and future restricted subsidiaries that guarantee the Term Loan Facility, the Floating Rate Senior Unsecured Notes (as defined herein) and any existing and future domestic subsidiaries that guarantee any other indebtedness under any other syndicated bank or capital markets indebtedness of PQ Corporation or any restricted subsidiary in an aggregate principal amount in excess of \$50 million.

The 6.75% Senior Secured Notes and the related guarantees are secured, subject to certain permitted liens and exceptions, by: (i) a first-priority security interest in substantially all of PQ Corporation’s and the guarantors’ property and assets that secure the Term Loan Facility (other than collateral securing the ABL Facility on a first-priority basis) and (ii) a second-priority security interest in assets that constitute ABL Collateral. The liens securing the 6.75% Senior Secured Notes and the guarantees are *pari passu* with the liens securing the Term Loan Facility subject to the *pari passu* intercreditor agreement and subordinated to the liens securing the ABL Facility on a first-priority basis subject to the ABL Facility intercreditor agreement.

Optional redemption

The 6.75% Senior Secured Notes are redeemable, in whole or in part, at the redemption prices (expressed as percentages of principal amount of 6.75% Senior Secured Notes to be redeemed) set forth below, plus accrued

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and unpaid interest, if any, to, but not including, the redemption date, if redeemed on or after any of the dates below until the subsequent date below:

<u>Year</u>	<u>Percentage</u>
May 15, 2019	103.375%
May 15, 2020	101.688%
May 15, 2021 and thereafter	100.000%

PQ Corporation may redeem up to 40% of the 6.75% Senior Secured Notes at any time prior to May 15, 2019 at a redemption price equal to 106.75% of the aggregate principal amount thereof, plus accrued and unpaid interest thereon, if any, to, but not including, the redemption date, with the net cash proceeds from certain equity offerings, including this offering. PQ Corporation may also redeem some or all of the 6.75% Senior Secured Notes at any time prior to May 15, 2019 at a redemption price equal to 100% of the principal amount thereof plus accrued and unpaid interest, if any, to, but not including, the redemption date, plus a “make whole” premium.

Change of control and asset sale offers

Upon the occurrence of certain events defined as constituting a change of control, each holder of 6.75% Senior Secured Notes has the right, subject to certain conditions, to cause PQ Corporation to repurchase all or any part of such holder’s 6.75% Senior Secured Notes at a purchase price in cash equal to 101% of the principal amount thereof, plus accrued and unpaid interest, if any, to, the date of repurchase.

If PQ Corporation or its restricted subsidiaries engage in certain asset sales, PQ Corporation generally must invest the net cash proceeds from such sales in its business within a period of time, prepay certain debt or, when the excess proceeds from such asset sales exceed \$40 million, make an offer to purchase a principal amount of the outstanding 6.75% Senior Secured Notes equal to the excess net cash proceeds, subject to certain exceptions. The purchase price of the outstanding 6.75% Senior Secured Notes will be 100% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

Special mandatory offer to purchase

If, six months prior to November 1, 2022, any of the 8.5% Senior Notes remain outstanding, each holder of the 6.75% Senior Secured Notes has the right to require, subject to certain conditions, PQ Corporation to repurchase all or any part of such holder’s 6.75% Senior Secured Notes at a purchase price equal to 100% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

Certain covenants and events of default

The indenture governing the 6.75% Senior Secured Notes contains a number of negative covenants that, among other things and, subject to exceptions, restrict the ability of PQ Corporation and its restricted subsidiaries to:

- create, incur, issue, assume or otherwise become directly or indirectly liable for additional indebtedness (including guarantees thereof);
- incur liens on assets;
- pay dividends or certain other distributions on capital stock or repurchase capital stock or prepay subordinated indebtedness;
- make certain investments;
- allow certain restrictions on the ability of PQ Corporation’s restricted subsidiaries to pay dividends or make other payments to PQ Corporation or any of its restricted subsidiaries;

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- engage in transactions with affiliates; and
- sell certain assets or merge or consolidate with or into other companies.

If the 6.75% Senior Secured Notes have an investment grade rating from Moody's and S&P, and no default exists under the indenture governing the 6.75% Senior Secured Notes, PQ Corporation and its restricted subsidiaries will not be subject to certain of the covenants listed above.

The indenture governing the 6.75% Senior Secured Notes also contains certain customary affirmative covenants and events of default.

Floating Rate Senior Unsecured Notes due 2022

Overview

In connection with the Business Combination, PQ Corporation issued \$525.0 million aggregate principal amount of Floating Rate Senior Unsecured Notes due 2022 (the "Floating Rate Senior Unsecured Notes") concurrent with the issuance of the 6.75% Senior Secured Notes. The Floating Rate Senior Unsecured Notes bear interest at an annual rate equal to three-month LIBOR plus 10.75%, with a 1% LIBOR floor, payable and reset quarterly on March 15, June 15, September 15 and December 15 of each year. The Floating Rate Senior Unsecured Notes will mature on May 1, 2022, provided that if the 8.5% Senior Notes have been refinanced or otherwise repaid prior to such date, the Floating Rate Senior Unsecured Notes will instead mature on May 1, 2023.

Guarantees

The Floating Rate Senior Unsecured Notes are guaranteed, jointly and severally, on an unsecured basis, by (i) PQ Holdings, CPQ and each restricted subsidiary of PQ Corporation that from time to time guarantees indebtedness in respect of the Senior Secured Credit Facilities (other than any foreign subsidiary guaranteeing foreign subsidiary obligations thereunder), the 8.5% Senior Notes or the 6.75% Senior Secured Notes and (ii) each restricted subsidiary of PQ Corporation that guarantees any other indebtedness under any other syndicated bank or capital markets indebtedness of PQ Corporation in an aggregate principal amount in excess of \$50 million.

Optional redemption

The Floating Rate Senior Unsecured Notes are redeemable, in whole or in part, at the redemption prices (expressed as percentages of principal amount of Floating Rate Senior Unsecured Notes to be redeemed) set forth below, plus accrued and unpaid interest thereon as of the date of prepayment, if redeemed on or after any of the dates below until the subsequent date below:

<u>Year</u>	<u>Percentage</u>
May 4, 2018	106.000%
May 4, 2019	103.000%
May 4, 2020	101.000%
May 4, 2021 and thereafter	100.000%

PQ Corporation may redeem up to 50% of the Floating Rate Senior Unsecured Notes at any time prior to May 4, 2018 at a redemption price equal to 106% of the principal amount of Floating Rate Senior Unsecured Notes redeemed, plus accrued and unpaid interest, if any, to the redemption date, with the net proceeds from certain equity offerings, including this offering. PQ Corporation may also redeem some or all of the Floating Rate Senior Unsecured Notes at any time prior to May 4, 2018 at a redemption price equal to 100% of the principal amount thereof, plus accrued and unpaid interest as of the date of prepayment, plus a "make whole" premium.

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Change of control and asset sale offers

Upon the occurrence of certain events defined as constituting a change of control, each holder has the right, subject to certain conditions, to cause PQ Corporation to repurchase the Floating Rate Senior Unsecured Notes at the purchase prices (expressed as percentages of principal amount of Floating Rate Senior Unsecured Notes to be repurchased) set forth below, plus accrued and unpaid interest thereon as of the date of repurchase, if the change of control event occurs on or after any of the dates below until the subsequent date below:

<u>Year</u>	<u>Percentage</u>
May 4, 2018	106.000%
May 4, 2019	103.000%
May 4, 2020	101.000%
May 4, 2021 and thereafter	100.000%

Upon the occurrence of certain events defined as constituting a change of control at any time prior to May 4, 2018, PQ Corporation would be required to repurchase the Floating Rate Senior Unsecured Notes at a purchase price equal to 100% of the principal amount thereof, plus accrued and unpaid interest as of the date of repurchase, plus a “make whole” premium. If PQ Corporation or its restricted subsidiaries engage in certain asset sales, PQ Corporation generally must invest the net cash proceeds from such sales in its business within a period of time, prepay certain debt or, when the excess proceeds from such asset sales exceed \$40 million in the aggregate, make an offer to purchase a principal amount of the outstanding Floating Rate Senior Unsecured Notes equal to the excess net cash proceeds, subject to certain exceptions. The purchase price of the outstanding Floating Rate Senior Unsecured Notes will be 100% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

Certain covenants and events of default

The notes purchase agreement governing the Floating Rate Senior Unsecured Notes contains a number of negative covenants that, among other things and, subject to exceptions, restrict the ability of PQ Corporation and its restricted subsidiaries to:

- create, incur, issue, assume or otherwise become directly or indirectly liable with respect to any additional indebtedness (including guarantees thereof);
- incur liens on assets;
- pay dividends or certain other distributions on equity interests or repurchase equity interests or prepay subordinated indebtedness;
- make certain investments or other restricted payments;
- allow certain restrictions on the ability of our restricted subsidiaries to pay dividends, make other payments to us or sell or transfer assets;
- engage in transactions with affiliates; and
- sell certain assets or merge or consolidate with or into other companies.

The notes purchase agreement governing the Floating Rate Senior Unsecured Notes also contains certain customary affirmative covenants and events of default.

8.5% Senior Notes due 2022

Overview

In October 2014, Eco, together with Eco Finance Corp., issued \$200.0 million aggregate principal amount of 8.5% Senior Notes due 2022 (the “8.5% Senior Notes”). Interest on the 8.5% Senior Notes is payable semi-annually on May 1 and November 1 of each year. The 8.5% Senior Notes will mature and be due in full on November 1, 2022.

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In connection with the Business Combination, PQ Corporation assumed all of the obligations of Eco and Eco Finance Corp. under the 8.5% Senior Notes and the related indenture.

Guarantees

The 8.5% Senior Notes are guaranteed, jointly and severally, by PQ Holdings, CPQ and each of PQ Corporation's existing and future domestic subsidiaries, in each case to the extent such entities are guarantors under the Senior Secured Credit Facilities.

Optional redemption

The 8.5% Senior Notes are redeemable, in whole or in part, at the redemption prices (expressed as percentages of principal amount of 8.5% Senior Notes to be redeemed) set forth below, plus accrued and unpaid interest thereon, if any, to, but not including, the redemption date, if redeemed on or after any of the dates below until the subsequent date below:

<u>Year</u>	<u>Percentage</u>
November 1, 2017	104.250%
November 1, 2018	102.125%
November 1, 2019 and thereafter	100.000%

PQ Corporation may redeem up to 40% of the 8.5% Senior Notes at any time prior to November 1, 2017 at a redemption price equal to 108.5% of the aggregate principal amount thereof, plus accrued and unpaid interest thereon, if any, to, but not including, the redemption date, with the net cash proceeds from certain equity offerings, including this offering. PQ Corporation may also redeem some or all of the 8.5% Senior Notes at any time prior to November 1, 2017 at a redemption price equal to 100% of the principal amount thereof plus accrued and unpaid interest, if any, to, but not including, the redemption date, plus a "make whole" premium.

Change of control and asset sale offers

Upon the occurrence of certain events defined as constituting a change of control, each holder of 8.5% Senior Notes has the right, subject to certain conditions, to cause PQ Corporation to repurchase all or any part of such holder's 8.5% Senior Notes at a purchase price in cash equal to 101% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

If PQ Corporation or its restricted subsidiaries engage in certain asset sales, PQ Corporation generally must invest the net cash proceeds from such sales in its business within a period of time, prepay certain debt or, when the excess proceeds from such asset sales exceed \$25 million, make an offer to purchase a principal amount of the outstanding 8.5% Senior Notes equal to the excess net cash proceeds, subject to certain exceptions. The purchase price of the outstanding 8.5% Senior Notes will be 100% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

Certain covenants

The indenture governing the 8.5% Senior Notes contains a number of negative covenants that, among other things and, subject to exceptions, restrict the ability of PQ Corporation and its restricted subsidiaries to:

- create, incur, issue, assume or otherwise become directly or indirectly liable for additional indebtedness (including guarantees thereof);
- incur liens on assets;
- pay dividends or certain other distributions on equity interests or repurchase equity interests or prepay subordinated indebtedness;
- make certain investments;

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- allow certain restrictions on the ability of PQ Corporation's restricted subsidiaries to pay dividends or make other payments to PQ Corporation or any of its restricted subsidiaries;
- engage in transactions with affiliates; and
- sell certain assets or merge or consolidate with or into other companies.

If the 8.5% Senior Notes have an investment grade rating from Moody's and S&P, and no default exists under the indenture governing the 8.5% Senior Notes, PQ Corporation and its restricted subsidiaries will not be subject to certain of the covenants listed above.

The indenture governing the 8.5% Senior Notes also contains certain customary affirmative covenants and events of default.

New Markets Tax Credits Financing

We have entered into four separate NMTC financing arrangements to fund the expansion of manufacturing facilities in Paris, Texas and Augusta, Georgia. The NMTC program, which is administered by the United States Treasury Department, requires certain balance sheet commitments. The NMTC financing arrangements will provide the company with certain monetary benefits as an offset to specifically identified capital expenditures. The NMTC arrangements require that certain commitments and covenants be maintained over the course of seven years of the closing of the transaction in order to recognize the benefit.

On October 24, 2013, Potters Industries, LLC ("Potters") entered into an NMTC financing arrangement with JPMorgan Chase Bank N.A. and several of its affiliates ("Chase"), and TX CDE V LLC, an affiliate of Texas LIC Development Company LLC d/b/a Texas Community Development Capital ("TX CDE"), whereby Chase agreed to contribute \$6.6 million and an additional \$15.6 million in funds lent to Chase by Potters Holdings II, L.P. to TX CDE. TX CDE, in turn, lent \$21.0 million in the form of \$5.4 million and \$15.6 million notes, or the Loans, to Potters, which used the proceeds of the notes to finance the expansion of Potters' manufacturing facility in Paris, Texas. The full \$21.0 million remained outstanding as of June 30, 2017. The capital expenditures associated with the NMTC financing arrangement were completed in 2014.

On May 17, 2016, Potters entered into an NMTC financing arrangement with U.S. Bank N.A. and several of its affiliates ("USB") and MRC XX, LLC, an affiliate of Midwest Renewable Capital, LLC ("MRC XX"), whereby USB agreed to contribute \$3.7 million and an additional \$7.8 million in funds lent to USB by Potters Holdings II, L.P. to MRC XX. MRC XX, in turn, lent \$11.0 million in the form of \$7.8 million, \$1.3 million and \$1.9 million notes, to Potters, which used the proceeds of the notes as working capital and to finance the expansion of Potters' manufacturing facility in Augusta, Georgia. The full \$11.0 million remained outstanding as of June 30, 2017. The capital expenditures and working capital associated with the NMTC financing arrangement were completed in 2017.

On December 29, 2016, Potters entered into another NMTC financing arrangement with USB and MRC XXI, LLC, an affiliate of Midwest Renewable Capital, LLC ("MRC XXI"), whereby USB agreed to contribute \$3.8 million and an additional \$7.8 million in funds lent to USB by Potters Holdings II, L.P. to MRC XXI. MRC XXI, in turn, lent \$11.0 million in the form of \$7.8 million, \$1.4 million and \$1.8 million notes, to Potters, which will use the proceeds of the Loans as working capital for another expansion of Potters' manufacturing facility in Paris, Texas. The full \$11.0 million remained outstanding as of June 30, 2017. Potters expects to expend the proceeds of the notes as working capital in 2017.

On June 22, 2017, Potters entered into an NMTC financing arrangement with USB and Business Conduit No. 28, LLC, an affiliate of Community Reinvestment Fund, Inc. ("CRF"), whereby USB agreed to contribute \$3.1 million and an additional \$6.2 million in funds lent to USB by Potters Leveraged Lender LLC to CRF. CRF, in turn, lent \$8.8 million in the form of \$6.2 million and \$2.6 million notes to Potters, which used the proceeds to acquire equipment for the expansion of Potters' manufacturing facility in Paris, Texas. The full \$8.8 million remained outstanding as of June 30, 2017. The capital expenditures associated with the NMTC financing arrangement are expected to be completed in 2017.

DESCRIPTION OF CAPITAL STOCK

General

Upon the closing of this offering, the total amount of our authorized capital stock will consist of _____ shares of common stock, par value \$0.01 per share and _____ shares of undesignated preferred stock. As of June 30, 2017, we had outstanding 625,172 shares of Class A common stock and 6,711,756 shares of Class B common stock. In connection with the Reclassification, all of the outstanding Class A common stock and Class B common stock was reclassified into _____ shares of common stock. See “The Reclassification.” As of June 30, 2017, we had 103 stockholders of record of Class A common stock and 66 stockholders of record of Class B common stock and had outstanding options to purchase 248,900 shares of Class A common stock, which options were exercisable at a weighted average exercise price of \$72.01 per share.

After giving effect to this offering, we will have _____ shares of common stock and no shares of preferred stock outstanding. The following summary describes all material provisions of our capital stock. We urge you to read our certificate of incorporation and our bylaws, which are included as exhibits to the registration statement of which this prospectus forms a part.

Our certificate of incorporation and bylaws will contain provisions that are intended to enhance the likelihood of continuity and stability in the composition of the board of directors and which may have the effect of delaying, deferring or preventing a future takeover or change in control of our company unless such takeover or change in control is approved by our board of directors. These provisions include a classified board of directors, elimination of the ability of stockholders to call special meetings, advance notice procedures for stockholder proposals and the ability of our board of directors to issue preferred stock without stockholder approval that could be used to dilute a potential hostile acquiror.

Common Stock

Dividend Rights. Subject to preferences that may apply to shares of preferred stock outstanding at the time, holders of outstanding shares of our common stock will be entitled to receive dividends out of assets legally available at the times and in the amounts as the board of directors may from time to time determine.

Voting Rights. Each outstanding share of our common stock will be entitled to one vote on all matters submitted to a vote of stockholders. Holders of shares of our common stock shall have no cumulative voting rights.

Except as otherwise required under the Delaware General Corporation Law or provided for in our certificate of incorporation, all matters other than the election of directors will be determined by a majority of the votes cast on the matter and all elections of directors will be determined by a plurality of the votes cast. However, we have implemented a Majority Voting Policy for uncontested director elections (elections in which the number of nominees for election does not exceed the number of directors to be elected). In the event that the votes “withheld” from a nominee’s election exceed the votes cast “for” that nominee’s election, such nominee shall be required to submit his or her resignation to the board of directors for consideration. The board of directors will then have the opportunity to determine whether to accept or reject such tendered resignation. The board of directors, in making its decision, may consider any factors or other information that it considers appropriate or relevant.

The board of directors will act within 120 days following certification of the shareholder vote. Thereafter, the board of directors will promptly publicly disclose, in a report furnished to the SEC, its decision regarding the tendered resignation, including its rationale for accepting or rejecting the tendered resignation. The board of directors may accept a director’s resignation or reject the resignation. If the board of directors accepts a director’s resignation, or if a nominee for director is not elected and the nominee is not an incumbent director, then the board of directors, in its sole discretion, may fill any resulting vacancy or may decrease the size of the board of

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directors, in each case pursuant to our bylaws. If a director's resignation is not accepted by the board of directors, such director will continue to serve until the next annual meeting of shareholders when such director's class is up for re-election and until his or her successor is duly elected, or his or her earlier resignation or removal.

Preemptive Rights. Our common stock will not be entitled to preemptive or other similar subscription rights to purchase any of our securities.

Conversion or Redemption Rights. Our common stock will not have any conversion rights and there will be no redemption or sinking fund provisions applicable to our common stock.

Liquidation Rights. Upon our liquidation, the holders of our common stock will be entitled to receive pro rata our assets that are legally available for distribution, after payment of all debts and other liabilities and subject to the prior rights of any holders of preferred stock then outstanding.

Stock Exchange Listing. We intend to list our common stock on the New York Stock Exchange under the symbol "PQG."

Preferred Stock

Our board of directors may, without further action by our stockholders, from time to time, direct the issuance of shares of preferred stock in series and may, at the time of issuance, determine the designations, powers, preferences, privileges, and relative participating, optional or special rights as well as the qualifications, limitations or restrictions thereof, including dividend rights, conversion rights, voting rights, terms of redemption and liquidation preferences, any or all of which may be greater than the rights of the common stock. Satisfaction of any dividend preferences of outstanding shares of preferred stock would reduce the amount of funds available for the payment of dividends on shares of our common stock. Holders of shares of preferred stock may be entitled to receive a preference payment in the event of our liquidation before any payment is made to the holders of shares of our common stock. Under certain circumstances, the issuance of shares of preferred stock may render more difficult or tend to discourage a merger, tender offer or proxy contest, the assumption of control by a holder of a large block of our securities or the removal of incumbent management. Upon the affirmative vote of a majority of the total number of directors then in office, our board of directors, without stockholder approval, may issue shares of preferred stock with voting and conversion rights which could adversely affect the holders of shares of our common stock and the market value of our common stock. Upon consummation of this offering, there will be no shares of preferred stock outstanding, and we have no present intention to issue any shares of preferred stock.

Anti-Takeover Effects of our Certificate of Incorporation and Bylaws

Our certificate of incorporation and bylaws will contain certain provisions that are intended to enhance the likelihood of continuity and stability in the composition of the board of directors and which may have the effect of delaying, deferring or preventing a future takeover or change in control of the company unless such takeover or change in control is approved by the board of directors.

These provisions include:

Classified Board. Our certificate of incorporation will provide that our board of directors will be divided into three classes of directors, with the classes as nearly equal in number as possible. As a result, approximately one-third of our board of directors will be elected each year. The classification of directors will have the effect of making it more difficult for stockholders to change the composition of our board. Our certificate of incorporation will also provide that, subject to any rights of holders of preferred stock to elect additional directors under specified circumstances, the number of directors will be fixed exclusively pursuant to a resolution adopted by our board of directors. Upon completion of this offering, our board of directors will have _____ members.

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Special Meetings of Stockholders. Our certificate of incorporation and bylaws will provide that, except as otherwise required by law, special meetings of the stockholders can only be called by the chairman of the board or pursuant to a resolution adopted by a majority of the board of directors. Except as otherwise required by law, stockholders will not be permitted to call a special meeting or to require the board of directors to call a special meeting.

Removal of Directors. Our certificate of incorporation will provide that our directors may be removed only for cause by the affirmative vote of at least a majority of the voting power of our outstanding shares of capital stock entitled to vote generally in the election of directors, voting together as a single class.

Advance Notice Procedures. Our bylaws will establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to the board of directors. Stockholders at an annual meeting will only be able to consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of the board of directors or by a stockholder who was a stockholder of record on the record date for the meeting, who is entitled to vote at the meeting and who has given our Secretary timely written notice, in proper form, of the stockholder's intention to bring that business before the meeting. Although the bylaws will not give the board of directors the power to approve or disapprove stockholder nominations of candidates or proposals regarding other business to be conducted at a special or annual meeting, the bylaws may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed or may discourage or deter a potential acquiror from conducting a solicitation of proxies to elect its own slate of directors or otherwise attempting to obtain control of the company.

Authorized but Unissued Shares. Our authorized but unissued shares of common stock and preferred stock will be available for future issuance without stockholder approval. These additional shares may be utilized for a variety of corporate purposes, including future public offerings to raise additional capital, corporate acquisitions and employee benefit plans. The existence of authorized but unissued shares of common stock and preferred stock could render more difficult or discourage an attempt to obtain control of a majority of our common stock by means of a proxy contest, tender offer, merger or otherwise.

Business Combinations with Interested Stockholders. We have elected in our certificate of incorporation not to be subject to Section 203 of the Delaware General Corporation Law, an antitakeover law. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a business combination, such as a merger, with a person or group owning 15% or more of the corporation's voting stock for a period of three years following the date the person became an interested stockholder, unless (with certain exceptions) the business combination or the transaction in which the person became an interested stockholder is approved in a prescribed manner. Accordingly, we are not subject to any anti-takeover effects of Section 203. However, our certificate of incorporation will contain provisions that have the same effect as Section 203, except that they provide that investment funds affiliated with CCMP, and certain of their respective transferees and affiliates will not be deemed to be "interested stockholders," regardless of the percentage of our voting stock owned by them, and accordingly will not be subject to such restrictions.

Exclusive Forum. Our certificate of incorporation will provide that, subject to limited exceptions, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law, our certificate of incorporation or our bylaws, or (iv) any other action asserting a claim against us that is governed by the internal affairs doctrine. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our certificate of incorporation described above. Although we believe these provisions benefit us by providing increased consistency in the application of Delaware law for the specified types of actions and proceedings, the provisions may have the effect of

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discouraging lawsuits against our directors and officers. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with one or more actions or proceedings described above, a court could find the choice of forum provisions contained in our certificate of incorporation to be inapplicable or unenforceable.

Corporate Opportunities

Our certificate of incorporation will provide that we renounce any interest or expectancy of the company in the business opportunities of CCMP and INEOS and of their respective officers, directors, agents, stockholders, members, partners, affiliates and subsidiaries and each such party shall not have any obligation to offer us those opportunities.

Limitations on Liability and Indemnification of Officers and Directors

Our certificate of incorporation will limit the liability of our directors to the fullest extent permitted by the Delaware General Corporation Law or any other law of the state of Delaware and our bylaws will provide that we may indemnify our directors and our officers that are appointed by the board of directors to the fullest extent permitted by applicable law. We expect to enter into indemnification agreements with our current directors and executive officers prior to the completion of this offering and expect to enter into a similar agreement with any new directors or executive officers. We expect to increase our directors' and officers' liability insurance coverage prior to the completion of this offering.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock will be American Stock Transfer and Trust Company, LLC. Its address is 6201 15th Avenue, Brooklyn, NY 11219. Its telephone number is (800) 937-5449.

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SHARES ELIGIBLE FOR FUTURE SALE

Immediately prior to this offering, there was no public market for our common stock, and we cannot predict what effect, if any, market sales of shares of our common stock or the availability of shares of our common stock for sale will have on the market price of our common stock prevailing from time to time. Nevertheless, sales of substantial amounts of our common stock in the public market, or the perception that such sales could occur, could materially and adversely affect the market price of our common stock and could impair our future ability to raise capital through the sale of our equity or equity-related securities at a time and price that we deem appropriate.

Upon the consummation of this offering, we will have outstanding an aggregate of approximately _____ shares of common stock. Of the outstanding shares, the shares sold in this offering will be freely tradable without restriction or further registration under the Securities Act, except any shares purchased by our “affiliates,” as that term is defined in Rule 144 under the Securities Act, may be sold only in compliance with the limitations described below. The remaining outstanding shares of common stock will be deemed restricted securities, as defined under Rule 144. Restricted securities may be sold in the public market only if registered or if they qualify for an exemption from registration under Rules 144 or 701 under the Securities Act, which we summarize below. Approximately _____ of these shares will be subject to lock-up agreements described below.

Taking into account the lock-up agreements described below, and assuming Morgan Stanley & Co. LLC and Goldman Sachs & Co. LLC do not release stockholders from these agreements, the following shares will be eligible for sale in the public market at the following times, subject to the provisions of Rule 144 and Rule 701:

Date Available for Resale	Shares Eligible For Sale	Comment
On the date of this offering (_____, 2017)		Shares eligible for sale under Rule 144 and Rule 701
180 days after the date of this offering (_____, 2018)		Lock-up released, shares eligible for sale under Rule 144 (subject, in some instances, to volume limitations) and Rule 701

Rule 144

In general, under Rule 144, beginning 90 days after the date of this prospectus, a person who is not our affiliate and has not been our affiliate at any time during the preceding three months will be entitled to sell any shares of our common stock that such person has beneficially owned for at least six months, including the holding period of any prior owner other than one of our affiliates, without regard to volume limitations. Sales of our common stock by any such person would be subject to the availability of current public information about us if the shares to be sold were beneficially owned by such person for less than one year.

Approximately _____ shares of our common stock that are not subject to the lock-up agreements described below will be eligible for sale under Rule 144 immediately upon the consummation of this offering.

Beginning 90 days after the date of this prospectus, our affiliates who have beneficially owned shares of our common stock for at least six months, including the holding period of any prior owner other than one of our affiliates, would be entitled to sell within any three-month period a number of shares that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately _____ shares immediately after this offering, assuming an initial public offering price of \$ _____ per share, which is the midpoint of the price range set forth on the cover of this prospectus; and

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- the average weekly trading volume in our common stock on the New York Stock Exchange during the four calendar weeks preceding the date of filing of a Notice of Proposed Sale of Securities Pursuant to Rule 144 with respect to the sale.

Sales under Rule 144 by our affiliates are also subject to manner of sale provisions and notice requirements and to the availability of current public information about us.

Rule 701

In general, under Rule 701 as currently in effect, any of our employees, directors, officers, consultants or advisors who purchase shares from us in connection with a compensatory stock or option plan or other written agreement before the effective date of this offering is entitled to sell such shares 90 days after the effective date of this offering in reliance on Rule 144, in the case of affiliates, without having to comply with the holding period requirements of Rule 144 and, in the case of non-affiliates, without having to comply with the public information, holding period, volume limitation or notice filing requirements of Rule 144.

Lock-Up Agreements

Our officers, directors and other stockholders owning an aggregate of _____ shares of our common stock will be subject to lock-up agreements with the underwriters that will restrict the sale of the shares of our common stock held by them for 180 days, subject to certain exceptions. See “Underwriters” for a description of these lock-up agreements.

Registration Statements on Form S-8

Immediately after the completion of this offering, we intend to file a registration statement on Form S-8 under the Securities Act to register all of the shares of our common stock issued or reserved for future issuance under our equity incentive plans. This registration statement would cover approximately _____ shares. Shares registered under the registration statement will generally be available for sale in the open market after the 180-day lock-up period immediately following the date of this prospectus.

Registration Rights

Beginning 180 days after the date of this prospectus, subject to certain exceptions, holders of _____ shares of our common stock will be entitled to the registration rights described under “Certain Relationships and Related Party Transactions—Amended and Restated Stockholders Agreement.” Registration of these shares under the Securities Act would result in these shares becoming freely tradable without restriction under the Securities Act immediately upon effectiveness of the registration.

**MATERIAL UNITED STATES FEDERAL INCOME TAX CONSIDERATIONS
FOR NON-U.S. HOLDERS OF COMMON STOCK**

The following is a summary of certain material U.S. federal income tax considerations relating to the acquisition, ownership and disposition of shares of our common stock issued pursuant to this offering by “non-U.S. holders,” as defined below. This summary deals only with shares of our common stock acquired by a non-U.S. holder in this offering that are held as capital assets within the meaning of Section 1221 of the Code. This summary does not address the U.S. federal income tax considerations applicable to a non-U.S. holder that is subject to special treatment under U.S. federal income tax laws, including: a dealer in securities or currencies; a financial institution; a tax-exempt organization; a non-U.S. government; an insurance company; a person holding shares of our common stock as part of a hedging, integrated, conversion or straddle transaction or a person deemed to sell shares of our common stock under the constructive sale provisions of the Code; a trader in securities that has elected the mark-to-market method of accounting; an entity or arrangement that is treated as a partnership (or is disregarded from its owner) for U.S. federal income tax purposes; a person that received shares of our common stock in connection with services provided to the company or any of its affiliates; a person whose “functional currency” is not the U.S. dollar; a “controlled foreign corporation”; or a “passive foreign investment” company.

This summary is based upon provisions of the Code, and applicable Treasury regulations promulgated or proposed thereunder, rulings, judicial decisions and administrative pronouncements of the Internal Revenue Service (“IRS”), all as in effect as of the date hereof. Those authorities may be changed, perhaps with retroactive effect, or may be subject to differing interpretations, which could result in U.S. federal income tax consequences different from those discussed below. There can be no assurance that the IRS will concur with the discussion of the tax considerations set forth below, and we have not obtained, and we do not intend to obtain, a ruling from the IRS with respect to the U.S. federal income tax consequences to a non-U.S. holder of the purchase, ownership or disposition of shares of our common stock. This summary does not address all aspects of U.S. federal income tax and does not address any state, local, non-U.S., gift, or estate tax considerations or any considerations relating to the alternative minimum tax or the Medicare tax on net investment income.

For purposes of this discussion, a “non-U.S. holder” is a beneficial holder of shares of our common stock that is for U.S. federal income tax purposes not a partnership or disregarded entity and not (i) an individual citizen or resident of the United States for U.S. federal income tax purposes; (ii) a corporation (or any other entity treated as a corporation for U.S. federal income tax purposes) created or organized in or under the laws of the United States, any state thereof or the District of Columbia (or otherwise treated as a domestic corporation for U.S. federal income tax purposes); (iii) an estate the income of which is subject to U.S. federal income taxation regardless of its source; or (iv) a trust if it (1) is subject to the primary supervision of a court within the United States and one or more “United States persons” (as defined in Section 7701(a)(30) of the Code) have the authority to control all substantial decisions of the trust or (2) has a valid election in effect under applicable U.S. Treasury regulations to be treated as a U.S. person.

If an entity or arrangement that is treated as a partnership for U.S. federal income tax purposes holds shares of our common stock, the tax treatment of a person treated as a partner in such partnership for U.S. federal income tax purposes generally will depend upon the status of the partner, the activities of the partnership and certain determinations made at the partner level. Any entity or arrangement that is treated as a partnership for U.S. federal income tax purposes, and any person holding shares of our common stock through such a partnership, are urged to consult their own tax advisors regarding the tax consequences to them of acquiring, owning and disposing of shares of our common stock.

This summary is for general information only and is not, and is not intended to be, tax advice. Non-U.S. holders of shares of our common stock are urged to consult their own tax advisors concerning the tax considerations related to the acquisition, ownership and disposition of shares of our common stock in light of their particular circumstances, as well as any tax considerations relating to gift or estate taxes, the alternative

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minimum tax or to the Medicare tax on net investment income, and any tax considerations arising under the laws of any other jurisdiction, including any state, local and non-U.S. income and other tax laws and under any applicable income tax treaty.

Distributions

As discussed in the section entitled “Dividend Policy” above, we do not currently expect to make distributions in respect of our common stock. In the event that we do make a distribution of cash or property with respect to our common stock, any such distributions generally will constitute dividends for U.S. federal income tax purposes to the extent of our current and accumulated earnings and profits, as determined under U.S. federal income tax principles. If a distribution exceeds our current and accumulated earnings and profits, the excess will first constitute a return of capital and will reduce a holder’s adjusted tax basis in such holder’s shares of our common stock, determined on a share-per-share basis, but not below zero. Any remaining excess will be treated as capital gain and subject to the tax treatment described below in the section entitled “—Sale, Exchange, Redemption or Certain Other Taxable Dispositions of Our Common Stock.”

Unless dividends, if any, are effectively connected with a non-U.S. holder’s U.S. trade or business (and if required by an applicable income tax treaty, are attributable to a permanent establishment or fixed base maintained in the United States), dividends paid to a non-U.S. holder of shares of our common stock generally will be subject to U.S. federal income tax (which generally will be collected through withholding) at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty). Even if a non-U.S. holder is eligible for a lower treaty rate, dividend payments generally will be subject to withholding at a 30% rate (rather than the lower treaty rate) unless the non-U.S. holder provides a valid IRS Form W-8BEN or W-8BEN-E (or applicable successor form) certifying such holder’s qualification for the reduced rate.

Subject to the discussions below regarding backup withholding and the Foreign Account Tax Compliance Act, if dividends paid to a non-U.S. holder are effectively connected with the non-U.S. holder’s conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, are attributable to a permanent establishment or fixed base maintained in the United States), the non-U.S. holder will be exempt from U.S. federal withholding tax. To claim the exemption, the non-U.S. holder must furnish to us or the relevant withholding agent a valid IRS Form W-8ECI (or applicable successor form), certifying that the dividends are effectively connected with the non-U.S. holder’s conduct of a trade or business within the United States.

Any dividends paid on shares of our common stock that are effectively connected with a non-U.S. holder’s U.S. trade or business (and, if required by an applicable tax treaty, attributable to a permanent establishment or fixed base maintained in the United States) generally will be subject to U.S. federal income tax on a net income basis in the same manner as if such holder were a U.S. person. A non-U.S. holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable tax treaty) on a portion of its effectively connected earnings and profits for the taxable year. Non-U.S. holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Non-U.S. holders who do not timely provide us or the relevant withholding agent with the required certification, but who qualify for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. holders should consult their tax advisors regarding their entitlement to benefits under a tax treaty.

If at the time a distribution is made we are not able to determine whether or not it will be treated as a dividend for U.S. federal income tax purposes (as opposed to being treated as a return of capital or capital gain), we or a financial intermediary may withhold tax on all or a portion of such distribution at the rate applicable to dividends. However, a non-U.S. holder may obtain a refund of any excess withholding by timely filing an appropriate claim for refund with the IRS.

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Any distribution described in this section would also be subject to the discussion below in the section entitled “Foreign Account Tax Compliance Act.”

Sale, Exchange, Redemption or Certain Other Taxable Dispositions of Our Common Stock

Subject to the discussions below regarding backup withholding and the Foreign Account Tax Compliance Act, anon-U.S. holder generally will not be subject to U.S. federal income tax or withholding tax on gain realized upon a sale, exchange or other taxable disposition of shares of our common stock (including a redemption, but only if the redemption would be treated as a sale or exchange rather than as a distribution for U.S. federal income tax purposes) unless: (i) the gain is effectively connected with the non-U.S. holder’s conduct of a trade or business in the United States (and, if required by an applicable income tax treaty, is attributable to a permanent establishment or fixed base maintained in the United States); (ii) the non-U.S. holder is a non-resident alien individual who is present in the United States for 183 days or more in the taxable year of that disposition, and certain other conditions are met; or (iii) we are or have been a “U.S. real property holding corporation” (“USRPHC”) for U.S. federal income tax purposes at any time within the shorter of the five-year period preceding the disposition and the non-U.S. holder’s holding period for shares of our common stock (the “relevant period”) and certain other conditions are met, as described below.

If the first exception applies, the non-U.S. holder generally will be subject to U.S. federal income tax on a net basis with respect to such gain in the same manner as if such holder were a resident of the United States. In addition, if the non-U.S. holder is a corporation for U.S. federal income tax purposes, such gains may, under certain circumstances, also be subject to the branch profits tax at a rate of 30% (or at a lower rate prescribed by an applicable income tax treaty), as adjusted for certain items.

If the second exception applies, the non-U.S. holder generally will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on the gain from a disposition of shares of our common stock, which may be offset by capital losses allocable to U.S. sources during the taxable year of disposition (even though the non-U.S. holder is not considered a resident of the United States), provided the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third exception above, we believe we currently are not, and we do not anticipate becoming, a USRPHC for U.S. federal income tax purposes. Because the determination of whether we are a USRPHC depends on the fair market value of our U.S. real property interests relative to the fair market value of our other trade or business assets and our non-U.S. real property interests, there can be no assurances that we will not become a USRPHC in the future. Generally, a corporation is a USRPHC only if the fair market value of its U.S. real property interests (as defined in the Code) equals or exceeds 50% of the sum of the fair market value of its worldwide real property interests plus its other assets used or held for use in a trade or business. Even if we are or become a USRPHC, a non-U.S. holder would not be subject to U.S. federal income tax on a sale, exchange or other taxable disposition of shares of our common stock by reason of our status as a USRPHC so long as (i) shares of our common stock continue to be regularly traded on an established securities market (within the meaning of Section 897(c)(3) of the Code) during the calendar year in which such disposition occurs and (ii) such non-U.S. holder does not own and is not deemed to own (directly, indirectly or constructively) more than 5% of the shares of our common stock at any time during the relevant period. If we are a USRPHC and the requirements described in clauses (i) or (ii) in the preceding sentence are not met, gain on the disposition of shares of our common stock generally will be taxed in the same manner as gain that is effectively connected with the conduct of a U.S. trade or business, except that the branch profits tax generally will not apply.

Information Reporting and Backup Withholding Tax

We or a financial intermediary must report annually to the IRS and to each non-U.S. holder the gross amount of the distributions on shares of our common stock paid to such holder and the tax withheld, if any, with respect to such distributions, regardless of whether withholding was required. This information also may be made

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available under a specific treaty or agreement with the tax authorities in the country in which the non-U.S. holder resides or is established. A non-U.S. holder generally will be subject to backup withholding at the then applicable rate for dividends paid to such holder unless such holder furnishes a valid IRS Form W-8BEN or W-8BEN-E (or such other applicable form and documentation as required by the Code or the Treasury regulations) certifying under penalties of perjury that it is a non-U.S. holder (and the payor does not have actual knowledge or reason to know that such holder is a U.S. person as defined under the Code), or otherwise establishes an exemption. Dividends paid to non-U.S. holders subject to U.S. federal withholding tax, as described above in the section entitled “Distributions,” generally will be exempt from U.S. backup withholding.

Information reporting and, depending on the circumstances, backup withholding will apply to the payment of the proceeds of a sale or other disposition of shares of our common stock by a non-U.S. holder effected by or through the U.S. office of any broker, U.S. or non-U.S., unless such holder certifies that it is not a U.S. person (as defined under the Code) and satisfies certain other requirements, or otherwise establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a non-U.S. holder where the transaction is effected outside the U.S. through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Prospective investors should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a credit against a non-U.S. holder's U.S. federal income tax liability, if any, and may entitle such holder to a refund, provided that an appropriate claim is timely filed with the IRS.

Foreign Account Tax Compliance Act

Under legislation commonly referred to as the Foreign Account Tax Compliance Act, as modified by Treasury regulations and subject to any official interpretations thereof, any applicable intergovernmental agreement between the United States and a non-U.S. government to implement these rules and improve international tax compliance, or any fiscal or regulatory legislation or rules adopted pursuant to any such agreement (collectively, “FATCA”), a 30% withholding tax will apply to dividends on, or gross proceeds from the sale or other disposition of, shares of our common stock paid to certain non-U.S. entities (including financial intermediaries) unless various information reporting and due diligence requirements, which are different from and in addition to the certification requirements described elsewhere in this discussion, have been satisfied (generally relating to ownership by U.S. persons of interests in or accounts with those entities). The withholding rules apply currently to payments of dividends on shares of our common stock. The withholding rules are scheduled to apply to payments of gross proceeds from dispositions of shares of our common stock beginning January 1, 2019.

Holders of shares of our common stock should consult their tax advisors regarding the possible impact of FATCA on their investment in our common stock, including, without limitation, the process and deadlines for meeting the applicable requirements to prevent the potential imposition of the 30% withholding tax under FATCA.

UNDERWRITERS

Under the terms and subject to the conditions in an underwriting agreement dated the date of this prospectus, the underwriters named below, for whom Morgan Stanley & Co. LLC and Goldman Sachs & Co. LLC are acting as representatives, have severally agreed to purchase, and we have agreed to sell to them, severally, the number of shares indicated below:

<u>Name</u>	<u>Number of Shares</u>
Morgan Stanley & Co. LLC	
Goldman Sachs & Co. LLC	
Citigroup Global Markets Inc.	
Credit Suisse Securities (USA) LLC	
J.P. Morgan Securities LLC	
Jefferies LLC	
Deutsche Bank Securities Inc.	
KeyBanc Capital Markets Inc.	
Evercore Group L.L.C.	
Nomura Securities International, Inc.	
Total:	=====

The underwriters and the representatives are collectively referred to as the “underwriters” and the “representatives,” respectively. The underwriters are offering the shares of our common stock subject to their receipt and acceptance of the shares from us and subject to prior sale. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part. The underwriting agreement provides that the obligations of the several underwriters to pay for and accept delivery of the shares of our common stock offered by this prospectus are subject to the approval of certain legal matters by their counsel and to certain other conditions. The underwriters are obligated to take and pay for all of the shares of our common stock offered by this prospectus if any such shares are taken. However, the underwriters are not required to take or pay for the shares covered by the underwriters’ option to purchase additional shares described below. The underwriters may offer and sell the shares through certain of their respective affiliates or selling agents.

The underwriters initially propose to offer part of the shares of our common stock directly to the public at the offering price listed on the cover page of this prospectus and part to certain dealers at a price that represents a concession not in excess of \$ per share under the public offering price. After the initial offering of the shares of our common stock, the offering price and other selling terms may from time to time be varied by the representatives.

We have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus, to purchase up to additional shares of our common stock at the public offering price listed on the cover page of this prospectus, less underwriting discounts and commissions. To the extent the option is exercised, each underwriter will become obligated, subject to certain conditions, to purchase about the same percentage of the additional shares of our common stock as the number listed next to the underwriter’s name in the preceding table bears to the total number of shares of our common stock listed next to the names of all underwriters in the preceding table.

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The following table shows the per share and total public offering price, underwriting discounts and commissions and proceeds before expenses to us. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase up to an additional _____ shares of our common stock.

	Per Share	Total	
		No Exercise	Full Exercise
Public offering price	\$	\$	\$
Underwriting discounts and commissions	\$	\$	\$
Proceeds, before expenses, to us	\$	\$	\$

The estimated offering expenses payable by us, exclusive of the underwriting discounts and commissions, are approximately \$ _____. We have agreed to reimburse the underwriters for expenses relating to clearance of this offering with the Financial Industry Regulatory Authority up to \$ _____.

The underwriters have informed us that they do not intend for sales to discretionary accounts to exceed 5% of the total number of shares of our common stock offered by them.

We intend to apply to list our common stock on the New York Stock Exchange under the trading symbol "PQG."

We and our officers, directors and certain holders of our common stock have agreed with the underwriters, subject to certain exceptions, not to dispose of or hedge any of our or their shares of our common stock or securities convertible into or exchangeable for shares of our common stock during the period from the date of this prospectus continuing through the date 180 days after the date of this prospectus, except with the prior written consent of Morgan Stanley & Co. LLC and Goldman Sachs & Co. LLC. This agreement does not apply to any existing employee benefit plans. See "Shares Eligible for Future Sale" for a discussion of certain transfer restrictions.

In order to facilitate the offering of our common stock, the underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of our common stock. Specifically, the underwriters may sell more shares than they are obligated to purchase under the underwriting agreement, creating a short position. A short sale is covered if the short position is no greater than the number of shares available for purchase by the underwriters under the option to purchase additional shares. The underwriters can close out a covered short sale by exercising the option to purchase additional shares or purchasing shares in the open market. In determining the source of shares to close out a covered short sale, the underwriters will consider, among other things, the open market price of shares compared to the price available under the option to purchase additional shares. The underwriters may also sell shares in excess of the option, creating a naked short position. The underwriters must close out any naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of our common stock in the open market after pricing that could adversely affect investors who purchase in this offering. As an additional means of facilitating this offering, the underwriters may bid for, and purchase, shares of our common stock in the open market to stabilize the price of our common stock. These activities may raise or maintain the market price of our common stock above independent market levels or prevent or retard a decline in the market price of our common stock. The underwriters are not required to engage in these activities and may end any of these activities at any time.

We and the underwriters have agreed to indemnify each other against certain liabilities, including liabilities under the Securities Act.

Sales of shares made outside the United States may be made by affiliates of the underwriters.

A prospectus in electronic format may be made available on websites maintained by one or more underwriters, or selling group members, if any, participating in this offering. The representatives may agree to

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allocate a number of shares of our common stock to underwriters for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters that may make Internet distributions on the same basis as other allocations.

The underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, investment research, principal investment, hedging, financing and brokerage activities. Certain of the underwriters and their respective affiliates have, from time to time, performed, and may in the future perform, various financial advisory and investment banking services for us, for which they received or will receive customary fees and expenses. In particular, Morgan Stanley & Co. LLC, Goldman Sachs & Co. LLC, Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC, J.P. Morgan Securities LLC, Jefferies LLC, Deutsche Bank Securities Inc. and KeyBanc Capital Markets Inc. or certain of their affiliates are lenders or act as agents or arrangers under our Senior Secured Credit Facilities.

In addition, in the ordinary course of their various business activities, the underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investment and securities activities may involve our securities and instruments. The underwriters and their respective affiliates may also make investment recommendations or publish or express independent research views in respect of such securities or instruments and may at any time hold, or recommend to clients that they acquire, long or short positions in such securities and instruments.

Pricing of the Offering

Prior to this offering, there has been no public market for our common stock. The initial public offering price was determined by negotiations between us and the representatives. Among the factors considered in determining the initial public offering price were our future prospects and those of our industry in general, our sales, earnings and certain other financial and operating information in recent periods, and the price-earnings ratios, price-sales ratios, market prices of securities, and certain financial and operating information of companies engaged in activities similar to ours.

Selling Restrictions

European Economic Area

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a “Relevant Member State”) an offer to the public of any shares of our common stock may not be made in that Relevant Member State, except that an offer to the public in that Relevant Member State of any shares of our common stock may be made at any time under the following exemptions under the Prospectus Directive, if they have been implemented in that Relevant Member State:

- (a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- (b) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the representatives for any such offer; or
- (c) in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of shares of our common stock shall result in a requirement for the publication by us or any underwriter of a prospectus pursuant to Article 3 of the Prospectus Directive.

For the purposes of this provision, the expression an “offer to the public” in relation to any shares of our common stock in any Relevant Member State means the communication in any form and by any means of

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sufficient information on the terms of the offer and any shares of our common stock to be offered so as to enable an investor to decide to purchase any shares of our common stock, as the same may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State, the expression “Prospectus Directive” means Directive 2003/71/EC (and amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member State), and includes any relevant implementing measure in the Relevant Member State.

United Kingdom

Each underwriter has represented and agreed that:

- (a) it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of Section 21 of the Financial Services and Markets Act 2000 (“FSMA”)) received by it in connection with the issue or sale of the shares of our common stock in circumstances in which Section 21(1) of the FSMA does not apply to us; and
- (b) it has complied and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the shares of our common stock in, from or otherwise involving the United Kingdom.

Australia

No placement document, prospectus, product disclosure statement or other disclosure document has been lodged with the Australian Securities and Investments Commission (ASIC), in relation to the offering. This prospectus does not constitute a prospectus, product disclosure statement or other disclosure document under the Corporations Act 2001 (the “Corporations Act”), and does not purport to include the information required for a prospectus, product disclosure statement or other disclosure document under the Corporations Act.

Any offer in Australia of the shares may only be made to persons (the “Exempt Investors”) who are “sophisticated investors” (within the meaning of section 708(8) of the Corporations Act), “professional investors” (within the meaning of section 708(11) of the Corporations Act) or otherwise pursuant to one or more exemptions contained in section 708 of the Corporations Act so that it is lawful to offer the shares without disclosure to investors under Chapter 6D of the Corporations Act. The shares applied for by Exempt Investors in Australia must not be offered for sale in Australia in the period of 12 months after the date of allotment under the offering, except in circumstances where disclosure to investors under Chapter 6D of the Corporations Act would not be required pursuant to an exemption under section 708 of the Corporations Act or otherwise or where the offer is pursuant to a disclosure document which complies with Chapter 6D of the Corporations Act. Any person acquiring shares must observe such Australian on-sale restrictions.

This prospectus contains general information only and does not take account of the investment objectives, financial situation or particular needs of any particular person. It does not contain any securities recommendations or financial product advice. Before making an investment decision, investors need to consider whether the information in this prospectus is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

Canada

The shares of our common stock may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the shares of our common stock must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

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Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Dubai International Financial Centre

This prospectus relates to an Exempt Offer in accordance with the Offered Securities Rules of the Dubai Financial Services Authority (DFSA). This prospectus is intended for distribution only to persons of a type specified in the Offered Securities Rules of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus nor taken steps to verify the information set forth herein and has no responsibility for the prospectus. The shares to which this prospectus relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the shares offered should conduct their own due diligence on the shares. If you do not understand the contents of this prospectus you should consult an authorized financial advisor.

Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance; or (b) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to the shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Japan

No registration pursuant to Article 4, paragraph 1 of the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948, as amended) (the "FIEL") has been made or will be made with respect to the solicitation of the application for the acquisition of the shares of our common stock.

Accordingly, the shares of our common stock have not been, directly or indirectly, offered or sold and will not be, directly or indirectly, offered or sold in Japan or to, or for the benefit of, any resident of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan) or to others for re-offering or re-sale, directly or indirectly, in Japan or to, or for the benefit of, any resident of Japan except pursuant to an exemption from the registration requirements, and otherwise in compliance with, the FIEL and the other applicable laws and regulations of Japan.

For Qualified Institutional Investors ("QII")

Please note that the solicitation for newly-issued or secondary securities (each as described in Paragraph 2, Article 4 of the FIEL) in relation to the shares of our common stock constitutes either a "QII only private

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placement” or a “QII only secondary distribution” (each as described in Paragraph 1, Article 23-13 of the FIEL). Disclosure regarding any such solicitation, as is otherwise prescribed in Paragraph 1, Article 4 of the FIEL, has not been made in relation to the shares of our common stock. The shares of our common stock may only be transferred to QIIs.

For Non-QII Investors

Please note that the solicitation for newly-issued or secondary securities (each as described in Paragraph 2, Article 4 of the FIEL) in relation to the shares of our common stock constitutes either a “small number private placement” or a “small number private secondary distribution” (each as is described in Paragraph 4, Article 23-13 of the FIEL). Disclosure regarding any such solicitation, as is otherwise prescribed in Paragraph 1, Article 4 of the FIEL, has not been made in relation to the shares of our common stock. The shares of our common stock may only be transferred en bloc without subdivision to a single investor.

Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of our shares may not be circulated or distributed, nor may our shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (1) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (2) to a relevant person or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275 of the SFA, or (3) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to compliance with conditions set forth in the SFA.

Where our shares are subscribed or purchased under Section 275 by a relevant person which is: (a) a corporation (which is not an accredited investor as defined in Section 4A of the SFA) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or (b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor; shares, debentures and units of shares and debentures of that corporation or the beneficiaries’ rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares under Section 275 of the SFA, except: (1) to an institutional investor (for corporations under Section 274 of the SFA) or to a relevant person defined in Section 275(2) of the SFA, or to any person pursuant to an offer that is made on terms that such shares, debentures and units of shares and debentures of that corporation or such rights and interest in that trust are acquired at a consideration of not less than \$200,000 (or its equivalent in a foreign currency) for each transaction, whether such amount is to be paid for in cash or by exchange of securities or other assets, and further for corporations, in accordance with the conditions, specified in Section 275 of the SFA; (2) where no consideration is or will be given for the transfer; or (3) where the transfer is by operation of law.

Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange (SIX) or on any other stock exchange or regulated trading facility in Switzerland. This document has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the company, the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document

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will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA (FINMA), and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes (CISA). The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

LEGAL MATTERS

The validity of the issuance of the shares of common stock to be sold in this offering will be passed upon for us by Ropes & Gray LLP, Boston, Massachusetts. Certain legal matters in connection with this offering will be passed upon on behalf of the underwriters by Latham & Watkins LLP, Washington, District of Columbia.

EXPERTS

The financial statements of PQ Group Holdings Inc. as of December 31, 2016 and 2015 and for the years then ended included in this prospectus have been so included in reliance on the report of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

The consolidated financial statements of Eco Services Operations LLC (accounting predecessor to PQ Group Holdings Inc.) for the period from inception (July 30, 2014) to December 31, 2014 (Successor Period), and of Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 through November 30, 2014 (Predecessor Period) included in this prospectus, have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report appearing herein (which report expresses an unqualified opinion and includes an emphasis of matter paragraph referring to the “carve out” of the Predecessor financial statements from Solvay USA Inc.). Such financial statements have been so included in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

The financial statements of PQ Holdings Inc. as of December 31, 2015 and 2014 and for each of the three years in the period ended December 31, 2015 included in this prospectus have been so included in reliance on the report of PricewaterhouseCoopers LLP, independent accountants, given on the authority of said firm as experts in auditing and accounting.

The financial statements of Zeolyst International as of December 31, 2016 and 2015 and for each of the three years in the period ended December 31, 2016 included in this prospectus have been so included in reliance on the report of PricewaterhouseCoopers LLP, independent accountants, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of our common stock being offered by this prospectus. This prospectus, which forms a part of the registration statement, does not contain all of the information set forth in the registration statement. For further information with respect to us and the shares of our common stock, reference is made to the registration statement and the exhibits and schedules filed as a part thereof. Statements contained in this prospectus as to the contents of any contract or other document are not necessarily complete. We are not currently subject to the informational requirements of the Exchange Act. As a result of this offering, we will become subject to the informational requirements of the Exchange Act and, in accordance therewith, will file reports and other information with the SEC. The registration statement, such reports and other information can be inspected and copied at the Public Reference Room of the SEC located at 100 F Street, N.E., Washington, D.C. 20549. Copies of such materials, including copies of all or any portion of the registration statement, can be obtained from the Public Reference Room of the SEC at prescribed rates. You can call the SEC at 1-800-SEC-0330 to obtain information on the operation of the Public Reference Room. Such materials may also be accessed electronically by means of the SEC’s website at www.sec.gov.

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Report of Independent Registered Public Accounting Firm

To the board of directors and stockholders of
PQ Group Holdings Inc.

In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows present fairly, in all material respects, the financial position of PQ Group Holdings Inc. and its subsidiaries as of December 31, 2016 and 2015, and the results of their operations and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statement schedule, listed in the accompanying index presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements. These financial statements and financial statement schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements and financial statement schedule based on our audits. We conducted our audits of these financial statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
June 9, 2017

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of
PQ Group Holdings, Inc.

We have audited the accompanying consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows of Eco Services Operations LLC and subsidiary (accounting predecessor to PQ Group Holdings, Inc.) for the period from inception (July 30, 2014) to December 31, 2014 (the "Successor Period") and the accompanying statements of operations, comprehensive income (loss), stockholders' equity, and cash flows of Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 to November 30, 2014 (the "Predecessor Period") (collectively the "financial statements"). These financial statements are the responsibility of the entities' management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. The entities were not required to have, nor were we engaged to perform, an audit of their internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entities' internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the results of operations and cash flows of Eco Services Operations LLC and subsidiary for the period from inception (July 30, 2014) to December 31, 2014, in accordance with accounting principles generally accepted in the United States of America. Further, in our opinion, the financial statements referred to above present fairly, in all material respects, the results of operations and cash flows of Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 to November 30, 2014, in accordance with accounting principles generally accepted in the United States of America.

As discussed in Note 1 to the financial statements, the accompanying financial statements of Eco, a business unit of Solvay USA Inc., have been "carved out" from Solvay USA Inc.'s financial statements using assumptions and allocations made by Solvay USA Inc. to depict Eco on a stand-alone basis and may not necessarily be indicative of Eco's results of operations or cash flows had Eco operated as a stand-alone entity. Our opinion is not modified with respect to this matter.

/s/ DELOITTE & TOUCHE LLP

Parsippany, New Jersey
May 15, 2015, except for Note 12 and Note 20, as to which the date is June 8, 2017

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(in thousands, except share amounts)

	December 31, 2016	December 31, 2015
ASSETS		
Cash and cash equivalents	\$ 70,742	\$ 25,155
Receivables, net	160,581	34,333
Inventories (Note 9)	227,048	10,179
Prepaid and other current assets	34,307	1,858
Total current assets	492,678	71,525
Investments in affiliated companies (Note 10)	459,406	—
Property, plant and equipment, net (Note 11)	1,181,388	481,073
Goodwill (Note 13)	1,241,429	311,892
Other intangible assets, net (Note 13)	816,573	137,284
Other long-term assets	68,197	5,862
Total assets	<u>\$ 4,259,671</u>	<u>\$ 1,007,636</u>
LIABILITIES		
Notes payable and current maturities of long-term debt (Note 15)	\$ 14,481	\$ 5,000
Accounts payable	128,478	15,878
Accrued liabilities (Note 14)	99,433	35,387
Total current liabilities	242,392	56,265
Long-term debt (Note 15)	2,547,717	668,101
Deferred income taxes (Note 18)	318,463	—
Other long-term liabilities (Note 16)	123,155	47,977
Total liabilities	<u>3,231,727</u>	<u>772,343</u>
Commitments and contingencies (Note 22)		
EQUITY		
Common stock, Class B (\$0.01 par); authorized shares 30,000,000; issued shares 6,727,685; outstanding shares 6,726,907 on December 31, 2016	67	—
Common stock, Class A (\$0.01 par); authorized shares 160,500,000; issued shares 627,251; outstanding shares 626,135 on December 31, 2016	6	—
Additional paid-in capital	1,167,137	245,279
Accumulated deficit	(90,380)	(10,634)
Treasury stock, at cost; shares 778 (Class B) and 1,116 (Class A) on December 31, 2016	(239)	—
Accumulated other comprehensive income (loss)	(53,711)	648
Total PQ Group Holdings Inc. equity	1,022,880	235,293
Noncontrolling interest	5,064	—
Total equity	<u>1,027,944</u>	<u>235,293</u>
Total liabilities and equity	<u>\$ 4,259,671</u>	<u>\$ 1,007,636</u>

See accompanying notes to consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except share and per share amounts)

	<u>Years ended</u> <u>December 31,</u>		<u>Successor</u> <u>Period from</u> <u>inception (July 30,</u> <u>2014) to</u> <u>December 31,</u>	<u>Predecessor</u> <u>Period from</u> <u>January 1,</u> <u>2014 to</u> <u>November 30,</u>
	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2014</u>
Sales	\$1,064,177	\$ 388,875	\$ 35,539	\$ 361,823
Cost of goods sold	<u>810,085</u>	<u>278,791</u>	<u>30,160</u>	<u>265,829</u>
Gross profit	254,092	110,084	5,379	95,994
Selling, general and administrative expenses	107,601	34,613	2,623	45,168
Other operating expense, net (Note 8)	<u>62,301</u>	<u>19,696</u>	<u>16,347</u>	<u>5,593</u>
Operating income (loss)	84,190	55,775	(13,591)	45,233
Equity in net income (loss) from affiliated companies (Note 10)	(2,612)	—	—	—
Interest expense	140,315	44,348	8,470	86
Debt extinguishment costs (Note 15)	13,782	—	—	—
Other (income) expense, net	<u>(3,402)</u>	<u>—</u>	<u>—</u>	<u>—</u>
Income (loss) before income taxes and noncontrolling interest	(69,117)	11,427	(22,061)	45,147
Provision for income taxes	<u>10,041</u>	<u>—</u>	<u>—</u>	<u>14,602</u>
Net income (loss)	(79,158)	11,427	(22,061)	30,545
Less: Net income attributable to the noncontrolling interest	588	—	—	—
Net income (loss) attributable to PQ Group Holdings Inc.	<u>\$ (79,746)</u>	<u>\$ 11,427</u>	<u>\$ (22,061)</u>	<u>\$ 30,545</u>
Basic net income (loss) per share:				
Class B shares	\$ —	\$ 7.58	\$ (14.78)	
Class A shares	\$ (185.43)	\$ —	\$ —	
Diluted net income (loss) per share:				
Class B shares	\$ —	\$ 7.58	\$ (14.78)	
Class A shares	\$ (185.43)	\$ —	\$ —	
Weighted average shares outstanding—Basic:				
Class B shares	4,947,982	1,507,719	1,492,682	
Class A shares	<u>430,051</u>	<u>—</u>	<u>—</u>	
Total weighted average shares outstanding—Basic	<u>5,378,033</u>	<u>1,507,719</u>	<u>1,492,682</u>	
Weighted average shares outstanding—Diluted:				
Class B shares	4,947,982	1,507,719	1,492,682	
Class A shares	<u>430,051</u>	<u>—</u>	<u>—</u>	
Total weighted average shares outstanding— Diluted	<u>5,378,033</u>	<u>1,507,719</u>	<u>1,492,682</u>	

See accompanying notes to consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)

	<u>Years ended</u> <u>December 31,</u>		<u>Successor</u> <u>Period from</u> <u>inception</u> <u>(July 30, 2014)</u> <u>to December 31,</u> <u>2014</u>	<u>Predecessor</u> <u>Period from</u> <u>January 1, 2014</u> <u>to November 30,</u> <u>2014</u>
	<u>2016</u>	<u>2015</u>		
Net income (loss)	\$ (79,158)	\$ 11,427	\$ (22,061)	\$ 30,545
Other comprehensive income (loss), net of tax:				
Pension and postretirement benefits	6,865	648	—	—
Net gain from hedging activities	4,557	—	—	—
Foreign currency translation	(66,834)	—	—	—
Total other comprehensive income (loss)	(55,412)	648	—	—
Comprehensive income (loss)	(134,570)	12,075	(22,061)	30,545
Less: Comprehensive income attributable to noncontrolling interests	(465)	—	—	—
Comprehensive income (loss) attributable to PQ Group Holdings Inc.	<u>\$ (134,105)</u>	<u>\$ 12,075</u>	<u>\$ (22,061)</u>	<u>\$ 30,545</u>

See accompanying notes to consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)

	Parent company investment	Common stock, Class B	Common stock, Class A	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Predecessor									
Balance, January 1, 2014	\$ 540,215	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —	\$ 540,215
Net income	30,545								30,545
Net transfers to Parent	(24,206)								(24,206)
Balance, November 30, 2014	<u>\$ 546,554</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 546,554</u>
Successor									
Balance, July 30, 2014	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —
Equity contribution	—	—	—	239,885	—	—	—	—	239,885
Net loss	—	—	—	—	(22,061)	—	—	—	(22,061)
Balance, December 31, 2014	\$ —	\$ —	\$ —	\$ 239,885	\$ (22,061)	\$ —	\$ —	\$ —	\$ 217,824
Net income	—	—	—	—	11,427	—	—	—	11,427
Other comprehensive income	—	—	—	—	—	—	648	—	648
Equity contribution	—	—	—	3,138	—	—	—	—	3,138
Stock compensation for restricted stock awards	—	—	—	2,256	—	—	—	—	2,256
Balance, December 31, 2015	\$ —	\$ —	\$ —	\$ 245,279	\$ (10,634)	\$ —	\$ 648	\$ —	\$ 235,293
Business Combination	—	67	6	912,127	—	—	—	6,569	918,769
Net income (loss)	—	—	—	—	(79,746)	—	—	588	(79,158)
Other comprehensive loss	—	—	—	—	—	—	(54,359)	(1,053)	(55,412)
Stock repurchase	—	—	—	—	—	(2,540)	—	—	(2,540)
Equity contribution	—	—	—	6,486	—	114	—	—	6,600
Dividend distribution	—	—	—	—	—	—	—	(1,040)	(1,040)
Stock compensation	—	—	—	3,245	—	2,187	—	—	5,432
Balance, December 31, 2016	<u>\$ —</u>	<u>\$ 67</u>	<u>\$ 6</u>	<u>\$ 1,167,137</u>	<u>\$ (90,380)</u>	<u>\$ (239)</u>	<u>\$ (53,711)</u>	<u>\$ 5,064</u>	<u>\$ 1,027,944</u>

See accompanying notes to consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Years ended		Successor	Predecessor
	December 31,	December 31,	Period from inception (July 30, 2014) to December 31, 2014	Period from January 1, 2014 to November 30, 2014
	2016	2015		
Cash flows from operating activities:				
Net income (loss)	\$ (79,158)	\$ 11,427	\$ (22,061)	\$ 30,545
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:				
Depreciation	89,453	28,790	2,103	33,171
Amortization	38,836	10,210	852	9,287
Acquisition accounting valuation adjustments on inventory sold	29,086	—	—	—
Intangible asset impairment charge	6,873	—	—	—
Amortization of deferred financing costs and original issue discount	6,859	3,115	255	—
Debt extinguishment costs	8,561	—	—	—
Debt modification creditor fees capitalized	(2,988)	—	—	—
Foreign currency exchange gain	(3,558)	—	—	—
Pension and postretirement healthcare benefit expense	1,957	2,900	—	—
Pension and postretirement healthcare benefit funding	(2,887)	(14,937)	—	—
Deferred income tax expense (benefit)	835	—	—	(10,264)
Net loss on asset disposals	4,216	3,911	—	—
Supplemental pension plan mark-to-market gain	(300)	—	—	—
Stock compensation	5,432	2,256	—	535
Equity in net loss from affiliated companies	2,612	—	—	—
Dividends received from affiliated companies	7,636	—	—	—
Working capital changes that provided (used) cash, excluding the effect of business combinations:				
Receivables	27,757	(280)	(7,881)	(4,105)
Inventories	(2,305)	(1,738)	4,855	(5,216)
Prepays and other current assets	548	20,096	(2,199)	(33)
Accounts payable	11,885	(2,486)	(1,568)	6,832
Accrued liabilities	(24,839)	(13,809)	23,324	2,617
Other, net	(6,791)	(4,740)	263	(5,776)
Net cash provided by (used in) operating activities	<u>119,720</u>	<u>44,715</u>	<u>(2,057)</u>	<u>57,593</u>
Cash flows from investing activities:				
Purchases of property, plant and equipment	(121,421)	(40,994)	(2,892)	(32,690)
Change in restricted cash, net	(14,786)	—	—	—
Loan receivable under the New Market Tax Credit arrangement	(15,598)	—	—	—
Business combinations, net of cash acquired	(1,777,740)	3,965	(885,440)	—
Other, net	(135)	(1,696)	(15)	(162)
Net cash used in investing activities	<u>(1,929,680)</u>	<u>(38,725)</u>	<u>(888,347)</u>	<u>(32,852)</u>
Cash flows from financing activities:				
Draw down of revolver	145,000	12,000	—	—
Repayments of revolver	(167,000)	(12,000)	—	—
Issuance of long-term debt under the New Market Tax Credit arrangement	22,000	—	—	—
Issuance of long-term debt, net of original issue discount and financing fees	1,219,791	—	497,500	—
Issuance of long-term notes, net of original issue discount and financing fees	1,124,629	—	200,000	—
Debt issuance costs	(5,397)	—	(24,354)	—
Repayments of long-term debt	(479,059)	(5,000)	—	—
Interest rate hedge premium	(1,551)	—	—	—
Equity contribution	6,600	1,538	239,885	—
Stock repurchase	(2,540)	—	—	—
Distributions to noncontrolling interests	(1,040)	—	—	—
Net transfers to parent	—	—	—	(24,741)
Net cash provided by (used in) financing activities	<u>1,861,433</u>	<u>(3,462)</u>	<u>913,031</u>	<u>(24,741)</u>
Effect of exchange rate changes on cash and cash equivalents	(5,886)	—	—	—
Net change in cash and cash equivalents	45,587	2,528	22,627	—
Cash and cash equivalents at beginning of period	25,155	22,627	—	—
Cash and cash equivalents at end of period	<u>\$ 70,742</u>	<u>\$ 25,155</u>	<u>\$ 22,627</u>	<u>\$ —</u>
Supplemental cash flow information:				
Cash paid for taxes	\$ 16,981	\$ —	\$ —	\$ —
Cash paid for interest	\$ 132,579	\$ 44,074	\$ 1	\$ 59
Non-cash investing activity:				
Capital expenditures acquired on account but unpaid as of the period end	\$ 18,161	\$ 624	\$ —	\$ —
Non-cash financing activity				
Equity consideration for the Business Combination	\$ 910,800	\$ —	\$ —	\$ —
Debt assumed in the Business Combination	\$ 22,911	\$ —	\$ —	\$ —
Non-cash equity contribution	\$ —	\$ 1,600	\$ —	\$ —

See accompanying notes to consolidated financial statements.

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1. Background and Basis of Presentation:

Description of Business

PQ Group Holdings Inc. and subsidiaries (the “Company” or “PQ Group Holdings”) conducts operations through two principal businesses: Performance Materials & Chemicals: a fully integrated, global leader in silicate technology, producing sodium silicate, specialty silicas, zeolites, spray dry silicates, magnesium silicate, and other high performance chemical products used in a variety of end-uses such as adsorbents for surface coatings, clarifying agents for beverages, cleaning and personal care products and engineered glass products for use in highway safety, polymer additives, metal finishing and electronics end uses; and Environmental Catalysts & Services: an industry-leading refinery services company that is also a merchant sulfuric acid producer operating a network of plants serving a variety of end uses, including the oil refining, nylon, mining, general industrial and chemical industries and as an integrated silica catalyst and specialty zeolite-based catalyst producer, producing silica catalyst used in the production of high-density polyethylene (“HDPE”) and methyl methacrylate (“MMA”), and specialty zeolite-based catalysts sold to the emissions control industry, the petrochemical industry and other areas of the broader chemicals industry.

The Company experiences some seasonality, primarily with respect to the performance materials and refining services product groups. With respect to the performance materials product group, sales and earnings are generally higher during the second and third quarters of the year as highway striping projects typically occur during warmer weather months. Additionally, the refining services product group typically experiences similar seasonal fluctuations as a result of higher demand for gasoline products in the summer months. As a result, working capital requirements tend to be higher in the first and fourth quarters of the year, while higher cash generation occurs in the second and third quarters of the year.

Basis of Presentation

Eco Services Acquisition from Solvay

On July 30, 2014, Eco Services Operations LLC (“Eco Services”), a newly formed Delaware limited liability company and certain investment funds affiliated with CCMP Capital Advisors, LLC (now known as CCMP Capital Advisors, LP; “CCMP”), entered into an Asset Purchase Agreement with Solvay USA, Inc. (“Solvay”), a Delaware corporation, which provided for the sale, transfer and assignment by Solvay and the acquisition, acceptance and assumption by Eco Services, of substantially all of the assets of Solvay’s Eco Services business unit (“Eco”) of Solvay’s regeneration and virgin sulfuric acid production business operations in the United States (the “2014 Acquisition”). Prior to the Asset Purchase Agreement with Solvay, Eco operated as a business unit within Solvay, which is an indirect, wholly owned subsidiary of Solvay SA, an international industrial group active in chemistry and headquartered in Brussels, Belgium.

On December 1, 2014, Eco Services consummated the 2014 Acquisition (see Note 6 to these consolidated financial statements for further information). The consolidated financial statements for the period from inception (July 30, 2014) to December 31, 2014 reflect the financial results of Eco Services on a stand-alone basis (the “Successor Period”), with nominal activity between July 30 and November 30, 2014. Transaction costs attributed to the 2014 Acquisition as well as certain costs related to bridge financing and other interest expense were allocated to the Successor Period.

The financial statements prior to the 2014 Acquisition reflect the financial results based upon the historical cost basis of Solvay’s Eco business unit, and include amounts that have been “carved out” from Solvay’s financial statements using assumptions and allocations made by Solvay to depict Solvay’s Eco business unit on a stand-alone basis (the “Predecessor Period”). As a result, the Predecessor Period from January 1, 2014 to November 30, 2014 included herein may not necessarily be indicative of Solvay’s Eco business unit’s results of operations or cash flows had Solvay’s Eco business unit operated solely as a stand-alone entity during the period presented.

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The financial statements related to the Predecessor Period were prepared using the historical basis of the assets and liabilities of Solvay's Eco business unit and include all sales, costs, assets and liabilities directly attributable to Solvay's Eco business unit. In addition, certain expenses reflected in the Predecessor Period are based on allocations of corporate expenses from Solvay using methodologies that in the opinion of management are reasonable and consistently applied. All such expenses are deemed to have been paid by Solvay's Eco business unit to Solvay in the period in which the expenses were incurred. Net changes in the parent company investment in Solvay's Eco business unit as shown in the statement of stockholders' equity and cash flows for the Predecessor Period include amounts due to or from Solvay that are not regularly settled and therefore, represent investment of such amounts by Solvay.

Solvay used a centralized approach to cash management and financing the operations of Solvay's Eco business unit as needed. Transactions between Solvay and Solvay's Eco business unit were accounted for through the parent company investment. Accordingly, none of the cash, cash equivalents, debt or related interest expense at the Solvay level in the Predecessor Period have been assigned to Solvay's Eco business unit with the exception of capital lease obligations and related interest expense that related to Solvay's Eco business unit.

PQ Merger with Eco Services

On August 17, 2015, the Company, PQ Holdings Inc. ("PQ Holdings"), Eco Services, certain investment funds affiliated with CCMP, and certain other stockholders of PQ Holdings and Eco Services entered into a reorganization and transaction agreement pursuant to which the companies consummated a series of transactions to reorganize and combine the businesses of PQ Holdings and Eco Services (the "Business Combination"), under a new holding company, PQ Group Holdings Inc. The Business Combination was consummated on May 4, 2016 (see Note 7 to these consolidated financial statements for further information).

In accordance with accounting principles generally accepted in the United States ("GAAP"), Eco Services is the accounting predecessor to PQ Group Holdings. Certain investment funds affiliated with CCMP held a controlling interest position in Eco Services prior to the Business Combination. In addition, certain investment funds affiliated with CCMP owned a non-controlling interest in PQ Holdings prior to the Business Combination and the merger with Eco Services constituted a change in control under the PQ Holdings credit agreements and bond indenture that were in place at the time of the Business Combination. Therefore, Eco Services is deemed to be the accounting acquirer. These consolidated financial statements are the continuation of Eco Services' business prior to the Business Combination.

Concurrent with the closing of the Business Combination, the Company refinanced the existing credit facilities of PQ Holdings and Eco Services by (i) entering into a \$1,200,000 senior secured term loan (consisting of a \$900,000 senior secured term loan and a \$300,000 Euro equivalent senior secured term loan), (ii) \$625,000 in new senior secured notes, (iii) issuing \$525,000 in senior unsecured notes, and (iv) entering into a \$200,000 asset-based secured revolving credit facility (see Note 15 to these consolidated financial statements for further information). Additionally, PQ Group Holdings assumed the obligations under the indenture governing Eco Services' outstanding \$200,000 senior notes.

2. Summary of Significant Accounting Policies:

Principles of Consolidation. The consolidated financial statements include the accounts of the Company and its controlled subsidiaries. Investments in affiliated companies are recorded at cost plus the Company's equity in their undistributed earnings. All intercompany transactions have been eliminated.

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All assets and liabilities of foreign subsidiaries and affiliated companies are translated to U.S. dollars using exchange rates in effect at the balance sheet date. Adjustments resulting from translation of the balance sheets and intercompany loans, which are considered permanent, are included in stockholders' equity as part of accumulated other comprehensive loss. Adjustments resulting from translation of certain intercompany loans, which are not considered permanent and are denominated in foreign currencies, are included in other (income) expense, net in the consolidated statement of operations. The Company considers intercompany loans to be of a permanent or long-term nature if management expects and intends that the loans will not be repaid. For the year ended December 31, 2016, all intercompany loan arrangements were determined to be non-permanent based on management's intention as well as actual lending and repayment activity. Therefore, the foreign currency transaction gains or losses associated with the intercompany loans were recorded in the statement of operations for the year ended December 31, 2016.

Income and expense items are translated at average exchange rates during the year. Net foreign exchange included in other (income) expense, net was a gain of \$3,558 for the year ended December 31, 2016. The Company did not incur any foreign exchange expense for the years ended December 31, 2015 or 2014 (including Predecessor and Successor periods). The foreign currency gains realized in 2016 were primarily driven by the non-permanent intercompany debt denominated in local currency and translated to U.S. dollars.

Cash and Cash Equivalents. Cash and cash equivalents include investments with original terms to maturity of 90 days or less from the time of purchase.

Restricted Cash. Restricted cash, which is restricted as to withdrawal or usage, is classified separately from cash and cash equivalents on our consolidated balance sheet. The proceeds from the New Markets Tax Credit ("NMTC") financing arrangements are restricted for use and are classified on our consolidated balance sheet as other current assets. As of December 31, 2016, there remained \$13,780 restricted cash that is required to be used to fund the capital expenditures associated with the NMTC arrangements. The Company did not have any restricted cash balances related to NMTC arrangements as of December 31, 2015. The remainder of the Company's restricted cash balance outside of the NMTC arrangements is not significant. See Note 15 to these consolidated financial statements for further information.

Accounts Receivable and Allowance for Doubtful Accounts. Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is the Company's best estimate of the amount of probable credit losses in its existing accounts receivable. A specific reserve for bad debt is recorded for known or suspected doubtful accounts receivable. For all other accounts, the Company recognizes a reserve for bad debt based on the length of time receivables are past due and historical write-off experience. Account balances are charged against the allowance when the Company believes it is probable that the associated receivables will not be recovered. If the financial condition of the Company's customers were to deteriorate resulting in an impairment of their ability to make payments, additional allowances may be required. The Company does not have any off-balance sheet credit exposure related to its customers. As of December 31, 2016 and 2015, the Company's allowance for doubtful accounts was not material.

Inventories. All inventories are stated at the lower of cost or market. Certain domestic inventories are valued using the last-in, first-out ("LIFO") method and all other inventories are valued using the weighted average cost or first-in, first-out ("FIFO") methods.

Property, Plant and Equipment. Property, plant and equipment are carried at cost and include expenditures for new facilities, major renewals and betterments. The Company capitalizes the cost of furnace rebuilds as part of property, plant and equipment. Plant and equipment under capital leases are carried at the present value of

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minimum lease payments as determined at the beginning of the lease term. Maintenance, repairs and minor renewals are charged to expense as incurred. The Company capitalizes certain internal costs associated with the implementation of purchased software. When property, plant and equipment is retired or otherwise disposed of, the net carrying amount is eliminated with any gain or loss on disposition recognized in earnings at that time. The Company also leases property, plant and equipment, principally under operating leases. Rent expense for operating leases, which may have escalating rentals or rent holidays, is recorded on a straight-line basis over the respective lease terms.

Depreciation is provided on the straight-line method based on the estimated useful lives of the assets, which generally range from 15 to 33 years for buildings and improvements and 3 to 10 years for machinery and equipment. Leasehold improvements are depreciated using the straight-line method based on the shorter of the useful life of the improvement or remaining lease term.

The Company capitalizes the interest cost associated with the development and construction of significant new plant and equipment and depreciates that amount over the lives of the related assets. Capitalized interest recorded during the year ended December 31, 2016 was \$5,687 and was not material for the year ended December 31, 2015 or for the Successor or Predecessor Periods.

Spare Parts. Spare parts are maintained by the Company's facilities to keep machinery and equipment in working order. Spare parts are capitalized and included in other long-term assets. Spare parts are measured at cost and are not depreciated or expensed until utilized; however, reserves may be provided on aged spare parts. When a spare part is utilized as part of an improvement to property, plant and equipment, the carrying value is depreciated over the applicable life once placed in service. Otherwise, the spare part is expensed and charged as a cost of production when utilized.

Investments in Affiliated Companies. Investments in affiliated companies are accounted for using the equity method of accounting if the investment provides the Company with the ability to exercise significant influence, but not control, over the investee. Significant influence is generally deemed to exist if the Company's ownership interest in the voting stock of the investee ranges between 20% and 50%, although other factors, such as representation on the investee's board of directors and the impact of commercial arrangements, are considered in determining whether the equity method of accounting is appropriate. Under the equity method of accounting, the investments in equity-method investees are recorded in the consolidated balance sheets as investments in affiliated companies, and the Company's share of the investees' earnings or losses, together with other-than temporary impairments in value, is recorded as equity in net income from affiliated companies in the consolidated statements of operations. Any differences between the Company's cost of an equity method investment and the underlying equity in the net assets of the investment, such as fair value step-ups resulting from acquisitions, are accounted for according to their nature and impact the amounts recognized as equity in net income from affiliated companies in the consolidated statements of operations.

Goodwill and Intangible Assets. Goodwill is an asset representing the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recognized. The Company is required to test goodwill associated with each of its reporting units for impairment at least annually and whenever events or circumstances indicate that it is more likely than not that goodwill may be impaired. The Company performs its annual goodwill impairment test as of October 1 of each year.

Goodwill is tested for impairment at the reporting unit level. In performing tests for goodwill impairment, the Company is permitted to first perform a qualitative assessment about the likelihood of the carrying value of a reporting unit exceeding its fair value. If an entity determines that it is more likely than not that the fair value of a

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reporting unit is less than its carrying amount based on the qualitative assessment, it is required to perform a two-step goodwill impairment test to identify the potential goodwill impairment and measure the amount of the goodwill impairment loss, if any, to be recognized for that reporting unit. However, if an entity concludes otherwise based on the qualitative assessment, the two-step goodwill impairment test is not required. The option to perform the qualitative assessment can be utilized at the Company's discretion, and the qualitative assessment need not be applied to all reporting units in a given goodwill impairment test. For an individual reporting unit, if the Company elects not to perform the qualitative assessment, or if the qualitative assessment indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, then the Company must perform the two-step goodwill impairment test for the reporting unit.

In applying the two-step process, the first step used to identify potential impairment involves comparing the reporting unit's estimated fair value to its carrying value, including goodwill. If the estimated fair value of a reporting unit exceeds its carrying value, goodwill is not impaired. If the carrying value exceeds the estimated fair value, there is an indication of potential impairment and the second step is performed to measure the amount of impairment, if any. The second step of the process involves the calculation of an implied fair value of goodwill for each reporting unit for which step one indicated potential impairment. The implied fair value of goodwill is determined in a manner similar to how goodwill is calculated in a business combination. That is, the estimated fair value of the reporting unit, as calculated in step one, is allocated to the individual assets and liabilities as if the reporting unit was being acquired in a business combination. If the implied fair value of goodwill exceeds the carrying value of goodwill assigned to the reporting unit, there is no impairment. If the carrying value of goodwill assigned to a reporting unit exceeds the implied fair value of goodwill, an impairment charge is recorded to write down the carrying value. An impairment loss cannot exceed the carrying value of goodwill assigned to a reporting unit and the loss establishes a new basis in the goodwill. Subsequent reversal of an impairment loss is not permitted.

For intangible assets other than goodwill, definite-lived intangible assets are amortized over their respective estimated useful lives. Intangible assets with indefinite lives are not amortized, but rather are tested for impairment at least annually or more frequently if events occur or circumstances change that would more likely than not reduce the fair value of the intangible asset below its carrying amount. The Company tests its indefinite-lived intangible assets as of October 1 of each year in conjunction with its annual goodwill impairment test.

Impairment Assessment of Long-Lived Assets. The Company performs an impairment review of property, plant and equipment and definite-lived intangible assets when facts and circumstances indicate that the carrying value of an asset or asset group may not be recoverable from its undiscounted future cash flows. When evaluating long-lived assets for impairment, if the carrying amount of an asset or asset group is found not to be recoverable, a potential impairment loss may be recognized. An impairment loss is measured by comparing the carrying amount of the asset or asset group to its fair value. Fair value is determined using quoted market prices, when available, or other techniques including discounted cash flows. The Company's estimates of future cash flows involve assumptions concerning future operating performance, economic conditions and technological changes that may affect the future useful lives of the assets.

Derivative Financial Instruments. The Company utilizes certain derivative financial instruments to enhance its ability to manage risk, including exposure to interest rates and natural gas price fluctuations that exist as part of ongoing business operations. Derivative instruments are entered into for periods consistent with the related underlying exposures and do not constitute positions independent of those exposures.

All derivatives designated as hedges are recognized on the balance sheet at fair value. On the date a derivative contract is entered into, the Company may designate the derivative as a hedge of a forecasted

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transaction or as a hedge of the variability of cash flows to be received or paid related to a recognized asset or liability (cash-flow hedge). Changes in the fair value of a derivative that is highly effective and that is designated and qualifies as a cash-flow hedge are recorded in other comprehensive income (loss) to the extent that the derivative is effective as a hedge and until earnings are affected by the variability in cash flows of the designated hedged item. The ineffective portion is reported in earnings. Changes in the fair value of a derivative that is not designated or does not qualify as a cash-flow hedge are recorded in the consolidated statement of operations. Cash flows from derivative instruments are reported in the same cash-flow category as the cash flows from the items being hedged.

The Company formally documents all relationships between hedging instruments and hedged items, as well as its risk-management objective and strategy for undertaking various hedge transactions. This process includes relating all derivatives that are designated cash-flow hedges to underlying forecasted transactions. The Company also formally assesses whether each hedging relationship is highly effective in achieving offsetting changes in fair values or cash flows of the hedged item during the period both at the inception of the hedge and on an ongoing basis. If it is determined that a derivative is not highly effective as a hedge, or if a derivative ceases to be a highly-effective hedge, hedge accounting is discontinued with respect to that derivative prospectively.

Fair Value Measurements. The Company measures fair value using the guidelines under GAAP. An asset's fair value is defined as the price at which the asset could be exchanged in a current transaction between market participants. A liability's fair value is defined as the amount that would be paid to transfer the liability to a market participant, not the amount that would be paid to settle the liability with the creditor. See Note 4 to these consolidated financial statements regarding the application of fair value measurements.

The carrying values of cash, accounts receivable, accounts payable and accrued liabilities approximate fair value due to the short-term nature of these items. See Note 15 to these consolidated financial statements regarding the fair value of debt.

Revenue Recognition. Revenue, net of related discounts and allowances, is recognized when both title and risk of loss of the product have been transferred to the customer, the seller's price to the buyer is fixed or determinable, collectability is reasonably assured, and persuasive evidence of an arrangement exists. Customers take title and assume all the risks of ownership based on delivery terms, which are generally included in customer contracts of sale, order confirmation documents and invoices.

The Company recognizes rebates given to customers as a reduction of revenue based on an allocation of the cost of honoring rebates earned and claimed to each of the underlying revenue transactions that result in progress by the customer toward earning the rebate. Rebates are recognized at the time revenue is recorded. The Company measures the rebate obligation based on the estimated amount of sales that will result in a rebate at the adjusted sales price per the respective sales agreement.

Shipping and Handling Costs. Amounts billed to a customer in a sale transaction related to shipping and handling, if any, represent revenues earned for the goods provided and are classified as revenue. Costs related to shipping and handling of products shipped to customers are classified as cost of goods sold.

Research and Development. Research and development costs of \$7,266 for the year ended December 31, 2016 were expensed as incurred and reported in selling, general and administrative expenses in the consolidated statements of operations. There were no significant research and development costs incurred during the years ended December 31, 2015 or 2014.

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Income Taxes. Prior to the Business Combination, Eco Services was a single member limited liability company and was treated as a partnership for federal and state tax purposes. All income tax liabilities and/or benefits of the Company were passed through to the member. As such, no recognition of federal or state income taxes for the Company have been provided for tax periods prior to the Business Combination. As a result of the Business Combination, Eco Services had a change in tax status and is taxed as a C-Corporation. See Note 18 to these consolidated financial statements for discussion of income taxes during the predecessor period.

The Company operates within multiple taxing jurisdictions and is subject to tax filing requirements and audit within these jurisdictions. The Company uses the asset and liability method in accounting for income taxes. Deferred tax assets and liabilities are recorded for temporary differences between the tax basis of assets and liabilities and their reported amounts in the financial statements using statutory tax rates in effect for the year in which the differences are expected to reverse. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the results of operations in the period that includes the enactment date. A valuation allowance is recorded to reduce the carrying amounts of deferred tax assets unless it is more likely than not that those assets will be realized.

In determining the provision for income taxes, the Company provides deferred income taxes on income from foreign subsidiaries as such earnings are taxable upon remittance to the United States. The Company establishes contingent liabilities for possible assessments by taxing authorities resulting from uncertain tax positions including, but not limited to, transfer pricing, deductibility of certain expenses and other state, local and foreign tax matters. The Company recognizes a financial statement benefit for positions taken for tax return purposes when it will be more-likely-than-not that the positions will be sustained. The Company recognizes potential accrued interest and penalties related to unrecognized tax benefits in income tax expense. Tax examinations are often complex as tax authorities may disagree with the treatment of items reported by the Company and may require several years to resolve. These accrued liabilities represent a provision for taxes that are reasonably expected to be incurred on the basis of available information but which are not certain.

Asset Retirement Obligations. The Company records a liability when the fair value of any future obligation to retire a long-lived asset as a result of an existing or enacted law, statute, ordinance or contract is reasonably estimable. The Company also records a liability for the fair value of a conditional asset retirement obligation if the fair value can be reasonably estimated. When the liability is initially recorded, the Company capitalizes the cost by increasing the amount of the related long-lived asset. Over time, the Company adjusts the liability to its present value by recognizing accretion expense as an operating expense in the consolidated statement of operations each period, and the capitalized cost is depreciated over the useful life of the related asset. Upon settlement of the liability, the Company records a gain or loss if the actual costs differ from the accrued amount.

The Company has recorded asset retirement obligations (“AROs”) identified as part of the Business Combination in other long-term liabilities in order to recognize legal obligations associated with the retirement of tangible long-lived assets. The Company has assessed whether an ARO is required at each manufacturing facility and has recorded an obligation for those locations for which an obligation exists. The most significant of these are primarily attributable to environmental remediation liabilities associated with current operations that were incurred during the course of normal operations. The Company has AROs that are conditional in nature. The Company identified certain conditional AROs upon which it was able to reasonably estimate their fair value and recorded a liability. These AROs were triggered upon commitments by the Company to comply with local, state, and national laws to remove environmentally hazardous materials. The AROs have been recognized on a discounted basis using a credit adjusted risk free rate. Accretion of the AROs is recorded in other operating expense, net in the

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Company's consolidated statements of operations and amounted to \$177 for the year ended December 31, 2016. Following are changes in the Company's ARO liability during the year ended December 31, 2016:

	Year ended December 31, 2016
Beginning balance	\$ —
AROs identified as part of the Business Combination	3,687
Accretion expense	177
Foreign exchange impact	(164)
Ending balance	<u>\$ 3,700</u>

Environmental Expenditures. Environmental expenditures that pertain to current operations or to future revenues are expensed or capitalized consistent with the Company's capitalization policy for property, plant and equipment. Expenditures that result from the remediation of an existing condition caused by past operations and that do not contribute to current or future revenues are expensed. Liabilities are recognized for remedial activities when the remediation is probable and the cost can be reasonably estimated. Recoveries of expenditures for environmental remediation are recognized as assets only when recovery is deemed probable. See Note 22 to these consolidated financial statements regarding commitments and contingencies, and Note 14 regarding the accrued environmental reserve.

Deferred Financing Costs. Financing costs incurred in connection with the issuance of long-term debt are deferred and presented as a direct reduction from the related debt instruments on the Company's consolidated balance sheet. Deferred financing costs are amortized as interest expense using the effective interest method over the respective terms of the associated debt instruments.

Stock-Based Compensation. The Company applies the fair value based method to account for stock options and awards. See Note 21 to these consolidated financial statements regarding compensation expense associated with stock options and awards.

Pensions and Postretirement Benefits. The Company maintains qualified and non-qualified defined benefit pension plans that cover employees in the United States and Canada, as well as certain employees in other international locations. Benefits for a majority of the plans are based on average final pay and years of service. Our funding policy, consistent with statutory requirements, is based on actuarial computations utilizing the projected unit credit method of calculation. Not all defined benefit pension plans are funded. In the United States and Canada, the pension plans' assets include equity and fixed income securities. In our other international locations, the pension plans' assets include equity and fixed income securities, as well as insurance policies. Certain assumptions are made regarding the occurrence of future events affecting pension costs, such as mortality, withdrawal, disablement and retirement, changes in compensation and benefits, and discount rates to reflect the time value of money.

The major elements in determining pension income and expense are pension liability discount rates and the expected return on plan assets. The Company references rates of return on high-quality, fixed income investments when estimating the discount rate, and the expected period over which payments will be made based upon historical experience. The long-term rate of return used to calculate the expected return on plan assets is the average rate of return estimated to be earned on invested funds for providing pension benefits.

In addition to pension benefits, the Company provides certain health care benefits for employees who meet age, participation and length of service requirements at retirement. The Company uses explicit assumptions using

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the best estimates available of the plan's future experience. Principal actuarial assumptions include: discount rates, present value factors, retirement age, participation rates, mortality rates, cost trend rates, Medicare reimbursement rates and per capita claims cost by age. Current interest rates, as of the measurement date, are used for discount rates in present value calculations.

The Company also has defined contribution plans covering domestic employees of the Company and certain subsidiaries.

Contingencies. Certain conditions may exist as of the date the financial statements are issued, which may result in a loss to the Company but which will only be resolved when one or more future events occur or fail to occur. The Company's management and its legal counsel assess such contingent liabilities, and such assessment inherently involves an exercise of judgment. In assessing loss contingencies related to legal proceedings that are pending against the Company or unasserted claims that may result in such proceedings, the Company and legal counsel evaluate the perceived merits of any legal proceedings or unasserted claims as well as the perceived merits of the amount of relief sought or expected to be sought therein. If the assessment of a contingency indicates that it is probable that a loss has been incurred and the amount of the liability can be estimated, then the estimated liability is accrued in the Company's financial statements. If the assessment indicates that a loss contingency is not probable, but is reasonably possible, or is probable but cannot be estimated, then the nature of the contingent liability, together with an estimate of the range of possible loss if determinable and material, would be disclosed. Loss contingencies considered remote are generally not disclosed unless they involve guarantees, in which case the nature of the guarantee would be disclosed, including the approximate term, how the guarantee arose, and the events or circumstances that would require the guarantor to perform under the guarantee.

Use of Estimates. The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications. As a result of the Business Combination, certain reclassifications have been made to the historical financial statements of Eco Services included in the consolidated financial statements to conform to the current presentation.

3. Recently Issued Accounting Standards:

In March 2017, the Financial Accounting Standards Board ("FASB") issued guidance to improve the presentation of net periodic pension cost and net periodic postretirement benefit cost (collectively, "pension costs"). Under current GAAP, there are several components of pension costs which are presented net to arrive at pension costs as included in the income statement and disclosed in the notes. As part of this amendment to the existing guidance, the service cost component of pension costs will be bifurcated from the other components and included in the same line item of the income statement as compensation costs are reported. The remaining components will be reported together below operating income on the income statement, either as a separate line item or combined with another line item on the income statement and disclosed. Additionally, with respect to capitalization to inventory, fixed assets, etc., only the service cost component will be eligible for capitalization upon adoption of the guidance. The new guidance is effective for public companies for annual periods beginning after December 15, 2017, including interim periods within those years. Early adoption is permitted. The amendments should be applied retrospectively upon adoption with respect to the presentation of the service and other cost components of pension costs in the income statement, and prospectively for the capitalization of the

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service cost component in assets. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In January 2017, the FASB issued guidance which eliminates the second step from the traditional two-step goodwill impairment test. Under current guidance, an entity performed the first step of the goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount; if an impairment loss was indicated, the entity computed the implied fair value of goodwill to determine whether an impairment loss existed, and if so, the amount to recognize. Under the new guidance, an impairment loss is recognized for the amount by which the carrying amount exceeds the reporting unit's fair value (the Step 1 test), with no further testing required. Any impairment loss recognized is limited to the amount of goodwill allocated to the reporting unit. The new guidance is effective for public companies that are SEC registrants for fiscal years beginning after December 15, 2019, with early adoption permitted for goodwill impairment tests performed on testing dates after January 1, 2017. All entities are required to apply the guidance prospectively to goodwill impairment tests subsequent to adoption of the standard. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In January 2017, the FASB issued guidance which clarifies the definition of a business and provides revised criteria and a framework to determine whether an integrated set of assets and activities is a business. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, including interim periods within those years. Early adoption is permitted. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In November 2016, the FASB issued guidance which clarifies the classification and presentation of changes in restricted cash on the statement of cash flows. The updates in the guidance require that the statement of cash flows explain the change during the period in the total of cash, cash equivalents and restricted cash when reconciling the beginning-of-period and end-of-period total amounts. The updates also require a reconciliation between cash, cash equivalents and restricted cash presented on the balance sheet to the total of the same amounts presented on the statement of cash flows. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those years. Early adoption is permitted, and the new guidance should be applied retrospectively to each period presented. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements. As of December 31, 2016, the Company had \$13,780 of restricted cash on its balance sheet related to its NMTC arrangements (see Note 15 to these consolidated financial statements for further information).

In October 2016, the FASB issued guidance which eliminates the deferral of the tax effects of intra-entity transfers of an asset other than inventory. Current GAAP prohibits the recognition of current and deferred income taxes for an intra-entity asset transfer until the asset has been sold to an outside party which has resulted in diversity in practice and increased complexity within financial reporting. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The Company early adopted the guidance effective January 1, 2017.

In August 2016, the FASB issued guidance which clarifies the classification of certain cash receipts and cash payments in the statement of cash flows, including debt prepayment or extinguishment costs and distributions from certain equity method investees. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. Early adoption is permitted, and the new guidance should be applied retrospectively to each period presented. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

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In March 2016, the FASB issued guidance that includes targeted improvements to the accounting for employee stock-based compensation. The updates in the guidance include changes in the income tax consequences, balance sheet classification and cash flow statement reporting of stock-based payment transactions. For public companies, the new guidance is effective for annual periods beginning after December 15, 2016, and interim periods within those years.

The Company adopted this new guidance as required on January 1, 2017, with no significant impact upon adoption to the Company's consolidated financial statements. On a prospective basis from the adoption date, the Company will record all tax effects related to stock-based compensation through the statement of operations, and all tax-related cash flows resulting from stock-based award payments will be reported as operating activities in the statement of cash flows. The Company has made an accounting policy election under the new guidance to account for forfeitures of stock-based compensation awards as they occur.

In February 2016, the FASB issued guidance that amends the accounting for leases. Under the new guidance, a lessee will recognize assets and liabilities for most leases (including those classified under existing GAAP as operating leases, which based on current standards are not reflected on the balance sheet), but will recognize expenses similar to current lease accounting. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those years. Early adoption is permitted. The new guidance must be adopted using a modified retrospective transition and provides for certain practical expedients. The Company is currently evaluating the impact that the new guidance will have on its consolidated financial statements. The Company has operating lease agreements for which it expects to recognize right of use assets and corresponding liabilities on its balance sheet upon adoption of the new guidance.

In September 2015, the FASB issued guidance that changes the requirements for reporting measurement period adjustments to provisional amounts initially recognized in conjunction with a business combination. GAAP previously required an acquiring entity to retrospectively adjust, in prior period financial statements, the provisional amounts to reflect new information obtained during the measurement period (a period, which may not exceed one year from the date of the business combination, during which the acquiring entity may receive information about the facts and circumstances existing as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of the acquisition date). Under the new guidance, adjustments to the provisional amounts are reflected in the financial statements for the reporting period in which the adjustments are determined, including by recognizing in current period earnings the full effect of changes in depreciation, amortization or other income effects. The guidance requires that the acquiring entity either present separately on the face of the current period income statement or disclose in the notes to the current period financial statements, by line item, the amounts of the adjustments made during the current period. The Company early adopted the guidance as of December 31, 2015, with prospective application as required. The only business combination to occur since the adoption date was the Business Combination (see Note 7 to these consolidated financial statements for further information). As of December 31, 2016, the measurement period was substantially complete, and because the Business Combination occurred during the year ended December 31, 2016, there were no adjustments to provisional amounts to report for the period of May 4, 2016, the date of the Business Combination, through December 31, 2016 that would have impacted a prior reporting period, since all amounts recorded in the consolidated financial statements as of and for the year ended December 31, 2016 reflect the final valuation.

In July 2015, the FASB issued new guidance that changes the measurement principle for inventory from the lower of cost or market to the lower of cost or net realizable value. The amendments in this guidance do not apply to inventory that is measured using LIFO or the retail inventory method; rather, the amendments apply to all other inventory, which includes inventory that is measured using FIFO or average cost. Within the scope of

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this new guidance, an entity should measure inventory at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal and transportation, which is consistent with existing GAAP. The Company adopted the new guidance on January 1, 2017 as required. The guidance did not have a significant impact on the Company's consolidated financial statements.

In August 2014, the FASB issued guidance regarding management's responsibility to evaluate whether there is substantial doubt about an entity's ability to continue as a going concern within one year of the issuance of the financial statements. If substantial doubt exists, additional disclosures are required. This guidance was effective for the Company starting with the year ended December 31, 2016, and is effective for annual and interim periods thereafter. The adoption of the guidance did not have an impact on the Company's disclosure in the notes to its consolidated financial statements.

In May 2014, the FASB issued accounting guidance (with subsequent targeted amendments) that will significantly enhance comparability of revenue recognition practices across entities, industries, jurisdictions and capital markets. The core principle of the guidance is that revenue recognized from a transaction or event that arises from a contract with a customer should reflect the consideration to which an entity expects to be entitled in exchange for goods or services provided. To achieve that core principle, the new guidance sets forth a five-step revenue recognition model that will need to be applied consistently to all contracts with customers, except those that are within the scope of other topics in the Accounting Standards Codification ("ASC"). Also required are enhanced disclosures to help users of financial statements better understand the nature, amount, timing and uncertainty of revenues and cash flows from contracts with customers. The enhanced disclosures include qualitative and quantitative information about contracts with customers, significant judgments made in applying the revenue guidance, and assets recognized related to the costs to obtain or fulfill a contract. For public companies, the new requirements are effective for annual reporting periods beginning after December 15, 2017, including interim periods within those years. The Company is reviewing its key revenue streams and assessing the underlying customer contracts within the framework of the new guidance. The Company has evaluated the key aspects of its revenue streams for impact under the new guidance and is currently performing a detailed analysis of its customer agreements to quantify the potential changes under the guidance. The Company has not yet determined whether the guidance will have a significant impact on its existing revenue recognition practices, but there are new robust disclosure requirements that will have an impact on the Company's reporting. The Company does not anticipate adopting the new guidance early, nor has it completed its determination of whether it will implement the guidance under the retrospective or modified retrospective transition methods of adoption.

4. Fair Value Measurements:

Fair values are based on quoted market prices when available. When market prices are not available, fair value is generally estimated using discounted cash flow analyses, incorporating current market inputs for similar financial instruments with comparable terms and credit quality. In instances where there is little or no market activity for the same or similar instruments, the Company estimates fair value using methods, models and assumptions that management believes a hypothetical market participant would use to determine a current transaction price. These valuation techniques involve some level of management estimation and judgment which becomes significant with increasingly complex instruments or pricing models. Where appropriate, adjustments are included to reflect the risk inherent in a particular methodology, model or input used.

The Company's financial assets and liabilities carried at fair value have been classified based upon a fair value hierarchy. The hierarchy gives the highest ranking to fair values determined using unadjusted quoted prices in active markets for identical assets and liabilities (Level 1) and the lowest ranking to fair values determined

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using methodologies and models with unobservable inputs (Level 3). The classification of an asset or a liability is based on the lowest level input that is significant to its measurement. For example, a Level 3 fair value measurement may include inputs that are both observable (Levels 1 and 2) and unobservable (Level 3). The levels of the fair value hierarchy are as follows:

- Level 1—Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets.
- Level 2—Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves.
- Level 3—Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company’s best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date.

The following table presents information about the Company’s assets and liabilities that were measured at fair value on a recurring basis as of December 31, 2016 and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value. There were no assets or liabilities measured at fair value on a recurring basis as of December 31, 2015.

	As of December 31, 2016	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts	\$ 6,434	\$ —	\$ 6,434	\$ —
Restoration plan assets	5,594	5,594	—	—
Total	<u>\$ 12,028</u>	<u>\$ 5,594</u>	<u>\$ 6,434</u>	<u>\$ —</u>

The following table presents information about the Company’s assets and liabilities that were measured at fair value on a non-recurring basis as of December 31, 2016. Refer to Note 13 to these consolidated financial statements for a description of the valuation techniques the Company utilized to determine such fair value. There were no assets or liabilities measured at fair value on a non-recurring basis as of December 31, 2015.

	As of December 31, 2016	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total Losses
Assets:					
Indefinite life tradenames(1)	\$ —	\$ —	\$ —	\$ 153,922	\$(6,873)
Total	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 153,922</u>	<u>\$(6,873)</u>

- (1) Indefinite life tradenames with a carrying amount of \$160,795, net of foreign exchange impact, were written down to their implied fair value of \$153,922 as part of the Company’s annual impairment assessment on October 1, 2016. This resulted in an impairment charge of \$6,873, which was recorded to other operating expense, net, on the consolidated statements of operations.

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Restoration plan assets

The fair values of the Company's restoration plan assets are determined through quoted prices in active markets. Restoration plan assets are assets held in a Rabbi trust to fund the obligations of the Company's defined benefit supplementary retirement plans and include various stock and fixed income mutual funds. See Note 19 to these consolidated financial statements regarding defined supplementary retirement plans.

Derivative contracts

Derivative assets and liabilities can be exchange-traded or traded over-the-counter ("OTC"). The Company generally values exchange-traded derivatives using models that calibrate to market transactions and eliminate timing differences between the closing price of the exchange-traded derivatives and their underlying instruments. OTC derivatives are valued using market transactions and other market evidence whenever possible, including market-based inputs to models, model calibration to market transactions, broker or dealer quotations or alternative pricing sources with reasonable levels of price transparency. When models are used, the selection of a particular model to value an OTC derivative depends on the contractual terms of, and specific risks inherent in, the instrument as well as the availability of pricing information in the market. The Company generally uses similar models to value similar instruments. Valuation models require a variety of inputs, including contractual terms, market prices and rates, forward curves, measures of volatility, and correlations of such inputs. For OTC derivatives that trade in liquid markets, such as forward contracts, swaps and options, model inputs can generally be corroborated by observable market data by correlation or other means, and model selection does not involve significant management judgment.

The Company has interest rate caps and natural gas caps and swaps that are fair valued using Level 2 inputs. In addition, the Company applies a credit valuation adjustment to reflect credit risk that is calculated based on credit default swaps. To the extent that the Company's net exposure under a specific master agreement is an asset, the Company utilizes the counterparty's default swap rate. If the net exposure under a specific master agreement is a liability, the Company utilizes a default swap rate comparable to PQ Group Holdings. The credit valuation adjustment is added to the discounted fair value to reflect the exit price that a market participant would be willing to receive to assume the Company's liabilities or that a market participant would be willing to pay for the Company's assets. As of December 31, 2016, the credit valuation adjustment resulted in a minimal change in the fair value of the derivatives.

5. Accumulated Other Comprehensive Income (Loss):

The following table presents the components of accumulated other comprehensive income (loss), net of tax, as of December 31, 2016 and 2015:

	December 31,	
	2016	2015
Amortization and unrealized gains on pension and postretirement plans, net of tax of (\$4,799) and \$0	\$ 7,513	\$ 648
Net changes in fair values of derivatives, net of tax of (\$2,793)	4,557	—
Foreign currency translation adjustments, net of tax of (\$6,627)	(65,781)	—
Accumulated other comprehensive income (loss)	<u>\$ (53,711)</u>	<u>\$ 648</u>

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The following table presents the tax effects of each component of other comprehensive income (loss) for the years ended December 31, 2016 and 2015 (no other comprehensive income was noted for the Predecessor and Successor Periods during the year ended December 31, 2014):

	Years ended December 31,					
	2016			2015		
	Pre-tax amount	Tax benefit / (expense)	After-tax amount	Pre-tax amount	Tax benefit / (expense)	After-tax amount
Defined benefit and other postretirement plan						
Amortization and unrealized gains	\$ 11,664	\$ (4,799)	\$ 6,865	\$ 648	\$ —	\$ 648
Benefit plans, net	11,664	(4,799)	6,865	648	—	648
Net gain from hedging activities	7,350	(2,793)	4,557	—	—	—
Foreign currency translation	(60,207)	(6,627)	(66,834)	—	—	—
Other comprehensive income (loss)	<u>\$ (41,193)</u>	<u>\$ (14,219)</u>	<u>\$ (55,412)</u>	<u>\$ 648</u>	<u>\$ —</u>	<u>\$ 648</u>

The following table presents the change in accumulated other comprehensive income (loss), net of tax, by component for the years ended December 31, 2016 and 2015:

	Defined benefit and other postretirement plans	Net gain (loss) from hedging activities	Foreign currency translation	Total
December 31, 2014	\$ —	\$ —	\$ —	\$ —
Other comprehensive income (loss) before reclassifications	648	—	—	648
Amounts reclassified from accumulated other comprehensive income ⁽¹⁾	—	—	—	—
Net current period other comprehensive income (loss)	648	—	—	648
December 31, 2015	\$ 648	\$ —	\$ —	\$ 648
Other comprehensive income (loss) before reclassifications	6,844	3,669	(65,781)	(55,268)
Amounts reclassified from accumulated other comprehensive income ⁽¹⁾	21	888	—	909
Net current period other comprehensive income (loss)	6,865	4,557	(65,781)	(54,359)
December 31, 2016	<u>\$ 7,513</u>	<u>\$ 4,557</u>	<u>\$ (65,781)</u>	<u>\$ (53,711)</u>

(1) See the following table for details about these reclassifications.

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The following table presents the reclassifications out of accumulated other comprehensive income (loss) for the years ended December 31, 2016 and 2015. Amounts in parentheses indicate debits to profit/loss.

<u>Details about Accumulated Other Comprehensive Income Components</u>	<u>Amount Reclassified from Accumulated Other Comprehensive Income</u>		<u>Affected Line Item in the Statement Where Net Income is Presented</u>
	<u>Years ended</u>		
	<u>2016</u>	<u>2015</u>	
Defined benefit and other postretirement plans			
Amortization of prior service cost	\$ —	\$ —	(2)
Amortization of net gain (loss)	26	—	(2)
	26	—	Total before tax
	(5)	—	Tax (expense) benefit
	<u>\$ 21</u>	<u>\$ —</u>	Net of tax
Net gain (loss) from hedging activities			
Interest rate caps	\$ —	\$ —	Interest expense
Natural gas swaps	1,433	—	Cost of goods sold
	1,433	—	Total before tax
	(545)	—	Tax (expense) benefit
	<u>\$ 888</u>	<u>\$ —</u>	Net of tax
Total reclassifications for the period	<u>\$ 909</u>	<u>\$ —</u>	Net of tax

(2) These accumulated other comprehensive income (loss) components are included in the computation of net periodic pension cost (see Note 19 to these consolidated financial statements for further information).

6. 2014 Acquisition

As described in Note 1 to these consolidated financial statements, on July 30, 2014, Eco Services entered into the 2014 Acquisition with Solvay, which provided for the sale, transfer and assignment by Solvay, and the acquisition, acceptance and assumption by Eco Services, of substantially all of the assets of Solvay's Eco business unit, which constitutes the Eco Services business after the 2014 Acquisition. The 2014 Acquisition closed on December 1, 2014 (the "Closing Date").

The purchase price for Eco was \$890,000 in cash, subject to adjustment for certain items, including the actual level of working capital at the closing of the 2014 Acquisition, and a defined contribution plan adjustment. The working capital and defined contribution plan adjustments to the purchase price resulted in a reduction to the purchase price by \$8,525 to \$881,475 and were settled with Solvay as of June 30, 2015. Acquisition costs of \$14,666 are included in other operating expense, net in the Company's consolidated statement of operations for the Successor Period.

The 2014 Acquisition and related transactions were funded with the proceeds of the following transactions:

Senior Secured Credit Facilities

Concurrent with the consummation of the 2014 Acquisition, Eco Services entered into senior secured credit facilities, which consisted of a \$500,000 seven-year term loan facility, all of which was drawn on the Closing

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Date, and a \$55,000 five-year revolving credit facility. See Note 15 to these consolidated financial statements for a more detailed description of Eco Services' senior secured credit facilities.

Senior Notes

Concurrent with the consummation of the 2014 Acquisition, Eco Services issued \$200,000 in aggregate principal amount of senior notes. See Note 15 to these consolidated financial statements for a more detailed description of Eco Services' senior unsecured notes.

Equity Investment

In connection with the 2014 Acquisition, affiliates of CCMP contributed \$230,000 in cash and members of Eco Services' board of managers and management contributed \$9,885 in cash.

The 2014 Acquisition was accounted for using the acquisition method of accounting. Under the acquisition method, the purchase price was allocated to Solvay's Eco business unit's net assets acquired based on the fair values of the assets acquired and the liabilities assumed as of the Closing Date. The excess of the purchase price over the fair values of these net assets was recorded as goodwill.

The following table sets forth the calculation and final allocation of the purchase price to the net assets acquired with respect to the 2014 Acquisition, which was finalized in 2015:

Total purchase price	<u>\$ 881,475</u>
Recognized amounts of identifiable assets acquired and liabilities assumed:	
Receivables	\$ 26,160
Other receivables	19,389
Inventories	13,297
Prepaid expenses	377
Property, plant and equipment	471,367
Intangibles, excluding goodwill	148,190
Other long-term assets	<u>1,624</u>
Fair value of assets acquired	680,404
Accounts payable	(20,908)
Other payables	(853)
Current portion of capital lease obligation	(236)
Accrued expenses	(8,710)
Accrued wages, salaries & employment benefits	(9,572)
Other current liabilities	(6,485)
Long-term portion of capital lease obligation	(1,185)
Environmental reserve	(4,783)
Supply contract obligation	(25,662)
Pension liability	<u>(32,427)</u>
Fair value of net assets acquired	569,583
Goodwill	<u>311,892</u>
Purchase price	<u>\$ 881,475</u>

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The Company believes that the expected revenue of Eco Services, the assembled workforce and several strategic benefits, including a comprehensive portfolio of brands, contributed to a total purchase price that resulted in the recognition of goodwill. Goodwill recognized as a result of the 2014 Acquisition is not deductible for income tax purposes.

The valuation of the intangible assets acquired and the related weighted-average amortization periods are as follows:

	<u>Amount</u>	<u>Weighted-Average Expected Useful Life (in years)</u>
Intangible assets subject to amortization:		
Customer relationships	\$ 99,300	15
Technical know-how	24,990	14
Permits	9,100	5
Total intangible assets subject to amortization	<u>133,390</u>	
Tradename, not subject to amortization	14,800	Indefinite
Total	<u>\$148,190</u>	

7. Business Combination:

As described in Note 1 to these consolidated financial statements, on May 4, 2016, the Company, PQ Holdings, Eco Services, certain investment funds affiliated with CCMP and certain other stockholders of PQ Holdings and Eco Services completed the Business Combination. Eco Services is the accounting predecessor to PQ Group Holdings. Certain investment funds affiliated with CCMP held a controlling interest position in Eco Services prior to the Business Combination. In addition, certain investment funds affiliated with CCMP owned a noncontrolling interest in PQ Holdings prior to the Business Combination and the merger with Eco constituted a change in control under the various PQ Holdings credit agreements and bond indenture. Therefore, Eco Services is deemed to be the accounting acquirer. These financial statements are the continuation of Eco Services' business prior to the Business Combination.

The Business Combination was accounted for using the acquisition method of accounting. Under the acquisition method, the purchase price is allocated to PQ Holdings' net assets acquired based on the fair values of assets acquired and liabilities assumed as of the acquisition date. The excess of the purchase price over the fair values of these net assets is recorded as goodwill.

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The following table sets forth the calculation and allocation of the purchase price to the net assets acquired with respect to the Business Combination, which was substantially complete as of December 31, 2016.

Total consideration, net of cash acquired	<u>\$ 2,689,941</u>
Recognized amounts of identifiable assets acquired and liabilities assumed:	
Receivables	\$ 161,110
Inventories	254,770
Prepaid and other current assets	19,295
Investments in affiliated companies	472,994
Property, plant and equipment	683,673
Other intangible assets	754,000
Other long-term assets	<u>48,127</u>
Fair value of assets acquired	2,393,969
Revolver, notes payable & current debt	(2,441)
Accounts payable	(93,222)
Accrued liabilities	(98,621)
Long-term debt	(20,470)
Deferred income taxes	(327,296)
Other long-term liabilities	(113,936)
Noncontrolling interest	<u>(6,569)</u>
Fair value of net assets acquired	1,731,414
Goodwill	<u>958,527</u>
	<u>\$ 2,689,941</u>

Total consideration for the Business Combination included \$1,777,740 of cash, \$910,800 of equity in the acquired PQ Holdings entities and \$1,401 of assumed stock awards of PQ Holdings. The fair value of the equity consideration was determined based on an estimated enterprise value using a market approach as of the date of the Business Combination reduced by borrowings to arrive at the fair value of equity. The existing PQ Holdings credit facilities were not legally assumed as part of the Business Combination, and the extinguishment of the debt concurrent with the Business Combination was included as part of the consideration transferred (see Note 15 to these consolidated financial statements for further information). Acquisition costs of \$1,583 are included in other operating expense, net in the Company's consolidated statement of operations for the year ended December 31, 2016.

The Company believes that its diverse range of industrial, consumer and governmental applications in which its products are used were the primary reasons that contributed to a total purchase price that resulted in the recognition of goodwill. The goodwill associated with the Business Combination is not deductible for tax purposes.

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The valuation of the intangible assets acquired and the related weighted-average amortization periods are as follows:

	<u>Amount</u>	<u>Weighted-Average Expected Useful Life (in years)</u>
Intangible assets subject to amortization:		
Trademarks	\$ 35,400	15.0
Technical know-how	189,300	20.0
Contracts	19,800	5.3
Customer relationships	268,700	10.6
In-process research and development	<u>6,800</u>	
Total intangible assets subject to amortization	520,000	
Tradenames, not subject to amortization	151,100	Indefinite
Trademarks, not subject to amortization	82,900	Indefinite
Total	<u>\$754,000</u>	

In accordance with the requirements of the purchase method of accounting for acquisitions, inventories were recorded at fair market value (which is defined as estimated selling prices less the sum of (a) costs of disposal and (b) a reasonable profit allowance for the selling effort of the acquiring entity), which was \$58,683 higher than the historical cost. The Company's cost of goods sold includes a pre-tax charge of \$29,086 for the year ended December 31, 2016 relating to the portion of the step-up on inventory sold during the period. A separate portion of the fair value step-up related to the domestic inventory accounted for under the LIFO method was included in inventory on the consolidated balance sheet as of December 31, 2016 as part of the new LIFO base layer on the acquired inventory (see Note 9 to these consolidated financial statements for further information).

The Company's consolidated financial statements include PQ Holdings' results of operations from May 4, 2016, the date of the Business Combination, through December 31, 2016. Net sales and operating income attributable to PQ Holdings' during this period are included in the Company's consolidated financial statements for the year ended December 31, 2016 and total \$690,459 and \$17,991, respectively.

Pro Forma Financial Information

The unaudited pro forma information has been derived from the Company's historical consolidated financial statements and has been prepared to give effect to the Business Combination, assuming that the Business Combination occurred on January 1, 2015. These pro forma adjustments primarily relate to depreciation expense on stepped up fixed assets, amortization of acquired intangibles, cost of goods sold expense related to the sale of stepped up inventory, interest expense related to additional debt that would be needed to fund the Business Combination, and the estimated impact of these adjustments on the Company's tax provision. The unaudited pro forma consolidated results of operations are provided for illustrative purposes and are not indicative of the Company's actual consolidated results of operations or consolidated financial position. The unaudited pro forma results of operations do not reflect any operating efficiencies or potential cost savings which may result from the acquisitions.

	<u>Years ended December 31,</u>	
	<u>2016</u>	<u>2015</u>
	<u>(unaudited)</u>	
Pro forma sales	\$ 1,403,041	\$ 1,413,201
Pro forma net loss	(76,994)	(120,982)

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Included in the pro forma net loss are adjustments to allocate charges incurred during the year ended December 31, 2016 to December 31, 2015. These non-recurring charges include a debt prepayment penalty of \$26,250, one-time refinancing charges of \$4,747 and transaction fee charges of \$1,795 that are each reflected in the pro forma net loss for the year ended December 31, 2015.

8. Other Operating Expense, Net:

A summary of other operating expense, net is as follows:

	Years ended December 31,		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
	2016	2015		
Amortization expense	\$25,263	\$ 6,605	\$ 552	\$ 5,806
Transaction and other related costs ⁽¹⁾	4,952	4,241	15,506	—
Restructuring and other related costs (Note 23)	12,630	4,147	247	—
Net loss on asset disposals	4,216	3,911	—	—
Intangible asset impairment charge (Note 13)	6,873	—	—	—
Management advisory fees (Note 26)	3,584	590	42	—
Environmental-related costs (benefits) (Note 22)	1,352	202	—	(213)
Other, net	3,431	—	—	—
	<u>\$62,301</u>	<u>\$19,696</u>	<u>\$ 16,347</u>	<u>\$ 5,593</u>

(1) Transaction and other related costs primarily include acquisition costs directly attributable to the Business Combination (see Note 7 to these consolidated financial statements for further information) and the 2014 Acquisition (see Note 6), as well as other business development costs.

9. Inventories:

Inventories were classified and valued as follows:

	December 31,	
	2016	2015
Finished products and work in process	\$ 175,182	\$ 8,820
Raw materials	51,866	1,359
	<u>\$ 227,048</u>	<u>\$ 10,179</u>
Valued at lower of cost or market:		
LIFO basis	\$ 135,605	\$ —
FIFO or average cost basis	91,443	10,179
	<u>\$ 227,048</u>	<u>\$ 10,179</u>

The domestic inventory acquired as part of the Business Combination is valued based on the LIFO method. Therefore, the fair value allocated to the acquired LIFO inventory was treated as the new base inventory value. If inventories valued under the LIFO basis had been valued using the FIFO method, inventories would have been \$30,338 lower than reported as of December 31, 2016, driven primarily by the purchase accounting fair value

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step-up of the LIFO inventory base value associated with the Business Combination. As of December 31, 2016, inventory quantities for one of the Company's LIFO pools were reduced below their levels at the Business Combination date. As a result of this reduction, LIFO inventory costs charged to cost of goods sold were computed based on the lower base layer costs at the Business Combination date. The impact on cost of goods sold and net income for the year ended December 31, 2016 was not material.

10. Investments in Affiliated Companies:

As a result of the Business Combination, the Company acquired investments in affiliated companies accounted for under the equity method. Affiliated companies accounted for on the equity method as of December 31, 2016 are as follows:

<u>Company</u>	<u>Country</u>	<u>Percent Ownership</u>
PQ Silicates Ltd.	Taiwan	50%
Zeolyst International	USA	50%
Zeolyst C.V.	Netherlands	50%
Quaker Holdings	South Africa	49%

Following is summarized information of the combined investments:

	<u>December 31,</u>	
	<u>2016</u>	<u>2015</u>
Current assets	\$ 207,997	\$ —
Noncurrent assets	212,144	—
Current liabilities	44,741	—
Noncurrent liabilities	1,384	—

	<u>Period from May 4, 2016 to December 31, 2016</u>
Net sales	\$ 206,072
Gross profit	91,761
Operating income	67,098
Net income	67,332

The Company's investments in affiliated companies balance as of December 31, 2016 includes net purchase accounting fair value adjustments of \$273,300 related to the Business Combination, consisting primarily of goodwill and intangible assets such as customer relationships, technical know-how and trade names. Consolidated equity in net income from affiliates is net of \$36,296 of amortization expense related to purchase accounting fair value adjustments for the year ended December 31, 2016.

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The following table summarizes the activity related to the Company's investments in affiliated companies balance on the consolidated balance sheet:

	Year ended December 31, 2016
Balance at beginning of period	\$ —
PQ/Eco Merger	472,994
Equity in net income of affiliated companies	33,684
Charges related to purchase accounting fair value adjustments	(36,296)
Dividends received	(7,636)
Foreign currency translation adjustments	(3,340)
Balance at end of period	<u>\$ 459,406</u>

The Company had net receivables due from affiliates of \$4,196 as of December 31, 2016, which are included in prepaid and other current assets. Net receivables due from affiliates are generally non-trade receivables. Sales to affiliates were \$1,587 for the year ended December 31, 2016. The Company purchased goods of \$1,147 from affiliates, which is included in cost of goods sold during the year ended December 31, 2016.

On December 18, 2013, PQ Holdings and its joint venture, Zeolyst International, entered into a real estate tax abatement agreement with the Unified Government of Wyandotte County and Kansas City, Kansas that will utilize an Industrial Revenue Bond financing structure to achieve a 75% real estate tax abatement on the value of the improvements that will be constructed during the expansion of PQ Holdings and Zeolyst International's facilities at the jointly-operated Kansas City, Kansas plant. The financing obligation and the industrial bond receivable have been presented net, as the financing obligation and the industrial bond meet the criteria for right of setoff conditions as prescribed in ASC 210-20-45.

11. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	December 31,	
	2016	2015
Land	\$ 186,327	\$ 108,197
Buildings and improvements	157,944	11,083
Machinery and equipment	788,175	362,917
Construction in progress	204,138	29,581
	<u>1,336,584</u>	<u>511,778</u>
Less: accumulated depreciation	<u>(155,196)</u>	<u>(30,705)</u>
	<u>\$ 1,181,388</u>	<u>\$ 481,073</u>

Depreciation expense was \$89,453 and \$28,790 for the years ended December 31, 2016 and 2015, respectively, and \$2,103 and \$33,171 for the Successor and Predecessor Periods of 2014, respectively.

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12. Reportable Segments and Geographical Information:

The Company has organized its business around two operating segments based on the review of discrete financial results for each of the operating segments by the Company's chief operating decision maker (the Company's President and Chief Executive Officer), or CODM, for performance assessment and resource allocation purposes. Each of the Company's operating segments represents a reportable segment under GAAP. The Company's reportable segments are organized based on the nature and economic characteristics of the Company's products. The Company's two reportable segments are Performance Materials and Chemicals ("PM&C") and Environmental Catalysts and Services ("EC&S").

The PM&C segment is a silicates and specialty materials producer with leading supply positions for the majority of its products sold in North America, Europe, South America, Australia and Asia (excluding China) serving end markets such as personal and industrial cleaning products, fuel efficient tires (or green tires), surface coatings, and food and beverage. The two product groups included in the PM&C segment are performance materials and performance chemicals. The EC&S segment is a leading global innovator and producer of catalysts for the refinery, emissions control, and petrochemical markets and is also a leading provider of catalyst recycling services to the North American refining market. The three product groups included in the EC&S segment are silica catalysts, zeolyst catalysts, and refining services. The EC&S segment includes equity in net income from Zeolyst International and Zeolyst C.V. (collectively, the "Zeolyst Joint Venture"), each of which are 50/50 joint ventures with CRI Zeolites, Inc. (a wholly-owned subsidiary of Royal Dutch Shell). The Zeolyst Joint Venture is accounted for using the equity method in the Company's consolidated financial statements (see Note 10 to these consolidated financial statements for further information). Company management evaluates the EC&S segment's performance, including the Zeolyst Joint Venture, on a proportionate consolidation basis. Accordingly, the revenues and expenses used to compute the EC&S segment's adjusted earnings before interest, income taxes, depreciation and amortization ("Adjusted EBITDA") include the Zeolyst Joint Venture's results of operations on a proportionate basis based on the Company's 50% ownership level. Since the Company uses the equity method of accounting for the Zeolyst Joint Venture, these items are eliminated when reconciling to the Company's consolidated results of operations.

The Company's management evaluates the operating results of each reportable segment based upon Adjusted EBITDA. Adjusted EBITDA consists of EBITDA, which is a measure defined as net income before depreciation and amortization, interest expense and income taxes (each of which is included in the Company's consolidated statements of operations), and adjusted for certain items as discussed below.

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Summarized financial information for the Company's reportable segments and product groups is shown in the following table:

	<u>Years ended</u> <u>December 31,</u>		<u>Successor</u> <u>period from inception</u> <u>(July 30, 2014) to</u> <u>December 31,</u> <u>2014</u>	<u>Predecessor</u> <u>period from</u> <u>January 1, 2014 to</u> <u>November 30,</u> <u>2014</u>
	<u>2016</u>	<u>2015</u>		
Net sales:				
Performance Materials & Chemicals:				
Performance Chemicals	\$ 437,523	\$ —	\$ —	\$ —
Performance Materials	<u>201,428</u>	<u>—</u>	<u>—</u>	<u>—</u>
Subtotal	638,951	—	—	—
Environmental Catalysts & Services:(1)				
Silica Catalysts	53,029	—	—	—
Refining Services	<u>373,718</u>	<u>388,875</u>	<u>35,539</u>	<u>361,823</u>
Subtotal	426,747	388,875	35,539	361,823
Eliminations(2)	<u>(1,521)</u>	<u>—</u>	<u>—</u>	<u>—</u>
Total	<u>\$1,064,177</u>	<u>\$388,875</u>	<u>\$ 35,539</u>	<u>\$ 361,823</u>
Segment Adjusted EBITDA:(3)				
Performance Materials & Chemicals	\$ 158,679	\$ —	\$ —	
Environmental Catalysts & Services(4)	<u>196,825</u>	<u>117,704</u>	<u>9,122</u>	
Total Segment Adjusted EBITDA(5)	<u>\$ 355,504</u>	<u>\$117,704</u>	<u>\$ 9,122</u>	

- (1) Excludes the Company's proportionate share of sales from the Zeolyst Joint Venture, which represents the Company's zeolite catalysts product group. The proportionate share of sales included in the EC&S segment is \$94,516 for the year ended December 31, 2016.
- (2) The Company eliminates intersegment sales when reconciling to the Company's consolidated statements of operations.
- (3) The Company defines Adjusted EBITDA as EBITDA adjusted for certain items as noted in the reconciliation below. Management evaluates the performance of its segments and allocates resources based on several factors, of which the primary measure is Adjusted EBITDA. Adjusted EBITDA should not be considered as an alternative to net income as an indicator of the Company's operating performance. Adjusted EBITDA as defined by the Company may not be comparable with EBITDA or Adjusted EBITDA as defined by other companies.
- (4) The equity in net income included in the EC&S segment is \$33,518 for the Zeolyst Joint Venture for the year ended December 31, 2016.
- (5) Total Segment Adjusted EBITDA differs from the Company's consolidated Adjusted EBITDA due to unallocated corporate expenses.

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A reconciliation from net income (loss) to Segment Adjusted EBITDA is as follows:

	Years ended December 31,		Successor Period from inception (July 30, 2014) to December 31, 2014	Predecessor Period from January 1, 2014 to November 30, 2014
	2016	2015		
(Dollars in thousands, except per share data)				
Reconciliation of net income (loss) attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA				
Net income (loss) attributable to PQ Group Holdings Inc.	\$ (79,746)	\$ 11,427	\$ (22,061)	\$ 30,545
Provision (benefit) for income taxes	10,041	—	—	14,602
Interest expense, net	140,315	44,348	8,470	86
Depreciation and amortization	128,288	38,999	2,955	42,458
Segment EBITDA	<u>\$198,898</u>	<u>\$ 94,774</u>	<u>\$ (10,636)</u>	<u>\$ 87,691</u>
Unallocated corporate expenses	23,971	—	—	—
Investments in affiliate and inventory step-up amortization	65,382	—	3,511	—
Impairment of fixed assets, intangibles and goodwill	6,873	—	—	—
Debt extinguishment costs	13,782	—	—	—
Losses on disposal of fixed assets	4,216	3,911	—	—
Foreign currency exchange (gains) losses	(3,558)	—	—	—
Non-cash revaluation of inventory, including LIFO	1,310	—	—	—
Management advisory fees	3,583	590	42	—
Transaction and other related costs	4,664	4,241	15,506	—
Equity-based and other non-cash compensation	7,042	2,256	—	—
Restructuring, integration and business optimization expenses	16,258	4,147	247	—
Defined benefit plan pension cost	1,375	2,903	—	—
Joint venture depreciation, amortization and interest	6,920	—	—	—
Abatement revenue	—	—	—	—
Corporate allocations	—	—	—	—
Estimated standalone costs	—	—	—	—
Retention bonus adjustment	—	—	—	—
Plant production—one-time	—	—	—	—
Contract adjustments	—	—	—	—
Other ⁽¹⁾	4,788	4,882	452	—
Segment Adjusted EBITDA	<u><u>\$355,504</u></u>	<u><u>\$117,704</u></u>	<u><u>\$ 9,122</u></u>	<u><u>\$ —</u></u>

(1) Other includes certain legal and environmental costs and other charges as capital taxes, asset retirement obligation accretion and other expenses.

The Company's consolidated results include equity in net loss from affiliated companies of \$2,612 for the year ended December 31, 2016. This is primarily comprised of equity in net income of \$33,518 in the EC&S segment from the Zeolyst Joint Venture for the year ended December 31, 2016. The remaining equity in net income for the Company is included in the PM&C segment, which is attributed to smaller investments and was not material. The Company's equity in net income from affiliates was more than offset by \$36,296 of amortization expense related to purchase accounting fair value adjustments associated with the Zeolyst Joint

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Venture for the year ended December 31, 2016 as a result of the Business Combination valuation. This portion of the Company's consolidated equity in net loss from affiliated companies is reflected in the "Corporate and Eliminations" line item of the Company's segment reconciliation of Adjusted EBITDA.

Capital expenditures for the Company's reportable segments are shown in the following table:

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014	Predecessor period from January 1, 2014 to November 30, 2014
	2016	2015		
Capital expenditures:				
Performance Materials & Chemicals	\$ 74,392	\$ —	\$ —	\$ —
Environmental Catalysts & Services ⁽¹⁾	74,921	41,854	2,892	32,690
Eliminations ⁽¹⁾	(19,001)	—	—	—
Total	\$130,312	\$41,854	\$ 2,892	\$ 32,690
Change in non-cash capital expenditures in A/P	(8,891)	(860)	—	—
Capital expenditures per the consolidated statement of cash flows	<u>\$121,421</u>	<u>\$40,994</u>	<u>\$ 2,892</u>	<u>\$ 32,690</u>

(1) Includes the Company's proportionate share of capital expenditures from the Zeolyst Joint Venture. The proportionate share of capital expenditures included in the EC&S segment is \$19,001 for the Zeolyst Joint Venture for the year ended December 31, 2016. These capital expenditures are in turn removed in the "Eliminations" line item to reconcile to the Company's consolidated capital expenditures.

Total assets by segment are not disclosed by the Company because the information is not prepared or used by the CODM to assess performance and to allocate resources.

Net sales and long-lived assets by geographic area are presented in the following tables. Net sales are attributed to countries based upon location of products shipped.

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014	Predecessor period from January 1, 2014 to November 30, 2014
	2016	2015		
Net sales ⁽¹⁾ :				
United States	\$ 705,348	\$388,875	\$ 35,539	\$ 361,823
Netherlands	79,821	—	—	—
United Kingdom	67,494	—	—	—
Other foreign countries	211,514	—	—	—
Total	\$1,064,177	\$388,875	\$ 35,539	\$ 361,823

(1) Except for the United States, no sales in an individual country exceeded 10% of the Company's total net sales.

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	December 31,	
	2016	2015
Long-lived assets(1):		
United States	\$ 2,870,958	\$ 936,111
Netherlands	288,239	—
United Kingdom	228,924	—
Other foreign countries	378,872	—
Total	<u>\$ 3,766,993</u>	<u>\$ 936,111</u>

(1) Long-lived assets exclude intercompany notes receivable and deferred tax assets.

13. Goodwill and Other Intangible Assets:

The changes in the carrying amount of goodwill for the years ended December 31, 2016 and 2015 are summarized as follows:

	Performance Materials & Chemicals	Environmental Catalysts & Services	Total
Balance as of January 1, 2016	\$ —	\$ 311,892	\$ 311,892
Goodwill recognized	876,844	81,683	958,527
Foreign exchange impact	(24,338)	(4,652)	(28,990)
Balance as of December 31, 2016	<u>\$ 852,506</u>	<u>\$ 388,923</u>	<u>\$ 1,241,429</u>
	Performance Materials & Chemicals	Environmental Catalysts & Services	Total
Balance as of January 1, 2015	\$ —	\$ 310,191	\$ 310,191
Goodwill adjustment	—	1,701	1,701
Balance as of December 31, 2015	<u>\$ —</u>	<u>\$ 311,892</u>	<u>\$ 311,892</u>

The Company completed its annual goodwill impairment assessments as of October 1, 2016 and 2015. (As a result of the 2014 Acquisition, there was no goodwill or indefinite-lived intangible asset impairment test required for 2014.) For the annual assessments, the Company bypassed the option to perform the qualitative assessment and proceeded directly to performing the first step of the two-step goodwill impairment test for each of its reporting units. As a result of the Business Combination, for the October 1, 2016 assessment, the Company identified four reporting units, two in each of its operating segments (PM&C and EC&S). For the October 1, 2015 assessment, the Company identified one reporting unit for testing.

The Company determined the fair value of its reporting units using a split between a market approach and an income, or discounted cash flow, approach. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Estimating the fair value of a reporting unit requires various assumptions including the use of projections of future cash flows and discount rates that reflect the risks associated with achieving those cash flows. The key assumptions used in estimating the fair value were the operating margin growth rates, revenue growth rates from implementation of strategic plans, the weighted average cost of capital, the perpetual growth rate, and the estimated earnings market multiples of each reporting unit. The market value was estimated using publicly traded

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comparable company values by applying their most recent annual EBITDA multiples to the reporting unit's trailing twelve months EBITDA. The income approach value was estimated using a discounted cash flow approach. The assumptions about future cash flows and growth rates are based on management's assessment of a number of factors including the reporting unit's recent performance against budget as well as management's ability to execute on planned future strategic initiatives. Discount rate assumptions are based on an assessment of the risk inherent in those future cash flows.

As of October 1, 2016 and 2015, the fair values of each of the Company's reporting units (with the exception of one) substantially exceeded their respective carrying values and therefore, the second step of the two-step goodwill impairment test was not required. For the Company's performance chemicals reporting unit within its PM&C segment, the result of the annual goodwill impairment test as of October 1, 2016 indicated that the fair value of the reporting unit was in excess of its carrying amount by 10%. Actual sales trends for the reporting unit were lower than originally forecasted due to unfavorable foreign exchange as well as lower volumes in certain product groups, particularly in the base silicate, pulp and paper, and drilling markets. The Company believes the performance chemicals reporting unit remains well positioned over the long term with respect to its entire portfolio of products; however, a deterioration in the macroeconomic environment could adversely affect the fair value or carrying amount of this reporting unit. The amount of goodwill associated with this reporting unit was \$577,667 as of the October 1, 2016 testing date.

In addition to the annual goodwill impairment assessment, the Company also performed the annual impairment test over its other indefinite-lived intangible assets as of October 1, 2016 and 2015. As a result of the test, the Company determined that the trade names related to its performance chemicals reporting unit within the PM&C segment and its catalysts reporting unit within the EC&S segment were impaired as of October 1, 2016. The impaired intangibles related to those identified as part of the Business Combination. The fair value of the respective trade names was determined using the relief-from-royalty method based on the discounted cash flows used in the goodwill impairment test. Slower sales growth rates for both reporting units led to the recognition of the impairment charges. Based on the testing performed, the Company recorded non-cash impairment charges of \$5,350 related to trade names within the performance chemicals reporting unit and \$1,523 related to trade names within the catalysts reporting unit. The impairment charges are included in the other operating expense, net line item of the Company's consolidated statement of operations for the year ended December 31, 2016.

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Gross carrying amounts and accumulated amortization for intangible assets other than goodwill are as follows:

	December 31, 2016					December 31, 2015		
	Gross Amounts	Accumulated Amortization	Impairment Charge	Foreign Exchange Impact	Net Balance	Gross Amounts	Accumulated Amortization	Net Balance
Technical know-how	\$214,290	\$ (10,029)	\$ —	\$ (7,855)	\$ 196,406	\$ 24,990	\$ (1,935)	\$ 23,055
Customer relationships	368,000	(31,199)	—	(11,064)	325,737	99,300	(7,176)	92,124
Contracts	19,800	(3,658)	—	—	16,142	—	—	—
Trademarks	35,400	(1,573)	—	(567)	33,260	—	—	—
Permits	9,100	(3,792)	—	—	5,308	9,271	(1,966)	7,305
Total definite-lived intangible assets	<u>646,590</u>	<u>(50,251)</u>	<u>—</u>	<u>(19,486)</u>	<u>576,853</u>	<u>133,561</u>	<u>(11,077)</u>	<u>122,484</u>
Indefinite-lived trade names	165,900	—	(6,873)	(5,105)	153,922	14,800	—	14,800
Indefinite-lived trademarks	82,900	—	—	(3,902)	78,998	—	—	—
In-process research and development	6,800	—	—	—	6,800	—	—	—
Total intangible assets	<u>\$902,190</u>	<u>\$ (50,251)</u>	<u>\$ (6,873)</u>	<u>\$(28,493)</u>	<u>\$ 816,573</u>	<u>\$ 148,361</u>	<u>\$ (11,077)</u>	<u>\$ 137,284</u>

The Company amortizes technical know-how over periods that range from fourteen to twenty years, customer relationships over periods that range from seven to fifteen years, trademarks over a fifteen year period, contracts over periods that range from two to sixteen years, and permits over five years.

Amortization of intangibles included in cost of goods sold on the consolidated statements of operations was \$13,573 and \$3,605 for the years ended December 31, 2016 and 2015, respectively, and \$300 and \$3,481 for the Successor and Predecessor Periods of 2014, respectively. Amortization of intangibles included in other operating expense, net on the consolidated statements of operations was \$25,263 and \$6,605 for the years ended December 31, 2016 and 2015, respectively, and \$552 and \$5,806 for the Successor and Predecessor Periods of 2014, respectively.

Estimated future aggregate amortization expense of intangible assets is as follows:

Year	Amount
2017	\$ 52,550
2018	50,930
2019	49,961
2020	46,410
2021	45,468
Thereafter	331,534
Total estimated future aggregate amortization expense	<u>\$ 576,853</u>

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14. Accrued Liabilities:

The following table summarizes the components of accrued liabilities as follows:

	December 31,	
	2016	2015
Compensation and bonus	\$47,823	\$11,684
Interest	9,139	2,947
Property tax	2,499	2,106
Environmental reserves (see Note 22)	8,346	1,857
Supply contract obligation (see Note 25)	1,638	1,638
Income taxes	8,035	—
Commissions and rebates	2,253	—
INEOS Group liability (see Note 22)	1,590	—
Supplemental retirement plans	1,170	—
Other	16,940	15,155
Total	<u>\$99,433</u>	<u>\$35,387</u>

15. Long-term Debt:

The summary of long-term debt is as follows:

	December 31,	
	2016	2015
Senior secured USD term loans with interest at 5.25% (due May 2022)	\$ 925,430	\$ —
Senior secured Euro term loans with interest at 5.00% (due May 2022)	297,317	—
Senior secured notes with interest at 6.75% (due November 2022)	625,000	—
Senior unsecured notes with interest at 11.75% (due May 2022)	525,000	—
Senior unsecured notes with interest at 8.50% (due November 2022)	200,000	200,000
Senior secured term loans with interest at 4.75% (was due December 2021)	—	495,000
ABL revolving credit facility (due May 2021)	—	—
Other	45,223	—
Total debt	2,617,970	695,000
Original issue discount	(28,497)	(2,160)
Deferred financing costs	(27,275)	(19,739)
Total debt, net of original issue discount and deferred financing costs	2,562,198	673,101
Less: current portion	(14,481)	(5,000)
Total long-term debt	<u>\$ 2,547,717</u>	<u>\$ 668,101</u>

Concurrent with the closing of the Business Combination, the Company refinanced the existing credit facilities of PQ Holdings and Eco Services by (i) entering into a \$1,200,000 senior secured term loan (consisting of a \$900,000 senior secured term loan and a \$300,000 Euro equivalent senior secured term loan), (ii) issuing \$625,000 in new senior secured notes, (iii) issuing \$525,000 in senior unsecured notes, and (iv) entering into a \$200,000 asset-based secured revolving credit facility. The existing PQ Holdings credit facilities were not legally assumed as part of the Business Combination, and the extinguishment of the debt was included as part of the consideration transferred for the Business Combination (see Note 7 to these consolidated financial statements for further information).

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The Company recorded \$4,747 of new creditor and third-party financing costs as debt extinguishment costs. In addition, previous unamortized deferred financing costs of \$6,252 and original issue discount of \$989 associated with the previously outstanding debt were written off as debt extinguishment costs.

The Company incurred deferred financing fees associated with the financing of its debt. Such deferred financing costs are amortized over the terms of the related agreements. Amortization of deferred costs of \$3,780 and \$2,801 for the years ended December 31, 2016 and 2015, respectively, were included in interest expense. In addition, the Company paid original issue discount associated with the financing of its debt. The original issue discount is amortized over the terms of the related agreements. Amortization of original issue discount of \$3,079 and \$314 for the years ended December 31, 2016 and 2015, respectively, were included in interest expense.

Senior Secured USD and Euro Term Loans and Asset-Based Revolving Loan

Concurrent with the Business Combination, the Company entered into new senior secured credit facilities (collectively, the “New Senior Secured Credit Facilities”) comprised of a \$1,200,000 term loan facility consisting of a \$900,000 U.S. dollar-denominated tranche and a \$300,000 Euro-denominated (or €265,000) tranche (the “Term Loan Facility”), and a \$200,000 asset-based revolving credit facility (the “ABL Facility”). The Term Loan Facility was issued at 99.0% of the principal amount. Borrowings under the Term Loan Facility bore interest at a rate equal to the LIBOR rate (or EURIBOR rate, as applicable) or the base rate elected by the Company at the time of the borrowing plus a margin of 4.75% or 3.75%, respectively. Further, the LIBOR rate and base rate elected under the facilities are subject to a floor of 1.00% and 2.00%, respectively. The Term Loan Facility requires minimum scheduled quarterly principal payments equal to 0.25% of the original principal amount of the term loans made on the closing date of the Business Combination. The Term Loan Facility has a maturity date of November 4, 2022, which date may be accelerated prior to the maturity date of the 2022 Notes unless the 2022 Notes have been refinanced or repaid prior to such time.

On November 14, 2016 (the “First Amendment Closing Date”), the Company entered into the First Amendment Agreement to the Term Loan Facility (the “First Amendment”) pursuant to which the Company, among other things: (a) refinanced the existing \$900,000 U.S. dollar-denominated tranche by issuing a U.S. dollar-denominated replacement term loan in the amount of \$927,750 and (b) refinanced the existing €265,000 (or \$300,000) Euro-denominated tranche by issuing a Euro-denominated replacement term loan in the amount of €283,338. Included in the U.S. dollar-denominated replacement term loan is an additional \$30,000 principal amount of borrowings. Included in the Euro-denominated replacement term loan is an additional €19,000 principal amount of borrowings. The borrowings under the First Amendment bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of borrowing plus a margin of 4.25% for U.S. dollar-denominated LIBOR Rate loans, 4.00% for Euro-denominated LIBOR Rate loans or 3.25%, for base rate loans. These new replacement term loans have substantially the same terms under the original Term Loan Facility subject to the amendments contained in the First Amendment.

The Company recorded \$474 of new creditor and third-party financing costs as debt extinguishment costs. In addition, previous unamortized deferred financing costs of \$564 and original issue discount of \$756 associated with the previously outstanding debt were written off as debt extinguishment costs.

The Company may at any time or from time to time voluntarily prepay loans under the Term Loan Facility in whole or in part without premium or penalty.

The Term Loan Facility further requires prepayments from certain “net cash proceeds” received and 50% of “excess cash flow” with step downs to lower percentages based on the Company’s leverage ratio, if applicable. In

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accordance with the Term Loan Facility, net cash proceeds generally relate to proceeds received from the issuance or incurrence of certain indebtedness or proceeds received on the disposition of assets, adjusted for certain costs and expenses, and are payable promptly upon receipt, subject in the case of net cash proceeds from asset dispositions or condemnation/casualty events exceeding certain thresholds. Net cash proceeds in respect of asset dispositions are not payable if such proceeds are reinvested in the Company's business within a certain specified time period. Excess cash flow is to be calculated annually and is defined as the sum of consolidated adjusted EBITDA, consolidated working capital adjustments and consolidated net income, each adjusted for various expenditures and/or proceeds commencing with the fiscal year ending on December 31, 2017. Prepayments with respect to excess cash flow, if any, are to be made on an annual basis due within 5 business days after the annual audited financials are delivered to the lenders thereunder of each year. The remaining principal balance of the term loans are due upon maturity.

The loans and guarantees under the Term Loan Facility are secured (i) by a first-priority security interest in, among other things, substantially all of the Company's and the guarantors' equity interests, equipment, intellectual property, pledged debt, material real estate assets, general intangibles, books, records and supporting obligations related to the foregoing and any other assets (other than collateral securing the ABL Facility on a first-priority basis) and (ii) by a second-priority security interest in receivables, inventory, deposit accounts and other collateral securing the ABL Facility. The liens securing the Term Loan Facility and the guarantees are *pari passu* with the liens securing the Senior Secured Notes subject to the *pari passu* intercreditor agreement.

The ABL Facility provides for up to \$200,000 in revolving credit borrowings consisting of up to \$150,000 in U.S. available borrowings, up to \$10,000 in Canadian available borrowings and up to \$40,000 of European available borrowings. Borrowings under the ABL Facility bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of the borrowing plus a margin of between 1.50%—2.00% or 0.50%—1.00%, respectively, depending on availability under the ABL Facility. In addition, there is an annual commitment fee equal to 0.375%, with a step-down to 0.25% based on the average usage of the revolving credit borrowings available. As of December 31, 2016, there were no revolving credit borrowings under the ABL Facility. Revolving credit borrowings are payable at the option of the Company throughout the term of the ABL Facility with the balance due May 4, 2021.

The Company has the ability to request letters of credit under the ABL Facility. The Company had \$18,417 of letters of credit outstanding as of December 31, 2016, which reduce available borrowings under the ABL Facility by such amounts.

The loans and guarantees under the ABL Facility are secured (i) by a first-priority security interest in, among other things, substantially all of the Company's and the guarantors' receivables, inventory, deposit accounts and other collateral securing the ABL Facility on a first-priority basis and (ii) by a second-priority security interest in the property and assets that secure the Term Loan Facility. In addition, the ABL Facility is secured by the equity interests in, and substantially all of the assets of, certain foreign guarantors in connection with the Canadian dollar-denominated and Euro-denominated availability.

The Term Loan Facility and the ABL Facility contain various non-financial restrictive covenants. Each limits the ability of PQ Corporation and its restricted subsidiaries to incur certain indebtedness or liens, merge, consolidate or liquidate, dispose of certain property, make investments or declare or pay dividends, make optional payments, modify certain debt instruments, enter into certain transactions with affiliates, enter into certain sales and leasebacks, and certain other non-financial restrictive covenants. The ABL Facility also contains one financial covenant which applies when minimum availability under the ABL Facility exceeds a certain threshold. During such time, the Company is required to maintain a fixed-charge coverage ratio of at least 1.0 to 1.0.

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Senior Secured Notes

Concurrent with the Business Combination, the Company issued \$625,000 of 6.750% Senior Secured Notes due November 2022 (the “Senior Secured Notes”) in transactions exempt from or not subject to registration under the Securities Act pursuant to Rule 144A and Regulation S under the Securities Act of 1933. The Senior Secured Notes are senior secured obligations of the Company and rank equally in right of payment with all of the Company’s existing and future senior debt, and are senior in right of payment to all of the Company’s existing and future subordinated debt. The Senior Secured Notes are effectively senior to all of the Company’s existing and future unsecured indebtedness that is not secured, to the extent of the value of the collateral securing the Senior Secured Notes. The Senior Secured Notes are effectively subordinated to the Company’s ABL Facility, to the extent of the value of the assets securing the ABL Facility on a first priority basis. The Senior Secured Notes are also structurally subordinated to the liabilities of PQ Corporation’s existing and future non-guarantor subsidiaries. The indenture relating to the Senior Secured Notes contains various limitations on the Company’s and its restricted subsidiaries’ ability to incur additional indebtedness, pay dividends or repay certain debt, make loans and investments, sell assets, create liens, enter into transactions with affiliates, enter into agreements restricting PQ Corporation’s subsidiaries ability to pay dividends, and merge and consolidate with other companies, among other things. Interest on the Senior Secured Notes is payable on May 15 and November 15 of each year, commencing November 15, 2016. No principal payments are required with respect to the Senior Secured Notes prior to their final maturity. The Senior Secured Notes mature on November 15, 2022.

The obligations of the Company under the Senior Secured Notes and the related indenture are guaranteed by PQ Holdings and CPQ Midco I Corporation, PQ Corporation’s direct parent, and each of PQ Corporation’s current and future domestic subsidiaries that is a guarantor under the Term Loan Facility. The obligations of the Company under the Senior Secured Notes and the indenture are secured (i) by a first-priority security interest in substantially all of the Company’s and the guarantors’ property and assets that secure the Term Loan Facility (other than collateral securing the ABL Facility on a first-priority basis) and (ii) by a second-priority security interest in receivables, inventory, deposit accounts and other collateral securing the ABL Facility. The liens securing the Senior Secured Notes and the guarantees are *pari passu* with the liens securing the Term Loan Facility subject to the *pari passu* intercreditor agreement.

If any Event of Default (other than a default relating to certain events of bankruptcy or insolvency of PQ Corporation or certain of its subsidiaries) occurs and is continuing under the Indenture, the Trustee or the Holders of at least 30% in principal amount of the then total outstanding notes by notice to the Company may declare the principal, premium, if any, interest and any other monetary obligations on all the then outstanding notes to be due and payable immediately. If an event of default arising from certain events of bankruptcy or insolvency of the Company occurs, the principal of, premium, if any, and interest on all the Senior Secured Notes shall become immediately due and payable without any declaration or other act on the part of the trustee or any holders.

Upon the occurrence of a change of control, as defined, each holder will have the right to require the Company to purchase all or any part of such holder’s Senior Secured Notes at a purchase price in cash equal to 101% of the principal amount, plus accrued and unpaid interest.

Senior Unsecured Notes

Concurrent with the Business Combination, the Company issued \$525,000 aggregate principal amount of floating rate Senior Unsecured Notes due 2022 (the “Senior Unsecured Notes”) in a concurrent private placement exempt from the registration requirements of the Securities Act. The notes were issued at 98.0% of the principal amount. The Senior Unsecured Notes will mature on May 1, 2022; provided that if the 2022 Notes have been

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refinanced or otherwise repaid prior to such date, the Senior Unsecured Notes will instead mature on May 1, 2023. Interest on the Senior Unsecured Notes is paid and reset quarterly at an annual rate equal to the three-month LIBOR plus 10.75% per year, with a 1.0% LIBOR floor. The note purchase agreement relating to the Senior Unsecured Notes contains various limitations on the Company's and its restricted subsidiaries' ability to incur additional indebtedness, pay dividends or repay certain debt, make loans and investments, sell assets, create liens, enter into transactions with affiliates, enter into agreements restricting PQ Corporation's subsidiaries ability to pay dividends, and merge and consolidate with other companies, among other things. Interest is payable on March 15, June 15, September 15, and December 15 of each year, commencing on June 15, 2016. The Senior Unsecured Notes are senior unsecured obligations of the Company and the guarantors. The obligations of the Company under the Senior Unsecured Notes and the related note purchase agreement are guaranteed by PQ Holdings and CPQ Midco I Corporation, PQ Corporation's direct parent, and each of PQ Corporation's subsidiaries that is a guarantor under the New Senior Secured Credit Facilities.

If any event of default (other than a default relating to certain events of bankruptcy or insolvency of PQ Corporation or certain of its subsidiaries) shall occur and be continuing, holders then holding greater than 50% of the sum of the aggregate principal amount of Senior Unsecured Notes then outstanding may, through the agent named in the note purchase agreement, declare the principal of, premium, if any, and accrued but unpaid interest on all the Senior Unsecured Notes to be due and payable and the same shall become immediately due and payable. If an event of default arising from certain events of bankruptcy or insolvency of the Company occurs, the principal of, premium, if any, and interest on all the Senior Unsecured Notes shall become immediately due and payable without any declaration or other act on the part of the agent or any holders.

Within ten days after the Company has knowledge of the occurrence of a change of control, as defined, the Company will give notice of the change of control to the agent and shall offer to prepay all, but not less than all, of the Senior Unsecured Notes held by each holder. In the event that the change of control occurs prior to the second anniversary of the closing date of the Senior Unsecured Notes, the notes will be prepaid at a price equal to 100% of the principal amount so prepaid, plus a make-whole premium. In the event that the change of control occurs on or after the second anniversary but before the third anniversary of the closing date, the Senior Unsecured Notes will be prepaid at a price equal to 106% of the principal amount so prepaid, plus accrued and unpaid interest thereon as of the date of prepayment. In the event that the change of control occurs on or after the third anniversary but before the fourth anniversary of the closing date, the Senior Unsecured Notes will be prepaid at a price equal to 103% of the principal amount so prepaid, plus accrued and unpaid interest thereon as of the date of prepayment. In the event that the change of control occurs on or after the fourth anniversary but before the fifth anniversary of the closing date, the Senior Unsecured Notes will be prepaid at a price equal to 101% of the principal amount so prepaid, plus accrued and unpaid interest thereon as of the date of prepayment. In the event that the change of control occurs on or after the sixth anniversary of the closing date, the Senior Unsecured Notes will be prepaid at a price equal to 100% of the principal amount so prepaid, plus accrued and unpaid interest thereon as of the date of prepayment.

Senior Secured Credit Facilities

On December 1, 2014, Eco Services entered into a credit agreement (the "Senior Credit Agreement") governing a \$555,000 senior secured credit facility, which included a \$500,000 term loan facility and a \$55,000 revolving credit facility (collectively, the "Senior Secured Credit Facilities"). The full amount of the \$500,000 term loan facility was drawn on December 1, 2014 (the "Eco Credit Facility Closing Date") to finance a portion of 2014 Acquisition with Solvay, including working capital and/or purchase price adjustments payable on the Eco Credit Facility Closing Date and the payment of related fees, expenses and other costs of the transactions. The Senior Credit Agreement was due to mature on December 1, 2021.

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Borrowings under the Senior Credit Agreement bore interest at a rate per annum equal to an applicable interest rate margin, plus, at Eco Services' option, either (a) a base rate determined by the reference to the highest of (1) the prime commercial lending rate publicly announced by the administrative agent as the "prime rate" as in effect on such day, (2) the federal funds effective rate plus 0.50%, and (3) the LIBOR rate determined by reference to the cost of funds for Eurodollar deposits for an interest period of one month, plus 1.00% or (b) a LIBOR rate determined by reference to the costs of funds for Eurodollar deposits for the specified interest period, as adjusted for certain statutory reserve requirements. As of December 31, 2015, the interest rate on the Senior Credit Agreement was 4.75%.

The term loan facility was issued at 99.5% of the principal amount, resulting in an original issue discount on the term loan facility of \$2,500. The accretion of the original issue discount is reported as interest expense, and is accreted under the effective interest method over the term of the loan.

Proceeds from the revolving credit facility were to be used to finance the Company's working capital needs and other general corporate purposes, including investments, restricted payments and any other purpose not prohibited as defined in the Senior Credit Agreement. In 2015, the Company borrowed and repaid \$12,000 under the revolving credit facility, resulting in no outstanding credit balance on the revolving credit facility as of December 31, 2015. The unamortized debt issuance costs of \$1,585 as of December 31, 2015 related to the revolving credit facility are presented as a noncurrent asset.

A portion of the revolving credit facility, not to exceed \$25,000, was also available for the issuance of letters of credit. As of December 31, 2015, Eco Services issued letters of credit totaling \$13,270.

Concurrent with the Business Combination, on May 4, 2016 the Senior Secured Credit Facilities were refinanced and as such, there is no principal amount outstanding as of December 31, 2016.

2022 Notes

In December 2014, Eco Services issued \$200,000 aggregate principal amount of 8.50% senior notes due 2022 (the "2022 Notes") under an indenture dated October 24, 2014. The 2022 Notes were issued in a private transaction exempt from the registration requirements of the Securities Act. Pursuant to the indenture governing the 2022 Notes, PQ Group Holdings assumed the obligations of Eco Services under the 2022 Notes following the Business Combination. Interest on the 2022 Notes is payable on May 1 and November 1 of each year. The 2022 Notes mature on November 1, 2022 and were issued at 100% of the principal amount. In 2014, the Successor Company recorded \$3,000 of costs related to potential bridge financing that was charged to interest expense upon the issuance of the 2022 Notes. The 2022 Notes are unsecured senior obligations of the Company, *pari passu* in right of payment to all existing and future senior indebtedness of the Company, and effectively subordinated to all secured indebtedness of the Company to the extent of the value of the assets securing such senior indebtedness. The 2022 Notes are senior in right of payment to all subordinated indebtedness of the Company.

The Company is not required to make any mandatory redemption or sinking fund payments with respect to the 2022 Notes. However, under certain circumstances, the Company may be required to offer to purchase the 2022 Notes if it undergoes a change in control or a sale of assets.

At any time prior to November 1, 2017, the Company may redeem all or part of the 2022 Notes, at its option, at a redemption price equal to 100% of the principal amount redeemed plus an applicable make-whole premium and accrued and unpaid interest.

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On and after November 1, 2017, the Company may redeem all or part of the 2022 Notes, at its option, at the redemption prices (expressed as percentages of the principal amount of the 2022 Notes redeemed) set forth below, plus accrued and unpaid interest, beginning on November 1 of each of the years indicated below:

Year	Percentage
2017	104.25%
2018	102.13%
2019 and thereafter	100.00%

In addition, until November 1, 2017, the Company may, at its option, on one or more occasions redeem up to 40% of the aggregate principal amount of the 2022 Notes at a redemption price equal to 108.50% of the aggregate principal amount thereof, plus accrued and unpaid interest, with the net cash proceeds of certain equity offerings, provided that at least 50% of the aggregate principal amount of the 2022 Notes originally issued remains outstanding immediately after the occurrence of each such redemption.

New Markets Tax Credit Financings

On October 24, 2013, PQ Holdings' (and now the Company's) subsidiary Potters Industries, LLC ("Potters") entered into a NMTC financing arrangement with JPMorgan Chase Bank N.A. and several of its affiliates ("Chase") and TX CDE V LLC, an affiliate of Texas LIC Development Company LLC d/b/a Texas Community Development Capital ("TX CDE") to fund the expansion of Potters' manufacturing facility in Paris, Texas (the "2013 NMTC Agreement"). The NMTC program, which is administered by the United States Treasury Department, requires certain balance sheet commitments. The 2013 NMTC Agreement will provide the Company with certain monetary benefits as an offset to specifically identified capital expenditures. The 2013 NMTC Agreement requires that certain commitments and covenants be maintained over a period of seven years in order to legally recognize the benefit. Chase agreed to contribute \$6,634 and an additional \$15,632 in funds lent to Chase by Potters Holdings II, L.P. to TX CDE. TX CDE, in turn, lent \$21,000 in the form of \$5,368 and \$15,632 of notes to Potters, which used the proceeds to finance the expansion of Potters' manufacturing facility in Paris, Texas. The capital expenditures associated with the 2013 NMTC Agreement were completed in 2014. The \$21,000 of debt related to the 2013 NMTC was assumed as part of the Business Combination and was outstanding as of December 31, 2016.

In connection with the 2013 NMTC Agreement, the Company provided an indemnification related to its actions or inactions which cause either a NMTC disallowance or recapture event. In the event that the Company causes either a recapture or disallowance of the tax credits expected to be generated under this program, then the Company will be required to repay the disallowed or recaptured tax credits plus an amount sufficient to pay the taxes on such repayment to the counterparty of the agreement. This indemnification covers the Company's actions and inactions prior to September 6, 2020. The maximum potential amount of future payments under this indemnification is approximately \$12,600. The Company currently believes that the likelihood of a required payment under this indemnification is remote.

On May 17, 2016, Potters entered into a NMTC financing arrangement with U.S. Bank N.A. and several of its affiliates ("USB") and MRC XX LLC, an affiliate of Midwest Renewable Capital, LLC ("MRC"), to fund the expansion of Potters' manufacturing facility in Augusta, Georgia (the "May 2016 NMTC Agreement"). The May 2016 NMTC Agreement provides the Company with certain monetary benefits as an offset to specifically identified capital expenditures. The May 2016 NMTC Agreement requires that certain commitments and covenants be maintained over a period of seven years in order to legally recognize the benefit. USB agreed to

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contribute \$3,732 and an additional \$7,822 in funds lent to USB by Potters Holdings II, L.P. to MRC. MRC, in turn, lent \$11,000 in the form of \$7,822, \$1,311 and \$1,866 of notes to Potters, which used the proceeds to finance the expansion of Potters' manufacturing facility in Augusta, Georgia. The \$11,000 was outstanding as of December 31, 2016. The capital expenditures associated with the May 2016 NMTC Agreement are expected to be completed in 2017.

In connection with the May 2016 NMTC Agreement, the Company provided an indemnification related to its actions or inactions which cause either a NMTC disallowance or recapture event. In the event that the Company causes either a recapture or disallowance of the tax credits expected to be generated under this program, then the Company will be required to repay the disallowed or recaptured tax credits plus an amount sufficient to pay the taxes on such repayment to the counterparty of the agreement. This indemnification covers the Company's actions and inactions prior to May 17, 2023. The maximum potential amount of future payments under this indemnification is approximately \$4,077. The Company currently believes that the likelihood of a required payment under this indemnification is remote.

On December 29, 2016, Potters entered into a second NMTC financing arrangement with USB and MRC whereby USB agreed to contribute \$3,815 and an additional \$7,775 in funds lent to USB by Potters Holdings II, L.P. to MRC. MRC, in turn, lent \$11,000 in the form of \$7,775, \$1,402 and \$1,823 of notes to Potters, which will use the proceeds as working capital for another expansion of Potters' manufacturing facility in Paris, Texas (the "December 2016 NMTC Agreement"). The \$11,000 was outstanding as of December 31, 2016. Potters expects to expend the proceeds of the notes as working capital in 2017.

In connection with the December 2016 NMTC Agreement, the Company provided an indemnification related to its actions or inactions which cause either a NMTC disallowance or recapture event. In the event that the Company causes either a recapture or disallowance of the tax credits expected to be generated under this program, then the Company will be required to repay the disallowed or recaptured tax credits plus an amount sufficient to pay the taxes on such repayment to the counterparty of the agreement. This indemnification covers the Company's actions and inactions prior to December 29, 2023. The maximum potential amount of future payments under this indemnification is approximately \$4,290. The Company currently believes that the likelihood of a required payment under this indemnification is remote.

Other Debt

The Company also has several note payable agreements denominated in Japanese Yen which enables the Company to borrow up to a total of 260,000 Japanese Yen, or \$2,158. Borrowings bear interest at either TIBOR ("Tokyo Interbank Offered Rate") plus a margin or the short-term prime rate with a weighted average rate of 0.53% as of December 31, 2016. The terms of the agreements vary and are renewable upon expiration of the term with the balances due in 2016. Borrowings under the agreement are payable at the option of the Company throughout the term of the agreements. Borrowings outstanding under these agreements were \$2,158 as of December 31, 2016.

Certain of the Company's foreign subsidiaries maintain other note payable agreements. These agreements are not further described as they are not significant to the consolidated financial statements.

The fair value of a financial instrument is the amount at which the instrument could be exchanged in a current transaction. As of December 31, 2016 and 2015, the fair value of the senior secured term loans and senior secured and unsecured notes was higher than book value by \$68,477 and lower than book value by \$42,375, respectively. The fair value of the senior secured term loans and senior secured and unsecured notes was derived from published loan prices at December 31, 2016 and 2015, as applicable. The fair value is classified as Level 2 based upon the fair value hierarchy (see Note 4 to these consolidated financial statements for further information on fair value measurements).

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The aggregate long-term debt maturities are:

Year	Amount
2017	\$ 14,481
2018	12,258
2019	12,258
2020	12,258
2021	33,258
Thereafter	2,533,457
	<u>\$ 2,617,970</u>

16. Other Long-term Liabilities:

The following table summarizes the components of other long-term liabilities as follows:

	December 31,	
	2016	2015
Pension benefits	\$ 71,443	\$ 20,239
Supply contract (see Note 25)	22,250	23,888
Other postretirement benefits	3,991	—
Supplemental retirement plans	12,055	—
Reserve for uncertain tax positions	4,149	—
Asset retirement obligation	3,700	—
INEOS Group liability (see Note 22)	329	—
Other	5,238	3,850
Total	<u>\$ 123,155</u>	<u>\$ 47,977</u>

17. Financial Instruments:

The Company uses interest rate related derivative instruments to manage its exposure related to changes in interest rates on its variable-rate debt instruments and uses commodity derivatives to manage its exposure to commodity price fluctuations. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates and commodity prices, the Company exposes itself to credit risk and market risk. Credit risk is the failure of the counterparty to perform under the terms of the derivative contract. When the fair value of a derivative contract is an asset, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is a liability, the Company owes the counterparty and, therefore, the Company is not exposed to the counterparty's credit risk in those circumstances. The Company minimizes counterparty credit risk in derivative instruments by entering into transactions with high quality counterparties. The derivative instruments entered into by the Company do not contain credit-risk-related contingent features.

Market risk is the adverse effect on the value of a derivative instrument that results from a change in interest rates, currency exchange rates, or commodity prices. The market risk associated with interest rate and commodity price contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

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Use of Derivative Financial Instruments to Manage Commodity Price Risk. The Company is exposed to risks in energy costs due to fluctuations in energy prices, particularly natural gas. The Company has a hedging program in the United States which allows the Company to mitigate exposure to natural gas volatility with natural gas swap agreements. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices of comparable contracts. The respective current and non-current liabilities are recorded in accrued liabilities and other long-term liabilities and the respective current and non-current assets are recorded in prepaid and other current assets and other long-term assets, as applicable. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains or losses are recorded in stockholders' equity as a component of other comprehensive income (loss), net of tax. Realized gains and losses on natural gas hedges are included in production cost and subsequently charged to cost of goods sold in the consolidated statements of operations in the period in which inventory is sold.

Use of Derivative Financial Instruments to Manage Interest Rate Risk. The Company is exposed to fluctuations in interest rates on the New Senior Secured Credit Facilities and Senior Unsecured Notes. Changes in interest rates will not affect the market value of such debt but will affect the amount of our interest payments over the term of the loans. Likewise, an increase in interest rates could have a material impact on the Company's cash flow. The Company hedges the interest rate fluctuations on debt obligations through interest rate cap agreements. The Company records these agreements at fair value as assets or liabilities. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains or losses are deferred in stockholders' equity as a component of other comprehensive income (loss), net of tax. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices.

In July 2016, the Company entered into interest rate cap agreements, paying a premium of \$1,551 to mitigate interest rate volatility from July 2016 through July 2020 by employing varying cap rates ranging from 1.50% to 3.00% on \$1,000,000 of notional variable rate debt.

The fair values of derivative instruments held as of December 31, 2016 are shown below:

	<u>Balance sheet location</u>	<u>December 31, 2016</u>
Asset derivatives:		
Derivatives designated as cash flow hedges:		
Natural gas swaps	Current assets	\$ 573
Natural gas swaps	Other long-term assets	58
Interest rate caps	Other long-term assets	<u>5,803</u>
Total asset derivatives		<u>\$ 6,434</u>

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The following table shows the effect of the Company's derivative instruments designated as hedges on other comprehensive income (loss) ("OCI") and the statement of income for the year ended December 31, 2016:

	<u>Location in Earnings</u>	<u>Year ended December 31, 2016</u>
Derivatives designated as cash flow hedges:		
AOCI derivative gain (loss) at beginning of year		\$ —
Effective portion of changes in fair value recognized in OCI:		
Interest rate caps		4,250
Natural gas swaps		(802)
Amount of gain reclassified from OCI to earnings:		
Interest rate caps	Interest expense	—
Natural gas swaps	Cost of goods sold	1,433
AOCI derivative gain at end of year		<u>\$ 4,881</u>

Amounts of unrealized gains in OCI that are expected to be reclassified to the consolidated statement of operations over the next twelve months are \$533 as of December 31, 2016.

18. Income Taxes:

Years Ended December 31, 2016 and 2015, and the Period from Inception (July 30, 2014) to December 31, 2014 (Successor Period)

Income (loss) before income taxes and non-controlling interest within or outside the United States are shown below:

	<u>Years ended December 31,</u>		<u>Successor Period from inception (July 30, 2014) to December 31, 2014</u>
	<u>2016</u>	<u>2015</u>	<u>2014</u>
Domestic	\$(84,094)	\$11,427	\$ (22,061)
Foreign	14,977	—	—
Total	<u>\$(69,117)</u>	<u>\$11,427</u>	<u>\$ (22,061)</u>

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The provision (benefit) for income taxes as shown in the accompanying consolidated statements of operations consists of the following:

	<u>December 31,</u> <u>2016</u>
Current:	
Federal	\$ (434)
State	91
Foreign	10,088
	<u>9,745</u>
Deferred:	
Federal	9,088
State	292
Foreign	(9,084)
	<u>296</u>
Provision for income taxes	<u>\$ 10,041</u>

A reconciliation of income tax expense (benefit) at the U.S. federal statutory income tax rate of 35% to actual income tax expense is as follows:

	<u>December 31,</u> <u>2016</u>
Tax at statutory rate	\$ (24,191)
State income taxes, net of federal income tax benefit	(4,110)
Goodwill Impairment	—
Repatriation of non-US earnings	4,576
Change in Tax Status—Eco—Passthrough to C-Corp	33,891
Changes in uncertain tax positions	(2,383)
Change in valuation allowances	2,577
Deduction on foreign taxes	—
Change in state effective rates	(290)
Foreign withholding taxes	1,505
Foreign tax rate differential	(1,354)
Provision to return adjustments	—
Non-deductible transaction costs	667
Other, net	(847)
Provision for income taxes	<u>\$ 10,041</u>

The total tax provision of \$10,041 for the year ended December 31, 2016 on the Company's consolidated pre-tax income for the period differs from the U.S. statutory tax rate of 35% principally due to the repatriation of non-U.S. earnings, foreign income tax in jurisdictions with statutory rates different than the U.S. rate, state taxes, non-deductible transaction costs, foreign withholding taxes, changes in valuation allowance, and changes in uncertain tax positions.

Prior to the Business Combination on May 4, 2016, Eco Services was a single member limited liability company and taxed as a partnership for federal and state income tax purposes. As such, all income tax liabilities

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and/or benefits of Eco Services were passed through to their members. Because Eco Services was taxed as a partnership, it did not record deferred taxes on the basis difference on their financial statements. Following the Business Combination on May 4, 2016, Eco Services had a change in tax status and is now taxed as a C-Corporation subject to federal and state corporate level income taxes at prevailing corporate tax rates. As Eco Services had not previously recorded deferred taxes on the basis difference, the Company recognized net deferred tax liabilities of \$33,891 for the year ended December 31, 2016 primarily related to basis differences in depreciable fixed assets and intangible assets based upon prevailing corporate tax rates.

Deferred tax assets (liabilities) are comprised of the following:

	<u>December 31,</u> <u>2016</u>
Deferred tax assets:	
Net operating loss carryforwards	\$ 157,811
Pension	21,454
Postretirement health	1,040
Transaction costs	2,896
Natural gas contracts	—
Interest rate swaps	—
Unrealized translation losses	6,046
Other	44,351
Valuation allowance	(38,271)
	<u>\$ 195,327</u>
Deferred tax liabilities:	
Depreciation	\$ (114,749)
Undistributed earnings of non-US subsidiaries	(73,205)
LIFO reserve	—
Inventory	(20,159)
Intangible assets	(276,671)
Natural gas contracts	(241)
Other accruals	(1,621)
Other	(27,144)
	<u>\$ (513,790)</u>
Net deferred tax liabilities	<u>\$ (318,463)</u>

Included in the 2016 deferred tax asset and liability amounts for depreciation, intangible assets, inventory, natural gas contracts, and other above is (\$75,539) of a net deferred tax liability related to the Company's investment in Potters, which is a partnership for federal income tax purposes. The Company and one of its subsidiaries own in aggregate 100% of Potters and the assets and liabilities of Potters are included in the consolidated financial statements of the Company.

The \$318,463 in net deferred tax liabilities as of December 31, 2016 consists of \$195,327 in non-current deferred tax assets and \$513,790 in net non-current deferred tax liabilities. Prior to the Business Combination, Eco Services was a single member LLC, treated as a partnership for federal and state tax purposes, with no deferred taxes provided.

The change in net deferred tax assets (liabilities) for the year ended December 31, 2016 was primarily related to the increase in deferred tax assets on accrued pension obligations, and book amortization of intangibles with no corresponding tax basis.

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Following are changes in the deferred tax valuation allowance during the year ended December 31, 2016:

	<u>Beginning Balance</u>	<u>Additions</u>	<u>Reductions</u>	<u>Ending Balance</u>
Year ended December 31, 2016	\$ —	46,347	(8,076)	\$38,271

The net change in the total valuation allowance was an increase of \$38,271 in 2016. Prior to the Business Combination, Eco Services was a single member LLC, treated as a partnership for federal and state tax purposes. Any income tax liabilities and/or benefits of Eco Services were passed through to the member. As such, prior to May 4, 2016, the date of the Business Combination, the valuation allowance was \$0. The valuation allowance at December 31, 2016 was primarily related to foreign and state net operating loss carryforwards and tax credits that, in the judgment of management, are not more likely than not to be realized. In assessing the ability to realize deferred tax assets, management considered whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considered the scheduled reversal of deferred tax liabilities (including the impact of available carryback and carryforward periods), projected future taxable income, and tax-planning strategies that are prudent in making this assessment. In order to fully realize deferred tax assets, the Company will need to generate future taxable income prior to the expiration of the net operating loss and credit carryforwards. The amount of the deferred tax assets considered realizable, however, could be reduced in the near term if estimates of future taxable income during the carryforward period are reduced.

Management considered certain earnings in non-U.S. subsidiaries to be available for repatriation in the future. The tax cost associated with non-U.S. subsidiary earnings and distributions for the year ended December 31, 2016 has been recorded as tax expense for the period. In this regard the Company expects to deduct, rather than credit, foreign tax expense in computing the U.S. tax effects of repatriation from non-U.S. subsidiaries in 2016. The unremitted earnings of non-U.S. subsidiaries and affiliates that have not been reinvested abroad indefinitely amount to \$190,586 as of December 31, 2016. The deferred U.S. federal and state income tax liability and deferred foreign withholding tax liability on these undistributed earnings is estimated to be \$73,205.

As of December 31, 2016, the cumulative unremitted earnings of foreign subsidiaries outside the United States, considered permanently reinvested, for which no income or withholding taxes have been provided, approximated \$194,444. Such earnings are expected to be reinvested indefinitely and, as a result, no deferred tax liability has been recognized with regard to such earnings. Determination of the deferred income tax liability on these unremitted earnings is not practicable, principally because such liability, if any, is dependent on circumstances existing if and when remittance occurs.

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The following table summarizes the activity related to our gross unrecognized tax benefits:

	<u>December 31,</u> <u>2016</u>
Balance at beginning of period	\$ —
Increases related to prior year tax positions	19,419
Decreases related to prior year tax positions	(68)
Increases related to current year tax positions	691
Decreases related to current year tax positions	—
Decreases related to settlements with taxing authorities	(3,914)
Decreases related to lapsing of statute of limitations	—
Balance at end of period	<u>\$ 16,128</u>

Included in the balance of total unrecognized tax benefits are potential benefits of \$16,128 arising from legacy PQ Corporation, that if recognized, would affect the effective tax rate on income from continuing operations as of December 31, 2016.

Interest and penalties recognized related to uncertain tax positions amounted to (\$2,054) in 2016. To the extent interest and penalties are not assessed with respect to uncertain tax positions, amounts accrued will be reduced and reflected as a reduction of the overall income tax provision in the period for which the event occurs requiring the adjustment. The \$1,177 in accrued interest and penalties as of December 31, 2016 is recorded in other long-term liabilities in the consolidated balance sheet.

Due to the Business Combination, the Company files numerous consolidated and separate income tax returns in the U.S. federal jurisdiction and in many state and foreign jurisdictions. The following describes the open tax years, by major tax jurisdiction, as of December 31, 2016:

<u>Jurisdiction</u>	<u>Period</u>
United States—Federal	2007—Present
United States—State	2008—Present
Canada ^(a)	2008—Present
Germany	2012—Present
Netherlands	2011—Present
Mexico	2011—Present
United Kingdom	2012—Present
Brazil	2012—Present

^(a)—Includes federal as well as local jurisdictions

Given that certain U.S. companies have net operating loss carryforwards, the statute for examination by taxing authorities in the United States, and certain state jurisdictions, will remain open for a period following the use of such net operating loss carryforwards, extending the period for examination beyond the years indicated above.

The Company has subsidiaries in various states, provinces and countries that are currently under audit for years ranging from 2008 through 2016. To date, no material adjustments have been proposed as a result of these audits. As of December 31, 2016, the Company does not believe that there are any positions for which it is reasonably possible that the total amount of unrecognized tax benefits will significantly increase or decrease within the next 12 months.

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The Company has a net operating loss carry-forward (“NOL”) available of \$383,182 to reduce future federal taxes payable. The federal carry-forward period is 20 years. As a result of the Business Combination, \$332,376 of the \$383,182 may be subject to the limitations of Section 382 of the Internal Revenue Code (“IRC”). Although potentially subject to the limitations of IRC §382, management believes it is more likely than not that the Company will realize the entire \$332,376 in pre-transaction NOLs in future years. The remaining \$50,806 relates to periods after the Business Combination and would not be subject to IRC §382.

For state income tax purposes, the Company incurred net operating losses of \$92,498 for 2016 that may be carried forward at periods ranging from 5 to 20 years among the states in which the Company is subject to tax to reduce future state income taxes payable. Cumulative state net operating losses carrying forward into 2017 are \$547,641. A valuation allowance of \$10,209 has been applied against the total \$21,659 of state net operating loss deferred tax assets, leaving losses of \$11,450 that have been recognized for financial accounting purposes for the portion of those losses that the Company believes, on a more likely than not basis, will be realized.

Foreign net operating losses of \$59,426, of which \$10,667 will begin to expire in 2037 with the remaining \$48,749 carrying forward indefinitely, are available to reduce future foreign income taxes payable. A valuation allowance of \$11,501 has been applied to \$14,840 of deferred tax assets related to foreign net operating loss carry-forwards, leaving a net deferred tax asset relating to foreign net operating losses of \$3,339 that has been recognized for financial accounting purposes.

Cash payments for income taxes are as follows:

	<u>December 31,</u>		<u>Successor</u>
	<u>2016</u>	<u>2015</u>	<u>period from inception</u>
			<u>(July 30, 2014) to</u>
			<u>December 31,</u>
			<u>2014</u>
Domestic	\$ 373	\$ 8	\$ —
Foreign	<u>16,608</u>	<u>—</u>	<u>—</u>
	<u>\$16,981</u>	<u>\$ 8</u>	<u>\$ —</u>

Predecessor Period

For the Predecessor Period, income taxes have been prepared on a separate return basis as if Solvay’s Eco business unit was a stand-alone entity. Historically, Solvay’s Eco business unit was included in the tax filings with other Solvay entities. Tax expenses (benefits) as presented are not reflective of the results that Solvay’s Eco business unit will generate in the future or would have generated on a stand-alone basis.

Pre-tax income for Solvay’s Eco business unit was as follows:

	<u>January 1 to</u>
	<u>November 30,</u>
	<u>2014</u>
U.S.	\$ 45,147
Total	<u>\$ 45,147</u>

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The components of the provision for income taxes were:

	January 1 to November 30, 2014
Current tax expense:	
U.S. federal	\$ 22,215
U.S. state and local	2,651
Total current tax expense	<u>24,866</u>
Deferred tax (benefit):	
U.S. federal	(9,065)
U.S. state and local	(1,199)
Total deferred tax benefit	<u>(10,264)</u>
Total provision for income taxes	<u><u>\$ 14,602</u></u>

An analysis of the effective income tax rate follows:

	January 1 to November 30, 2014	
Statutory U.S. federal income tax rate	\$ 15,801	35.00%
Meals & entertainment (50%)	55	0.12%
Domestic production deduction	(2,197)	(4.81)%
State taxes—current	1,723	3.77%
State taxes—deferred	(780)	(1.68)%
Provision for income taxes	<u>\$ 14,602</u>	<u>32.40%</u>

19. Benefit Plans:

The Company sponsors defined benefit pension plans covering employees in the United States and certain employees at its foreign subsidiaries. Benefits for a majority of the plans are based on average final pay and years of service. The Company's funding policy is to fund the minimum required contribution under local statutory requirements.

The Company sponsors unfunded plans to provide certain health care benefits to retired employees in the United States and Canada. The plans pay a stated percentage of medical expenses reduced by deductibles and other coverage. The plans are unfunded and obligations are paid out of the Company's operations.

The Company also has defined benefit supplementary retirement plans which provide benefits for certain U.S. employees in excess of qualified plan limitations. The obligations are paid out of the Company's general assets, including assets held in a Rabbi trust, or restoration plan assets.

The Company uses a December 31 measurement date for all of its defined benefit pension, postretirement medical and supplementary retirement plans.

The following discussion includes information for the Eco Services benefit plans for all periods presented, and the acquired PQ Holdings benefit plans beginning on the date of the Business Combination. The Company assumed the liabilities related to those employees participating in the Eco Services benefit plans that were previously sponsored by Solvay upon the date of the 2014 Acquisition. Thus, activity for 2014 reflects the period from December 1, 2014 to December 31, 2014 for the Eco Services benefit plans.

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The Eco Services benefit plans include two defined benefit pension plans and one retiree health plan, all based in the U.S. The PQ Holdings benefit plans include a U.S. defined benefit pension plan as well as the defined benefit pension plans for all of the Company's foreign subsidiaries, two retiree health plans (one each in the U.S and Canada), and the Company's defined benefit supplementary retirement plans.

Of the Company's three defined benefit pension plans covering employees in the U.S., only the Eco Services Hourly Pension Plan continues to accrue benefits subsequent to December 31, 2016. All future accruals were frozen for the PQ Corporation Retirement Plan as of December 31, 2006 and for the Eco Services Pension Equity Plan as of December 31, 2016. With respect to the Company's three retiree health plans, the PQ Holdings plans in the U.S. and Canada were closed to new retirees as of December 31, 2006. The Eco Services Postretirement Life and Dental Plan will be closed to new retirees effective July 1, 2017. The Company's defined benefit supplementary retirement plans were frozen to future accruals as of December 31, 2006.

Defined Benefit Pension Plans

The following tables summarize changes in the benefit obligation, plan assets and funded status of the Company's significant defined benefit pension plans as well as the components of net periodic benefit cost, including key assumptions:

	U.S.		Foreign	
	December 31,		December 31,	
	2016	2015	2016	2015
Change in benefit obligation:				
Benefit obligation at beginning of period	\$ 71,605	\$ 74,048	\$ —	\$ —
Service cost	2,130	2,778	2,106	—
Interest cost	7,680	2,913	2,224	—
Participant contributions	—	—	300	—
Plan curtailments	(1,325)	—	(1,204)	—
Plan settlements	(4,772)	(5,099)	—	—
Benefits paid	(5,390)	(108)	(1,305)	—
Expenses paid	—	—	(66)	—
Net transfer in ⁽¹⁾	192,120	—	99,025	—
Actuarial (gains) losses	(14,630)	(2,927)	9,804	—
Translation adjustment	—	—	(4,859)	—
Benefit obligation at end of the period	<u>\$ 247,418</u>	<u>\$ 71,605</u>	<u>\$ 106,025</u>	<u>\$ —</u>
Change in plan assets:				
Fair value of plan assets at beginning of period	\$ 52,678	\$ 42,469	\$ —	\$ —
Actual return on plan assets	6,897	479	8,274	—
Employers contributions	1,425	14,937	921	—
Employee contributions	—	—	300	—
Plan settlements	(4,772)	(5,099)	—	—
Benefits paid	(5,390)	(108)	(1,305)	—
Expenses paid	—	—	(66)	—
Acquisitions ⁽¹⁾	148,077	—	81,974	—
Translation adjustment	—	—	(3,953)	—
Fair value of plan assets at end of the period	<u>\$ 198,915</u>	<u>\$ 52,678</u>	<u>\$ 86,145</u>	<u>\$ —</u>
Funded status of the plans (underfunded)	<u>\$ (48,503)</u>	<u>\$ (18,927)</u>	<u>\$ (19,880)</u>	<u>\$ —</u>

(1) Relates to the PQ Holdings defined benefit pension plans assumed as part of the Business Combination.

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Amounts recognized in the consolidated balance sheets consist of:

	U.S.		Foreign	
	December 31,		December 31,	
	2016	2015	2016	2015
Noncurrent asset	\$ —	\$ —	\$ 3,391	\$ —
Current liability	—	—	(331)	—
Noncurrent liability	(48,503)	(18,927)	(22,940)	—
Accumulated other comprehensive income (loss)	8,190	520	(2,085)	—
Net amount recognized	<u>\$(40,313)</u>	<u>\$(18,407)</u>	<u>\$(21,965)</u>	<u>\$—</u>

Amounts recognized in accumulated other comprehensive income (loss) consist of:

	U.S.		Foreign	
	December 31,		December 31,	
	2016	2015	2016	2015
Prior service credit	\$ —	\$ —	\$ —	\$ —
Net gain (loss)	12,920	520	(2,686)	—
Gross amount recognized	12,920	520	(2,686)	—
Deferred income taxes	(4,730)	—	601	—
Net amount recognized	<u>\$ 8,190</u>	<u>\$520</u>	<u>\$(2,085)</u>	<u>\$—</u>

Components of net periodic benefit cost consist of:

	U.S.			Foreign		
	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014
	2016	2015		2016	2015	
Service cost	\$ 2,130	\$ 2,778	\$ 224	\$ 2,106	\$ —	\$ —
Interest cost	7,680	2,913	246	2,224	—	—
Expected return on plan assets	(9,293)	(2,885)	—	(2,038)	—	—
Amortization of net (gain) loss	—	—	—	(10)	—	—
Curtailement gain recognized	(1,311)	—	—	(517)	—	—
Settlement (gain) loss recognized	152	(2)	—	—	—	—
Net periodic expense (benefit)	<u>\$(642)</u>	<u>\$ 2,804</u>	<u>\$ 470</u>	<u>\$ 1,765</u>	<u>\$—</u>	<u>\$—</u>

There are no estimated net actuarial losses (gains) or prior service costs (credits) for the Company's defined benefit pension plans that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017.

The total accumulated benefit obligation as of December 31, 2016 and 2015 for the Company's U.S. pension plans was \$244,003 and \$66,706, respectively. The total accumulated benefit obligation as of December 31, 2016 for the Company's foreign pension plans was \$100,473.

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The following table presents selected information about the Company's pension plans with accumulated benefit obligations in excess of plan assets:

	U.S.		Foreign	
	December 31,		December 31,	
	2016	2015	2016	2015
Projected benefit obligation	\$ 247,418	\$ 71,605	\$ 58,837	\$ —
Accumulated benefit obligation	244,003	66,706	55,981	—
Fair value of plan assets	198,915	52,678	36,771	—

Significant weighted average assumptions used in determining the pension obligations include the following:

	U.S.		Foreign	
	December 31,		December 31,	
	2016	2015	2016	2015
Discount rate	4.24%	4.51%	2.99%	—
Rate of compensation increase ⁽²⁾	3.00%	Age-based / 3.00%	2.97%	—

- (2) With respect to the U.S. plans, the weighted average rate of compensation increase as of December 31, 2016 reflects only the Eco Services Hourly Pension Plan assumption of 3.00%, as both the Eco Services Pension Equity Plan and the PQ Corporation Retirement Plan were frozen to new accruals as of December 31, 2016 (and were included in the average at zero). The weighted average rate of compensation increase at December 31, 2015 for the U.S. plans includes 3.00% for the Eco Services Hourly Pension Plan and an age-based assumption for the Eco Services Pension Equity Plan.

Significant weighted average assumptions used in determining net periodic benefit cost include the following:

	U.S.			Foreign		
	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31,	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31,
	2016	2015	2014	2016	2015	2014
Discount rate	4.02%	4.09%	4.09%	5.16%	—	—
Rate of compensation increase ⁽³⁾	3.10%	Age-based / 3.00%	Age-based / 3.00%	3.95%	—	—
Expected return on assets	6.34%	None assumed	None assumed	5.62%	—	—

- (3) The weighted average rate of compensation increase for the year ended December 31, 2015 and for the period December 1 to December 31, 2014 for the U.S. plans was 3.00% for the Eco Services Hourly Pension Plan and an age-based assumption for the Eco Services Pension Equity Plan.

The discount rate for each of the U.S. plans was determined by utilizing a yield curve model. The model develops a spot rate curve based on the yields available from a broad-based universe of high quality corporate bonds. The discount rate is then set as the weighted average spot rate, using the respective plan's expected benefit cash flows as the weights.

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In determining the expected return on U.S. plan assets, the Company considers the relative weighting of plan assets, the historical performance of total plan assets and individual asset classes, and expected future performance. In addition, the Company may consult with and consider the opinions of our external advisors in developing appropriate return benchmarks.

The investment objective for the U.S. plans is to generate returns sufficient to meet future obligations. The strategy to meet the objective includes generating attractive returns using higher returning assets such as equity securities and balancing risk using less volatile assets such as fixed income securities. The U.S. plans invest in an allocation of assets across the two broadly-defined financial asset categories of equity and fixed income securities. The target allocations for the plan assets across the three U.S. plans are as follows: 45% equity securities and 55% fixed income investments for the PQ Corporation Retirement Plan; 50% equity securities and 50% fixed income investments for the Eco Services Pension Equity Plan; and 48% equity securities and 52% fixed income investments for the Eco Services Hourly Pension Plan.

Similar considerations are applied to the investment objectives of the non-U.S. plans as well as the asset classes available in each location and any legal restrictions on plan investments.

The Company classified plan assets based upon a fair value hierarchy (see Note 4 to these consolidated financial statements for further information). The classification of each asset within the hierarchy is based on the lowest level input that is significant to its measurement. The fair value hierarchy consists of three levels as follows:

- Level 1—Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets. Level 1 assets primarily include investments in publicly traded equity securities and mutual funds. These securities (or the underlying investments of the funds) are actively traded and valued using quoted prices for identical securities from the market exchanges.
- Level 2—Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves. Level 2 assets primarily consist of fixed-income securities and comingled funds that are not actively traded or whose underlying investments are valued using observable marketplace inputs. The fair value of plan assets invested in fixed-income securities is generally determined using valuation models that use observable inputs such as interest rates, bond yields, low-volume market quotes and quoted prices for similar assets. Plan assets that are invested in comingled funds are valued using a unit price or net asset value (“NAV”) that is based on the underlying investments of the fund.
- Level 3—Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company’s best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date. Level 3 assets include investments covered by insurance policies and real estate funds valued using significant un-observable inputs.

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	Fair value measurements at December 31, 2016			
	Total	Level 1	Level 2	Level 3
Cash and cash equivalents	\$ 1,979	\$ 1,863	\$ 116	\$ —
Equity securities:				
U.S. investment funds	60,179	41,529	18,650	—
International investment funds	58,457	26,119	32,338	—
Fixed income securities:				
Government securities	25,437	—	25,437	—
Corporate bonds	4,981	—	4,981	—
Investment fund bonds	113,460	77,938	35,522	—
Other:				
Insurance policies	20,567	—	17,281	3,286
Total	\$ 285,060	\$ 147,449	\$ 134,325	\$ 3,286

	Fair value measurements at December 31, 2015			
	Total	Level 1	Level 2	Level 3
Cash and cash equivalents	\$ 40	\$ 40	\$ —	\$ —
Equity securities:				
U.S. investment funds	20,395	—	20,395	—
International investment funds	8,027	—	8,027	—
Fixed income securities:				
Government securities	13,214	—	13,214	—
Corporate bonds	11,002	—	11,002	—
Total	\$ 52,678	\$ 40	\$ 52,638	\$ —

The changes in the Level 3 pension plan assets for the year ended December 31, 2016 were as follows:

	Insurance policies
Balance at December 31, 2015	\$ —
Acquisition (May 4, 2016)	3,226
Actual return on plan assets	23
Benefits paid	(27)
Contributions	236
Exchange rate changes	(172)
Balance at December 31, 2016	\$ 3,286

The Company expects to contribute \$4,050 to the U.S. pension plans and \$3,679 to the foreign pension plans in 2017.

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The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

Year	U.S.	Foreign
2017	\$15,890	\$ 2,520
2018	14,808	2,520
2019	14,632	3,227
2020	15,100	2,983
2021	15,649	3,210
Years 2022-2026	77,082	20,654

Certain of the Company's foreign subsidiaries maintain other defined benefit plans that are consistent with statutory practices. These plans are not included in the disclosures above as they are not significant to the Company's consolidated financial statements.

Supplemental Retirement Plans

The following tables summarize changes in the benefit obligation, plan assets and funded status of the Company's defined benefit supplementary retirement plans, as well as the components of net periodic benefit cost, including key assumptions:

	December 31,	
	2016	2015
Change in benefit obligation:		
Benefit obligation at beginning of period	\$ —	\$ —
Interest cost	328	—
Net transfer in ⁽⁴⁾	14,671	—
Benefits paid	(767)	—
Actuarial gain	(1,007)	—
Benefit obligation at end of period	<u>\$ 13,225</u>	<u>\$ —</u>
Change in plan assets:		
Fair value of plan assets at beginning of period	\$ —	\$ —
Employer contributions	767	—
Benefits paid	(767)	—
Fair value of plan assets at end of period	<u>\$ —</u>	<u>\$ —</u>
Funded status of the plans (underfunded)	<u><u>\$ (13,225)</u></u>	<u><u>\$ —</u></u>

(4) Relates to the PQ Holdings defined benefit supplementary retirement plans assumed as part of the Business Combination.

Amounts recognized in the consolidated balance sheets consist of:

	December 31,	
	2016	2015
Current liability	\$ (1,170)	\$ —
Noncurrent liability	(12,055)	—
Accumulated other comprehensive loss	623	—
Net amount recognized	<u><u>\$ (12,602)</u></u>	<u><u>\$ —</u></u>

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Amounts recognized in accumulated other comprehensive income consist of:

	December 31,	
	2016	2015
Net gain	\$1,007	\$—
Gross amount recognized	1,007	—
Deferred income taxes	(384)	—
Net amount recognized	\$ 623	\$—

Components of net periodic benefit cost consist of:

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014
	2016	2015	2014
Interest cost	\$ 328	\$ —	\$ —
Net periodic expense	\$ 328	\$ —	\$ —

There are no estimated net actuarial gains for the Company's defined benefit supplementary retirement plans that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017.

The accumulated benefit obligation of our defined benefit supplemental retirement plans as of December 31, 2016 was \$13,225.

The discount rate used in determining the defined benefit supplemental retirement plan obligation was 3.90% as of December 31, 2016.

The discount rate used in determining net periodic benefit cost was 3.40% for the year ended December 31, 2016. The rate of compensation increase for the year ended December 31, 2016 was zero, as all future accruals were frozen for the defined supplemental retirement plans as of December 31, 2006.

The Company expects to contribute \$1,171 to the defined benefit supplementary retirement plans in 2017.

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

Year	Amount
2017	\$ 1,171
2018	1,137
2019	1,101
2020	1,067
2021	1,031
Years 2022-2026	4,560

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Other Postretirement Benefit Plans

The following tables summarize changes in the benefit obligation, plan assets and funded status of the Company's other postretirement benefit plans as well as the components of net periodic benefit cost, including key assumptions:

	December 31,	
	2016	2015
Change in benefit obligation:		
Benefit obligation at beginning of period	\$ 1,296	\$ 1,327
Service cost	37	39
Interest cost	151	57
Employee contributions	176	—
Plan amendments	(443)	—
Benefits paid	(484)	—
Medical subsidies received	90	—
Premiums paid	(2)	—
Net transfer in ⁽⁵⁾	4,868	—
Actuarial gains	(1,057)	(127)
Translation adjustment	(12)	—
Benefit obligation at end of period	<u>\$ 4,620</u>	<u>\$ 1,296</u>
Change in plan assets:		
Fair value of plan assets at beginning of period	\$ —	\$ —
Employer contributions	220	—
Employee contributions	176	—
Benefits paid	(484)	—
Medical subsidies received	90	—
Premiums paid	(2)	—
Fair value of plan assets at end of period	<u>\$ —</u>	<u>\$ —</u>
Funded status of the plans (underfunded)	<u><u>\$(4,620)</u></u>	<u><u>\$(1,296)</u></u>

(5) Relates to the PQ Holdings retiree health plans assumed as part of the Business Combination.

Amounts recognized in the consolidated balance sheets consist of:

	December 31,	
	2016	2015
Current liability	(629)	(29)
Noncurrent liability	(3,991)	(1,267)
Accumulated other comprehensive income	877	127
Net amount recognized	<u><u>\$(3,743)</u></u>	<u><u>\$(1,169)</u></u>

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Amounts recognized in accumulated other comprehensive income consist of:

	December 31,	
	2016	2015
Net gain	\$1,163	\$ 127
Gross amount recognized	1,163	127
Deferred income taxes	(286)	—
Net amount recognized	<u>\$ 877</u>	<u>\$ 127</u>

Components of net periodic benefit cost consist of:

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31, 2014
	2016	2015	
Service cost	\$ 37	\$ 39	\$ 3
Interest cost	151	57	5
Amortization of net gain	(17)	—	—
Net periodic expense (benefit)	<u>\$ 171</u>	<u>\$ 96</u>	<u>\$ 8</u>

The estimated net actuarial loss (gain) for the Company's retiree health plans that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017 is (\$76). The estimated prior service cost (credit) for the Company's retiree health plans that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017 is (\$78).

Significant weighted average assumptions used in determining the net periodic benefit cost, the postretirement benefit obligations and trend rate include the following:

	December 31,	
	2016	2015
Benefit obligation:		
Discount rate	3.74%	4.80%
Immediate trend rate	6.84%	N/A
Ultimate trend rate	4.50%	N/A
Year that the rate reaches ultimate trend rate	2035	N/A

	December 31,		
	2016	2015	2014
Benefit cost:			
Discount rate	3.92%	4.36%	4.36%
Immediate trend rate	7.28%	N/A	N/A
Ultimate trend rate	4.50%	N/A	N/A
Year that the rate reaches ultimate trend rate	2035	N/A	N/A

Note that the Eco Services retiree health plan only includes a life insurance and dental component; thus, the trend rate assumptions for 2015 were not applicable. The trend rate assumptions for 2016 reflect the acquired PQ Holdings retiree health plans.

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A 1% change in the assumed health care cost trend would have increased (decreased) the accumulated postretirement benefit obligation as of December 31, 2016 and the periodic postretirement benefit cost for the year then ended as follows:

	<u>1% Increase</u>	<u>1% Decrease</u>
Accumulated postretirement benefit obligation	152	(135)
Periodic postretirement benefit cost	4	(4)

The Company expects to contribute \$629 to the retiree health plans in 2017.

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

<u>Year</u>	<u>Amount</u>
2017	\$ 629
2018	592
2019	500
2020	433
2021	384
Years 2022-2026	1,054

There are no expected Medicare subsidy receipts expected in future periods.

Certain of the Company's foreign subsidiaries maintain other postretirement benefit plans that are consistent with statutory practices. These plans are not included in the disclosures above as they are not significant to the Company's consolidated financial statements.

Predecessor Period

Solvay's Eco business unit received an allocation of the service cost, interest cost and expected return on plan assets of Eco Services' pension and other postretirement plans based on a combination of salaries and headcount. The amount of net pension and other postretirement benefit expense allocated to Solvay's Eco business unit related to these multiemployer plans was \$1,790 for the Predecessor Period from January 1, 2014 to November 30, 2014.

Defined Contribution Plans

The Company also has defined contribution plans covering domestic employees of the Company and certain subsidiaries. The Company recorded expenses of \$1,205 and \$1,511 related to these plans for the years ended December 31, 2016 and 2015, respectively, \$85 for the Successor Period from inception (July 30, 2014) to December 31, 2014, and \$1,848 for the Predecessor Period from January 1, 2014 to November 30, 2014.

20. Earnings per Share

During the period from January 1, 2014 to November 30, 2014, Solvay's Eco business unit did not have an independent capital structure. Because of the absence of an independent capital structure during this time, there was no earnings per share calculation for the Predecessor Period. From the December 1, 2014 closing date of the 2014 Acquisition to May 4, 2016, the date of the Business Combination, the Company was structured as a single

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member LLC, with capital contributions from affiliates of CCMP, the Company's board of managers and management represented by a class of membership units ("Eco Services Class A Units" or "Eco Services Membership Units"). During this period, Eco Services also granted incentive awards to certain employees, directors and affiliates in the form of Class B Units of Eco Services (the "Eco Services Class B Units"), which provided recipients with the option to purchase Eco Services Class A Units upon the attainment of certain vesting and other restrictions (see Note 21 to these consolidated financial statements for further information regarding the Company's equity incentive plans). At the date of the Business Combination, the existing Eco Services Class A Units were converted to Class B shares of PQ Group Holdings and the legacy PQ Holdings equity was converted to both Class A and Class B common shares of PQ Group Holdings. None of the Eco Class B Units had been exercised prior to the Business Combination, and all Eco Class B Units converted to Class A options of PQ Group Holdings at the date of the Business Combination (see Note 21).

The Company currently has two existing classes of common stock: Class A and Class B. Both Class A and Class B shares have been issued as restricted stock as part of the Company's stock incentive plan (see Note 21 to these consolidated financial statements for further information), which are generally subject to certain service and/or performance vesting conditions. Non-qualified incentive stock options to purchase Class A shares have also been issued as part of the Company's stock incentive plan, though no options had been exercised as of December 31, 2016. Class A and Class B shares have also been issued as purchases with no vesting restrictions. Holders of both Class A and Class B shares have rights to receive dividends and participate in earnings regardless of whether the shares have vested, but Class B shareholders have liquidation preference to receiving distributions before the holders of Class A common stock. Holders of vested Class A and Class B shares have equal voting rights, but for unvested shares, only the holders of Class B shares have voting rights, whereas holders of unvested Class A shares do not have voting rights.

Of the 626,135 shares of outstanding Class A common stock as of December 31, 2016, 429,985 shares were vested. With respect to the 6,726,907 shares of outstanding Class B common stock as of December 31, 2016, 6,676,813 shares were vested.

Basic earnings per share is calculated as income (loss) available to common stockholders, divided by the weighted average number of common shares outstanding during the period for each class of common stock, respectively. In periods of income, the income is shared equally amongst Class A and B common stockholders. In the event of liquidation, the holders of Class B common stock have preference to receiving distributions before the holders of Class A common stock. As a result, holders of Class B common stock are considered preferential participating securities and will not be allocated any losses in the periods of net losses, but will be allocated income in the periods of net income using the two-class method.

Diluted earnings per share is calculated as income (loss) available to common stockholders, divided by the weighted average number of common and potential common shares outstanding during the period for each class of common stock, if dilutive. Potential shares reflect the unvested Class A and Class B shares as well as options to purchase Class A shares and Eco Services membership units, which have been included in the diluted earnings per share calculation using the treasury stock method. For purposes of calculating diluted earnings per share, income has been reallocated between the classes based on the diluted weighted average number of common shares outstanding for each class. In periods of net loss, inclusion of potential common shares would be anti-dilutive.

For both the basic and dilutive weighted average unit calculations, as a result of the Business Combination, the number of Eco Services membership units outstanding from January 1, 2016 through May 4, 2016, the date of the Business Combination, as well as for the historical periods presented for the year ended December 31,

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2015 and the period from inception (July 30, 2014) to December 31, 2014 (Successor Period), were computed on the basis of the weighted average units outstanding for Eco Services during the respective periods multiplied by the exchange ratio established for Class B shares as part of the Business Combination. For the year ended December 31, 2015 and for the Successor 2014 period, Eco related units were retrospectively reflected as Class B shares for earnings per share purposes including in periods of loss since during these periods this was the only class of share in existence to absorb income and losses.

The reconciliation from basic to diluted weighted average shares outstanding is as follows:

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31,
	2016	2015	2014
Weighted average shares outstanding—Basic—Class B:	4,947,982	1,507,719	1,492,682
Dilutive effect of unvested Class B shares with service conditions	—	—	—
Weighted average shares outstanding—Diluted—Class B:	<u>4,947,982</u>	<u>1,507,719</u>	<u>1,492,682</u>
Weighted average shares outstanding—Basic—Class A:	430,051	—	—
Dilutive effect of assumed stock option exercises and conversions	—	—	—
Weighted average shares outstanding—Diluted—Class A:	<u>430,051</u>	<u>—</u>	<u>—</u>

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The following table reconciles the components of basic and diluted income (loss) per share for the years ended December 31, 2016 and 2015, and for the period from inception (July 30, 2014) to December 31, 2014 (Successor period):

	Years ended December 31,		Successor period from inception (July 30, 2014) to December 31,
	2016	2015	2014
Numerator:			
Net income (loss) available to PQ Group Holdings common shareholders	\$ (79,746)	\$ 11,427	\$ (22,061)
Denominator:			
Weighted average shares outstanding—Basic:			
Class B shares	4,947,982	1,507,719	1,492,682
Class A shares	430,051	—	—
Total weighted average shares outstanding—Basic	<u>5,378,033</u>	<u>1,507,719</u>	<u>1,492,682</u>
Weighted average shares outstanding—Diluted:			
Class B shares	4,947,982	1,507,719	1,492,682
Class A shares	430,051	—	—
Total weighted average shares outstanding—Diluted	<u>5,378,033</u>	<u>1,507,719</u>	<u>1,492,682</u>
Basic net income (loss) per share:			
Class B shares	\$ —	\$ 7.58	\$ (14.78)
Class A shares	\$ (185.43)	\$ —	\$ —
Diluted net income (loss) per share:			
Class B shares	\$ —	\$ 7.58	\$ (14.78)
Class A shares	\$ (185.43)	\$ —	\$ —

21. Stock-Based Compensation:

Eco Services Class B Units

Prior to the Business Combination, the Company recognized stock-based compensation expense for incentive awards issued under the Eco Services Group Holdings Incentive Unit Agreement dated December 29, 2014 (the “Incentive Unit Agreement”). Under the Incentive Unit Agreement, the Company granted a total of 25,786 of Eco Services Class B Units to certain employees, directors and affiliates of the Company at an exercise price of \$1,000/unit. Of this amount, 14,419 and 11,367 of Eco Services Class B Units were granted on January 13, 2015 and December 29, 2014, respectively. Immediately prior to the date of the Business Combination on May 4, 2016 and as of December 31, 2015, there were 25,093 of Eco Services Class B Units outstanding.

Of this total, 10,674 Eco Services Class B Units granted to employees (the “Management Awards”) had two vesting criteria, in which 50% were subject to a service (time-based) vesting condition and 50% were subject to a performance condition. The Eco Services Class B Units subject to the service condition vest 25% annually, with the first annual vesting date of December 1, 2015. The remaining 14,419 of Eco Services Class B Units awarded to directors and affiliates (the “Director Awards”) were subject to a service vesting condition only, consistent

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with that of the Management Awards. The Eco Services Class B Units did not have a contractually defined maximum term. All of the Eco Services Class B Units were valued using a Black-Scholes option pricing model, and the fair value of an Eco Services Class B Unit was \$448/unit. The key assumptions used in valuing the Eco Services Class B Units were as follows: expected term of seven years, expected volatility of 40.27%, risk-free interest rate of 2.02% and expected dividend yield of 0.00%.

The expected term represents the period of time over which the Eco Services Class B Units are expected to be outstanding prior to exercise or forfeiture. With the limited experience of the Company with respect to historical exercise and forfeiture rates or patterns, the expected term was estimated in the context of the four-year service award vesting as well as the timeframe for a liquidity event for the performance awards. The expected volatility was based on the actual stock price volatility of a peer group of companies. The risk-free interest rate was based on U.S. Treasury rates in effect at the time of the grants commensurate with the expected term. There was no dividend yield assumption since the Company has not paid dividends nor does it have an expectation of future dividend payouts.

The following table summarizes the activity of the Eco Services Class B Units during the year ended December 31, 2015 and through May 3, 2016, the date immediately preceding the Business Combination:

	<u>Number of units</u>	<u>Weighted average exercise price</u>
Outstanding at December 31, 2014	11,367	\$ 1,000
Granted	14,419	\$ 1,000
Forfeited	(693)	\$ 1,000
Outstanding at December 31, 2015 and May 3, 2016	<u>25,093</u>	\$ 1,000
Exercisable at December 31, 2015 and May 3, 2016	<u>4,939</u>	\$ 1,000

For the period from January 1, 2016 through May 3, 2016 and for the year ended December 31, 2015, the Company recognized stock-based compensation expense of \$766 and \$2,256, respectively, related to the Eco Services Class B Units. Since the Company was not subject to income taxes prior to the Business Combination, there was no tax benefit associated with the expense. The expense related to the 50% of the Management Awards and all of the Director Awards subject to the service condition, and was recognized on a straight-line basis over the vesting period for the awards. The 50% of the Management Awards subject to the performance condition only vest when specific liquidity events occur. As of May 3, 2016 and December 31, 2015, the performance-based criteria of the Management Awards was not considered probable, and therefore no expense for the Management Awards subject to the performance condition has been recognized.

The total fair value of Eco Services Class B Units that vested during the year ended December 31, 2015 was \$2,213. No Eco Services Class B Units vested from the period from January 1, 2016 through May 3, 2016.

PQ Group Holdings Awards

In conjunction with the Business Combination, the Company adopted a new incentive plan, namely the PQ Group Holdings Inc. Stock Incentive Plan. Under the terms of the plan, the Company is authorized to issue a total of 908,189 shares for Class A awards to employees, directors and affiliates of the Company, while the number of Class B awards that may be granted is determined by the Board of Directors from time-to-time. As part of the Business Combination, the 25,093 of outstanding Eco Services Class B Units at the date of the Business

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Combination were canceled and replaced with 156,139 of PQ Group Holdings Class A Options (the "Class A Options") to purchase PQ Group Holdings Class A common stock at an exercise price of \$70.94/share. The Eco Services Class B Units were replaced by Class A Options in accordance with a formula to convert such awards, plus a vested cash component. The terms of the new awards were substantially identical to those in effect prior to the Business Combination, except for adjustments to the underlying number of shares (based on the conversion ratio) and the exercise price, which was now based on PQ Group Holdings Inc. Class A common stock. Additionally, although the Eco Services Class B Units did not have a contractually defined maximum term, the maximum term of the Class A Options is ten years.

The Company accounted for the cancelation and replacement (including a cash component) as a combination of a modification and a cash settlement. This resulted in no incremental compensation cost recognized at the time of the modification, but led to an acceleration of \$1,174 of previously measured but unrecognized compensation cost.

The Class A Options were valued using a Black-Scholes option pricing model, and the fair value of a Class A Option at the modification (merger) date was \$29.43. The key assumptions used in valuing the Class A Options were as follows: expected term of five years, expected volatility of 45.79%, risk-free interest rate of 1.54% and expected dividend yield of 0.00%.

With the limited experience of the Company with respect to historical exercise and forfeiture rates or patterns, the expected term was estimated in the context of the service award vesting period as well as the timeframe for a liquidity event for the performance awards, along with the ten year contractual maximum term. The expected volatility was compared to a range of the actual stock price volatility of a peer group of companies. The risk-free interest rate was based on U.S. Treasury rates in effect at the time of the grant commensurate with the expected term. There was no dividend yield assumption since the Company has not paid dividends nor does it have an expectation of future dividend payouts.

In addition to the Eco Services Class B Units that were canceled and replaced at the time of the Business Combination, the Company exchanged the outstanding option awards of PQ Holdings for options of PQ Group Holdings in connection with the merger. The terms of the PQ Group Holdings awards were substantially identical to those of the PQ Holdings awards, including the number of underlying shares and vesting conditions, with the exception of an exercise price of \$70.94/share for the Class A Options. There are various vesting conditions associated with the exchanged awards, including satisfaction of certain service and performance based conditions.

The following table summarizes the activity of the Class A Options for the period from the date of the Business Combination of May 4, 2016 through December 31, 2016, which includes both the Eco Services Class B Units that were canceled and replaced, as well as the PQ Holdings options that were exchanged:

	Number of options	Weighted average exercise price
Granted/assumed on May 4, 2016 in connection with the Business Combination	196,945	\$ 70.94
Granted	61,049	\$ 71.01
Forfeited	(54,262)	\$ 70.94
Outstanding at December 31, 2016	<u>203,732</u>	\$ 70.96
Exercisable at December 31, 2016	<u>61,457</u>	\$ 70.94

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In addition to the exchange of the PQ Holdings options, the Company also exchanged PQ Holdings restricted stock for 197,144 shares of Class A restricted stock (“Class A Restricted Stock”) and 46,936 shares of Class B restricted stock (“Class B Restricted Stock”) of PQ Group Holdings. The Class A and Class B Restricted Stock were issued at substantially identical terms to the original PQ Holdings awards, with the exception of a new price ascribed to the shares.

The shares of the Class A restricted stock were all subject to the same vesting requirement that was identical to the original awards, namely a performance condition. As defined in the award agreements, each grant fully vests upon the occurrence of a defined liquidity event upon which certain investment funds affiliated with CCMP receive proceeds exceeding certain thresholds, subject to the employee’s continued service with the Company through the vesting date. The Class A restricted stock was valued at \$70.94/share at the date of the exchange (merger date), with the fair value determined using multiples of EBITDA and the income approach, based on a discounted free cash flow model. Since all of the Class A restricted stock is subject to a performance condition that was not deemed probable for the period from the consummation of the Business Combination through December 31, 2016, no expense for the Class A restricted stock was recognized.

The shares of the Class B restricted stock were all subject to vesting requirements identical to the original awards, which included the satisfaction of certain service and performance based conditions. The Class A restricted stock was valued at \$184.80/share at the date of the exchange (merger date), with the fair value determined using multiples of EBITDA and the income approach, based on a discounted free cash flow model.

The following table summarizes the activity of the Class A and Class B Restricted Stock for the period from the date of the Business Combination of May 4, 2016 through December 31, 2016:

	Number of shares		Weighted average grant date fair value (per share)	
	Class A	Class B	Class A	Class B
Nonvested awards assumed on May 4, 2016 in connection with the Business Combination	197,114	46,936	\$ 70.94	\$ 184.80
Granted	—	15,862	\$ —	\$ 184.80
Vested	—	(11,926)	\$ —	\$ 184.80
Forfeited	(964)	(778)	\$ 70.94	\$ 184.80
Nonvested awards at December 31, 2016	<u>196,150</u>	<u>50,094</u>	\$ 70.94	\$ 184.80

The exchange of the PQ Holdings options and restricted stock for awards of PQ Group Holdings in the context of a business combination was accounted for as a modification of the awards. As a result, the cost of the replacement awards of PQ Group Holdings represents a combination of both pre- and post-merger services. The amount attributable to services prior to the Business Combination in connection with the modification was \$1,401, and is considered part of the consideration transferred in the Business Combination (see Note 7 to these consolidated financial statements for further information). The remainder of the cost is attributed to post-merger services and is being recognized over the respective remaining vesting periods.

For the years ended December 31, 2016 and 2015, total stock-based compensation expense for the Company (inclusive of both the Eco Services Class B Units prior to the Business Combination and the awards replaced or exchanged at the consummation of the Business Combination) was \$7,029 and \$2,256, respectively. The income tax benefit recognized in the statement of operations for the year ended December 31, 2016 was \$3,300 (there was no tax benefit for the year ended December 31, 2015 since the Company was not subject to income taxes).

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Predecessor Period

Historically, Solvay maintained various share-based compensation plans for employees during the Predecessor Period. Employees participated in these share-based payment plans. Upon the 2014 Acquisition, all existing Solvay awards for Eco Services employees were terminated. Accordingly, no further stock-based compensation expense related to Solvay awards was provided in the Successor Period.

In the Predecessor Period, stock-based compensation expense was recognized on a straight-line basis in the statement of operations over the vesting periods relating to these awards. Share-based payment expense recognized during the Predecessor Period was \$535. For purposes of determining the fair value of stock option awards, Solvay used the Black-Scholes option pricing model.

22. Commitments and Contingent Liabilities:

Environmental

There is a risk of environmental impact in chemical manufacturing operations. The Company's environmental policies and practices are designed to ensure compliance with existing laws and regulations and to minimize the possibility of significant environmental impact. The Company is also subject to various other lawsuits and claims with respect to matters such as governmental regulations, labor and other actions arising out of the normal course of business. No accrual for these matters currently exists, with the exception of those listed below, because management believes that the liabilities resulting from such lawsuits and claims are not probable or reasonably estimable.

PQ Holdings triggered the requirement of New Jersey's Industrial Site Recovery Act ("ISRA") statute with the PQ Holdings stock transfer/corporate merger in December 2004. As required under ISRA, a General Information Notice with respect to PQ Holdings' two New Jersey locations was filed with the New Jersey Department of Environmental Protection ("NJDEP") in December 2004 and again in July 2007. Based on an initial review of the facilities by the NJDEP in 2005, PQ Holdings estimated that \$500 would be required for contamination assessment and removal work of one specific contaminant (polychlorinated biphenyls) that exceeded applicable NJDEP standards at these facilities, and had recorded a reserve for such amount as of December 31, 2005. During subsequent years, it was determined that additional assessment, removal and remediation work would be required and the reserve was increased to cover the estimated cost of such work. In addition, during this period, work had been performed and the reserve was reduced for actual costs incurred for the assessment and remediation work. Work at the Carlstadt, NJ facility has been completed and is closed from an ISRA standpoint, but as of December 31, 2016, the Company has recorded a reserve of \$700 for costs required for contamination assessment and removal work at Rahway, NJ. There may be additional costs related to the remediation of Rahway, but until further investigation takes place, the Company cannot reasonably estimate the amount of additional liability that may exist.

As part of a Delaware River Basin Commission ("DRBC") required Pollutant Minimization Plan ("PMP"), in July 2013, the PQ Holdings Chester facility conducted limited paint sampling for polychlorinated biphenyls ("PCBs"). Also, as part of demolition, repair and maintenance projects scheduled for the PQ Holdings' Baltimore facility in 2014, PQ Holdings conducted limited paint sampling during the fall of 2013 for waste categorization purposes. Paint samples were analyzed for PCB Aroclor 1254, the specific PCB congener commonly used in the manufacture of paint until the late 1970s. The PQ Holdings analytical results indicated that PCB Aroclor 1254 is present in paint on some structures (e.g., piping, structural steel, tanks) in excess of the fifty (50) parts per million ("ppm") regulatory threshold. Under the Toxic Substances Control Act ("TSCA"), there is no requirement to test

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

in use paint for PCB content. However, once PCB content is identified at concentrations at or above the regulatory threshold, absent specific approval from the U.S. Environmental Protection Agency ("EPA"), the PCB-containing paint is regulated as an unauthorized use of PCBs, and the paint must be addressed. The Company abated painted surfaces that have tested positive for PCBs at levels exceeding 50 ppm at Baltimore in 2015 and early 2016. Similar abatement of painted structures as necessary at Chester is currently in process. As of December 31, 2016, the Company recorded a reserve of \$1,048 for the anticipated remediation costs of known PCB painted structures at the Company's Baltimore and Chester facilities.

In 2011, the Company installed a Continuous Emissions Monitor ("CEM") to measure CO, NOx and Opacity emissions from a furnace at the Company's Chester facility in Pennsylvania, and the Company conducted Relative Accuracy Test Audits ("RATA") as part of its efforts to certify the CEM. On May 5, 2014, the Pennsylvania Department of Environmental Protection ("PADEP") officially notified the Company that it was certifying the CEM based on RATA test results dating back to November 2011 and instructed the Company to start entering data previously recorded by the CEM into the Agency's on-line database. During the third and fourth quarters of 2014, the Company officially entered data recorded from the CEM up until the second quarter of 2013. In November 2015, PADEP issued an Assessment of Civil Penalty in the amount of \$1,739 for alleged violations under the Pennsylvania Air Pollution Control Act during the period from August 11, 2011 through June 30, 2013. The Company appealed, and PADEP reduced the penalty assessment to \$1,550. In January 2017, a hearing to review the merits of PQ's appeal to the Environmental Hearing Board was held, followed by a 90 to 120 day briefing period after which the judge should render an opinion. As of December 31, 2016, the Company has recorded a reserve of \$1,500 associated with the PADEP penalty.

As part of the Business Combination, the Company acquired a manufacturing facility at Warrington, United Kingdom. Asbestos-containing building material is present at the site, and asbestos removal and insulation replacement initiatives are underway. As of December 31, 2016, the Company has recorded a reserve of \$532 for costs related to this program.

In 2008, the Company sold the property of a manufacturing facility located in the United States to the local port authority. In 2009, the port authority commissioned an environmental investigation of portions of the property. In 2010, the port authority advised the Company of alleged soil and groundwater contamination on the property and alleged the Company liable for certain conditions. The Company received and reviewed the environmental investigation documentation and determined it may have liability with respect to some, but not all, of the alleged contamination. As of December 31, 2016, the Company has recorded a reserve of \$913, for costs related to this potential liability.

The Company has recorded a reserve of \$1,776 as of December 31, 2016 to address remaining subsurface remedial and wetlands/marsh management activities at the Company's Martinez, CA site. Although currently a sulfuric acid regeneration plant, the site originally was operated by Mountain Copper Company ("Mococo") as a copper smelter. Also, the site sold iron pyrite to various customers and allowed their customers to deposit waste iron pyrite cinder and slag on the site. The property is adjacent to Peyton Slough, where Mococo had a permitted discharge point from its process. In 1997, the San Francisco Bay Regional Water Quality Control Board ("RWQCB") required characterization and remediation of Peyton Slough for Copper, Zinc and Acidic Soils. Various remediation activities were undertaken and completed, and the site has received final concurrence from the Army Corps with respect to the completed work. The RWQCP has agreed that Eco has achieved the goals for vegetative cover, but the current marsh condition is not sustainable without continued operation of the tide gates. The Company is now working with the RWQCP on a plan to involve the County and work towards development of an alliance for operating, maintaining and funding the tide gates in the future.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
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As of December 31, 2016, the Company has recorded a reserve of \$1,755 for subsurface remediation and the Soil Vapor Extraction Project at the Company's Dominguez, CA site. In the 1980s and 1990s, the EPA and the Los Angeles Regional Water Quality Control Board conducted investigations of the site due to historic chlorinated pesticide and chlorinated solvent use. Soil and groundwater beneath the site were impacted by chlorinated solvents and associated breakdown products, petroleum hydrocarbons, chlorinated pesticides and metals. A Corrective Measures Plan approved in October 2011 requires (1) soil vapor extraction ("SVE") in affected areas, (2) covering of unpaved areas containing pesticide impacted soil, and (3) annual groundwater monitoring of the perched water-bearing zone. Installation of the SVE unit has been completed and startup has occurred. The California Department of Toxic Substances Control ("DTSC") has granted conditional approval of the Company's soil management, and monitoring and maintenance plans. Most recently, the DTSC is requiring the Company to delineate the PCE plume on the eastern boundary of the site. Eco Services is now preparing an action plan to address this matter.

Leases

The Company has entered into various lease agreements for the rental of office and plant facilities, railcars, machinery and equipment, substantially all of which are classified as operating leases. Total rent expense under these agreements was \$16,315 and \$6,096 for the years ended December 31, 2016 and 2015, respectively and \$471 and \$5,647 for the Successor and Predecessor periods, respectively.

Total rent due under non-cancelable operating lease commitments as of December 31, 2016 is:

Year	Amount
2017	\$16,541
2018	10,079
2019	7,187
2020	5,812
2021	4,395
Thereafter	11,539
	<u>\$55,553</u>

Purchase Commitments

The Company has entered into short and long-term purchase commitments for various key raw materials and energy requirements. The purchase obligations include agreements to purchase goods that are enforceable and legally binding, and that specify all significant terms. The purchase commitments covered by these agreements are with various suppliers and total approximately \$34,310 as of December 31, 2016.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

Purchases under these agreements are expected to be:

<u>Year</u>	<u>Amount</u>
2017	\$17,206
2018	11,276
2019	764
2020	766
2021	764
Thereafter	3,534
	<u>\$34,310</u>

Other

PQ Holdings was previously liable to the seller of a business for potential multi-year UK tax benefits derived from the acquisition. PQ Holdings was contractually obligated to make a payment on an annual basis on its UK taxable results, which fluctuate period-to-period, until there was a change in control, as defined in the purchase agreement. As a result of the Business Combination, a change in control was triggered, and PQ Holdings is no longer liable for additional accruals under the arrangement as of May 4, 2016. At December 31, 2016, the Company has accrued \$1,919 for this arrangement, representing the expected payment owed on the calculation of the liability for the tax years 2016 (through May 4, 2016) and 2015. The Company recorded these expenses as transaction and other related costs in other operating expense, net in the Company's consolidated statements of operations.

23. Restructuring and Other Related Costs:

The following table presents the components of restructuring and other related costs for the years ended December 31, 2016 and 2015, and the period from inception (July 30, 2014) to December 31, 2014 (Successor period) included in other operating expenses, net, in the accompanying consolidated statements of operations:

	<u>Years ended</u> <u>December 31,</u>		<u>Successor</u> <u>period from</u> <u>inception</u> <u>(July 30,</u> <u>2014) to</u> <u>December 31</u> <u>2014</u>
	<u>2016</u>	<u>2015</u>	
Severance and other employee costs related to restructuring plan	\$ 5,093	\$3,971	\$ 247
Other related costs	7,537	176	—
	<u>\$12,630</u>	<u>\$4,147</u>	<u>\$ 247</u>

Restructuring Plan

Subsequent to the 2014 Acquisition, the Company initiated a restructuring plan designed to improve organizational efficiency and streamline the operations of Eco Services as a stand-alone company. The primary impact of the plan to the Company's consolidated results of operations was the recognition of severance costs related to a reduction-in-force. These costs included benefits payable under ongoing Company severance plan arrangements, whereby payments are attributable to employee services rendered with benefits that accumulate over time. The liabilities and associated charges related to these severance costs are recognized by the Company

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
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when payment of the benefits becomes probable and estimable. Charges related to severance costs for the restructuring plan under ongoing benefit plan arrangements were \$5,093 and \$1,293 for the years ended December 31, 2016 and 2015.

Additionally, certain one-time costs related to retention bonuses were also recognized as part of the restructuring plan. The Company recognizes costs under one-time benefit arrangements by measuring the liability as of the employee communication date, which is based on the estimated fair value of the liability at the termination date, and recognizing the liability ratably over the required future service period based on the terms of the arrangement. Charges related to one-time costs for the restructuring plan were \$2,678 for the year ended December 31, 2015 and \$247 for the period from inception (July 30, 2014) to December 31, 2014 (Successor period).

Costs related to the restructuring plan affected employees in the Company's EC&S segment, although these costs are excluded from the segment's measure of profitability of Adjusted EBITDA (see Note 12 to these consolidated financial statements for further information). The activity in the accrued liability balance associated with the restructuring plan, all of which related to severance and other employee costs, was as follows for the years ended December 31, 2016 and 2015, and the period from inception (July 30, 2014) to December 31, 2014:

Balance at July 30, 2014	\$ —
Restructuring charges	<u>247</u>
Balance at December 31, 2014	\$ 247
Restructuring charges	3,971
Cash payments and other adjustments	<u>(2,925)</u>
Balance at December 31, 2015	\$ 1,293
Restructuring charges	5,093
Cash payments	<u>(4,743)</u>
Balance at December 31, 2016	<u>\$ 1,643</u>

The remaining accrued liability balance associated with the restructuring plan at December 31, 2016 is expected to be paid in 2017.

Other Related Costs

The Company incurred severance and other business optimization costs of \$7,537 and \$176 for the years ended December 31, 2016 and 2015, respectively. These costs were not associated with formal restructuring plans and primarily related to severance charges for certain executives, transition/duplicate staffing, professional fees and other expenses related to the Company's organizational changes.

24. Relationship with Solvay:

Years Ended December 31, 2016 and 2015, and the Successor Period

Transition Services Agreement

Concurrent with the consummation of the 2014 Acquisition, Eco Services entered into a transition services agreement with Solvay (the "Transition Services Agreement"), which provided certain transition services by

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

Solvay to Eco Services and from Eco Services to Solvay. The services from Solvay included the provision of information technology services, certain workspace related services, cost accounting services and consulting services, among others. The Transition Services Agreement was terminated as of December 31, 2015. The Company recorded \$4,882 and \$462 of fees for the transition services provided in selling, general and administrative expenses for the year ended December 31, 2015 and for the period from inception (July 30, 2014) to December 31, 2014, respectively.

Cross-Services Agreement

In connection with the 2014 Acquisition, Eco Services entered into a Cross-Services Agreement (the “CSA”) with Aroma Performance, a Solvay business unit (“Aroma”), on July 28, 2014. The CSA pertains to Eco Services’ Baton Rouge, LA site. In connection with the CSA, Eco Services (and now the Company) agreed to continue to provide certain services that it historically provided to Aroma when it operated as a component of Solvay, including its well water and process steam requirements, for an initial term of five years. Further, Eco Services also agreed to provide Aroma with the use of space, operating machinery and handling of chemicals on the site.

Under the CSA, the Company sells product to Aroma on an ongoing basis. Sales under the CSA totaled \$1,047 and \$1,272 for the years ended December 31, 2016 and 2015, respectively, and \$124 for the period from inception (July 30, 2014) to December 31, 2014 (Successor period). The Company also provides hazardous waste removal services to Aroma under the CSA. Sales related to the hazardous waste removal services were \$1,615 and \$1,544 for the years ended December 31, 2016 and 2015, respectively, and \$23 for the period from inception (July 30, 2014) to December 31, 2014 (Successor period).

The Company incurs certain shared costs, such as electricity, steam, other utility and plant administration costs, all of which are charged to Aroma primarily based on direct usage. The Company charged Aroma \$2,686 and \$3,745 for such expenses for the years ended December 31, 2016 and 2015, respectively, and \$407 for the period from inception (July 30, 2014) to December 31, 2014 (Successor period).

Silica Sales Agreement

In connection with the 2014 Acquisition, Eco Services entered into an agreement (the “Silica Sales Agreement”) with Solvay’s Silica business unit (“Silica”) pursuant to which Eco Services agreed to provide Silica with sulfuric acid produced at its Hammond, IN plant for a term of five years, renewing automatically for one year terms thereafter. Eco Services historically provided sulfuric acid to Silica when it operated as a component of Solvay, and the Company continues to sell product to Solvay under the Silica Sales Agreement on an ongoing basis. These sales totaled \$1,743 and \$1,983 for the years ended December 31, 2016 and 2015, respectively, and \$145 for the period from inception (July 30, 2014) to December 31, 2014.

Predecessor Period

Allocation of General Corporate and Other Expenses

The Predecessor Period includes expense allocations for certain functions provided by Solvay and Solvay SA including, but not limited to, finance, legal, information technology, human resources and regulatory. These expenses have been allocated to Solvay’s Eco business unit on the basis of direct usage when identifiable, with the remainder allocated on the basis of revenue or headcount. For the period from January 1, 2014 to November 30, 2014, Solvay’s Eco business unit was allocated \$12,942, with such amounts included in selling, general and administrative expenses within the statement of operations.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

In addition, the Predecessor Period includes expense allocations from Solvay for employee benefit costs, including payroll taxes, group medical, dental and life insurance, postemployment and other benefits. These costs have been allocated on the basis of total salary expense. For the period from January 1, 2014 to November 30, 2014, Solvay's Eco business unit was allocated \$14,062 of employee benefit costs incurred by Solvay. For the period from January 1, 2014 to November 30, 2014, Solvay's Eco business unit was allocated \$565 of rent expense for shared facilities on the basis of sales.

The expense allocations have been determined on a basis that management considers to be a reasonable reflection of the utilization of services provided or the benefit received by Solvay's Eco business unit during the periods presented. The allocations may not, however, reflect the expense Solvay's Eco business unit would have incurred as an independent company for the periods presented. Actual costs that may have been incurred if Solvay's Eco business unit had been a stand-alone company would depend on a number of factors, including the chosen organization structure, which functions were outsourced or performed by employees and strategic decisions made in areas such as information technology and infrastructure.

Related Party Transactions

Solvay's Eco business unit sold product to two other Solvay business units, with revenue recorded equivalent to cost incurred. These sales totaled \$1,541 for the period from January 1, 2014 to November 30, 2014.

Solvay's Eco business unit also provided hazardous waste removal services to one of these other Solvay business units at cost. Such sales totaled \$754 for the period from January 1, 2014 to November 30, 2014. Solvay's Eco business unit also operated a facility that is shared with another Solvay business unit. Solvay's Eco business unit incurs certain shared costs, such as electricity, steam, other utility costs and plant administration costs, all of which are charged to this other business unit primarily based on direct usage. Solvay's Eco Services business unit charged \$5,799 for such expenses for the period from January 1, 2014 to November 30, 2014, with such amounts included as a reduction to cost of sales in the statement of operations.

Parent Company Investment

Under the Predecessor Period presentation, which lacks an independent capital structure, it is not meaningful to show share capital or retained earnings for Solvay's Eco business unit. The net assets are represented by the cumulative investment in Solvay's Eco business unit by Solvay, which is shown as Parent company investment comprised of the accumulated earnings of Solvay's Eco business unit and net transfers to/from the Parent.

All significant intercompany transactions between Solvay's Eco business unit and Solvay have been included in the Predecessor Period and are considered to be effectively settled for cash at the time the transaction is recorded. The total net effect of the settlement of these intercompany transactions is reflected in the statements of cash flows as a financing activity as Parent company investment. Net transfers to/from Solvay are deemed borrowings and repayments to Solvay associated with Solvay's centralized treasury function (for which bifurcation between gross borrowings and gross repayments is not practical). Accordingly, such activity is deemed a net financing activity for cash flow presentation purposes.

25. Long-term Supply Contract:

As part of Solvay's 2004 sale of its Specialty Phosphates business, Solvay agreed to continue to supply sulfuric acid to a third party in support of the phosphoric acid production for its specialty phosphates business

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

under a preexisting supply agreement. This non-cancelable agreement extends to 2031, and was assumed by the Company in connection with the 2014 Acquisition.

The liability associated with this supply agreement was recorded at an estimated fair value of \$27,300 in connection with the 2014 Acquisition. The fair value was determined by appraisal, based on the marked up price of the sulfuric acid over the price per the supply agreement, or mark up. The liability was \$23,888 and \$25,526 at December 31, 2016 and 2015, respectively, and is being amortized to cost of goods sold over the remaining term of the agreement.

26. Related Party Transactions:

The Company maintains certain policies and procedures for the review, approval and ratification of related party transactions to ensure that all transactions with selected parties are fair, reasonable and in the Company's best interests. All significant relationships and transactions are separately identified by management if they meet the definition of a related party or a related party transaction. Related party transactions include transactions that occurred during the year, or are currently proposed, in which the Company was or will be a participant, and for which any related person had or will have a direct or indirect material interest. All related party transactions are reviewed, approved and documented by the appropriate level of the Company's management in accordance with these policies and procedures.

On December 29, 2014, PQ Holdings, CCMP and PQ Corporation entered into a consulting agreement relating to the provision of certain financial and strategic advisory services and consulting services. Similarly, the consulting agreement between PQ Holdings, INEOS Capital Partners and PQ Corporation was amended and restated. Under the new consulting agreements, the Company agreed to pay an annual monitoring fee of \$5,000 distributed to CCMP and INEOS AG equal to the Pro Rata Percentage, as defined, between CCMP and INEOS AG. The Company recorded \$3,584 of management advisory fees in other operating expense in the consolidated statements of operations for the year ended December 31, 2016.

Advisory Services and Monitoring Agreement

Concurrent with the consummation of the 2014 Acquisition, the Company entered into an advisory services and monitoring agreement with CCMP, pursuant to which CCMP provided certain advisory services to the Company. Pursuant to the advisory services and monitoring agreement, CCMP and certain members of the Company's management and board of managers were paid a one-time fee on the Closing Date of \$8,000 related to the 2014 Acquisition, Senior Secured Credit Facilities and 2022 Notes transactions, and CCMP received (i) an annual advisory fee of \$500 and (ii) reimbursement for reasonable out-of-pocket expenses incurred in connection with the provision of services, including the reasonable fees and disbursements of legal counsel and other advisors retained by CCMP and travel and reasonable out-of-pocket expenses of each director appointed by CCMP to the Company's board of managers or the board of directors of its affiliates, and of any other representative of CCMP in connection with their provision of such services. The advisory services and monitoring agreement also provided for customary exculpation, indemnification and confidentiality provisions. The one-time management fee was recorded by the Company as an increase to selling, general, and administrative expenses.

Effective January 1, 2015, the Company entered into a service agreement with CCMP (the "Services Agreement") for the provision of services historically provided by Solvay. The services include product information and operations support, manufacturing support, electronic data processing and systems support, employee relations, and financial services. The Company recorded \$1,616 for these services and reimbursable

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)

expenses provided under the Service Agreement, which was recorded in selling, general and administrative expenses for the year ended December 31, 2015.

Pursuant to the advisory services and monitoring agreement, the Company agreed to pay certain investors a one-time fee of \$1,600 for services provided related to the 2014 Acquisition. On January 13, 2015, pursuant to a payment direction and subscription agreement, in lieu of the Company paying this fee, these investors agreed to contribute the \$1,600 transaction fee to the capital of Eco Services Group Holdings LLC (“Holdings”). Holdings contributed this fee to Eco Services Intermediate Holdings LLC (“Intermediate Holdings”). Intermediate Holdings in turn contributed this transaction fee to the Company, increasing the Company’s additional paid-in capital by \$1,600.

Transactions with Management and Board of Managers

For the year ended December 31, 2015, certain members of the Company’s board of managers and management contributed \$1,538 in cash, which was invested directly into Holdings. Holdings contributed these proceeds to Intermediate Holdings. Intermediate Holdings in turn contributed the proceeds to the Company, increasing the Company’s additional paid-in capital by \$1,538.

Transactions with Board of Directors

In connection with the offering by PQ Corporation of \$525.0 million aggregate principal amount of Senior Unsecured Notes due 2022 in May 2016, a member of our board of directors purchased \$4 million in principal amount of such notes. Interest accrues on the notes at an annual rate equal to three-month LIBOR plus 10.75%, with a 1.0% LIBOR floor, payable and reset quarterly. The director received interest payments in respect of the notes totaling \$0.3 million during the year ended December 31, 2016 and has not received any repayment in respect of the principal amount of such notes.

Joint Venture Agreement

The Company entered into a joint venture agreement (the “ZI Partnership Agreement”) in 1988 with CRI Zeolites Inc., a Royal Dutch Shell plc affiliate, to form Zeolyst International, our 50/50 joint venture partnership (the “Partnership”). Under the terms of the ZI Partnership Agreement, the Partnership leases certain land used in its Kansas City production facilities from PQ Corporation. This lease, which has been recorded as an operating lease, provided for rental payments of \$187 for the year ended December 31, 2016. The terms of this lease are evergreen as long as the ZI Partnership Agreement is in place. The Partnership purchases certain of its raw materials from the Company and is charged for various manufacturing costs incurred at the Company’s Kansas City production facility. The amount of these costs charged to the Partnership during the year ended December 31, 2016 was \$10,707. Certain administrative, marketing, engineering, management-related, and research and development services are provided to the Partnership by the Company. During the year ended December 31, 2016, the Partnership was charged \$8,169 for these services. In addition, the Partnership was charged certain product demonstration costs of \$1,663 during the year ended December 31, 2016.

Other

From time to time, the Company makes sales to portfolio companies of funds that are affiliated with CCMP and companies that are affiliated with INEOS Capital Partners, but these sales are not material.

27. Subsequent Events:

The Company has evaluated subsequent events since the balance sheet date through June 9, 2017, the date the financial statements were issued, and determined there are no additional items to disclose.

SCHEDULE I
PQ GROUP HOLDINGS INC. AND SUBSIDIARIES (PARENT)
CONDENSED FINANCIAL INFORMATION
CONDENSED BALANCE SHEET
(in thousands)

	December 31, 2016
ASSETS	
Total current assets	\$ —
Investment in subsidiaries	1,022,880
Total assets	<u>\$ 1,022,880</u>
LIABILITIES	
Total current liabilities	\$ —
Total liabilities	<u>\$ —</u>
STOCKHOLDERS' EQUITY	
Common stock, Class A (\$0.01 par); authorized shares 160,500,000; issued shares 627,251; outstanding shares 626,617 on December 31, 2016	6
Common stock, Class B (\$0.01 par); authorized shares 30,000,000; issued shares 6,727,685; outstanding shares 6,726,907 on December 31, 2016	67
Additional paid-in capital	1,167,137
Accumulated deficit	(90,380)
Treasury stock, at cost; shares 1,116 (Class A) and 778 (Class B) on December 31, 2016	(239)
Accumulated other comprehensive loss	<u>(53,711)</u>
Total PQ Group Holdings Inc. stockholders' equity	<u>1,022,880</u>
Total liabilities and stockholders' equity	<u>\$ 1,022,880</u>

See accompanying notes to condensed financial statements.

SCHEDULE I
PQ GROUP HOLDINGS INC. AND SUBSIDIARIES (PARENT)
CONDENSED FINANCIAL INFORMATION
CONDENSED STATEMENT OF OPERATIONS
(in thousands)

	For the Year Ended December 31, 2016
Stock compensation expense	\$ 7,029
Equity in loss of subsidiaries	(72,717)
Net loss	(79,746)
Other comprehensive income (loss), net of tax	
Pension and postretirement benefits	6,865
Net gain from hedging activities	4,557
Foreign currency translation	(65,781)
Total other comprehensive loss	(54,359)
Comprehensive loss	\$ (134,105)

See accompanying notes to condensed financial statements.

SCHEDULE I
PQ GROUP HOLDINGS INC. AND SUBSIDIARIES (PARENT)
CONDENSED FINANCIAL INFORMATION
CONDENSED STATEMENT OF CASH FLOWS
(in thousands)

	For the Year Ended December 31, 2016
Cash flows from operating activities:	
Net loss	\$ (79,746)
Adjustments to reconcile net loss to net cash provided by operating activities:	
Equity in net loss from subsidiaries	72,717
Stock compensation expense	7,029
Net cash provided by operating activities	<u>—</u>
Cash flows from investing activities:	
Net cash used in financing activities	<u>—</u>
Cash flows from financing activities:	
Net cash used in financing activities	<u>—</u>
Effect of exchange rate changes on cash	<u>—</u>
Net change in cash and cash equivalents	<u>—</u>
Cash and cash equivalents at beginning of period	<u>—</u>
Cash and cash equivalents at end of period	<u>\$ —</u>

See accompanying notes to condensed financial statements.

SCHEDULE I
PQ GROUP HOLDINGS INC. AND SUBSIDIARIES (PARENT)
CONDENSED FINANCIAL INFORMATION
NOTES TO CONDENSED SCHEDULE I

1. Description of PQ Group Holdings Inc. and Subsidiaries

On August 17, 2015, PQ Holdings, Inc. (“PQ Holdings”), Eco Services Operations, LLC (“Eco Services”), certain investment funds affiliated with CCMP Capital Advisors, LLC (now known as CCMP Capital Advisors, LP; “CCMP”), INEOS Capital Partners (“INEOS”) and certain other stockholders of PQ Holdings and Eco Services entered into a reorganization and transaction agreement pursuant to which the companies consummated a series of transactions to reorganize and combine the businesses of PQ Holdings and Eco Services (the “Business Combination”), under a new holding company, PQ Group Holdings Inc. (“PQ Group Holdings” or the “Parent Company”). The reorganization was consummated on May 4, 2016.

In accordance with accounting principles generally accepted in the United States (“GAAP”), Eco Services is the accounting predecessor to PQ Group Holdings. Certain investment funds affiliated with CCMP held a controlling interest position in Eco Services prior to the Business Combination. In addition, certain investment funds affiliated with CCMP owned a non-controlling interest in PQ Holdings and the merger with Eco Services constituted a change in control under the PQ Holdings credit agreements and bond indenture that were in place at the time of the Business Combination. Therefore, Eco Services is deemed to be the accounting acquirer. These Parent Company condensed financial statements are the continuation of Eco Services’ business prior to the Business Combination.

PQ Group Holdings is a holding company that conducts substantially all of its business operations through its wholly owned subsidiary, PQ Corporation. As specified in certain of PQ Corporation’s debt agreements entered into concurrently with the Business Combination, there are restrictions on the ability of PQ Corporation to make payments to its stockholder, PQ Group Holdings, on behalf of their equity interests (refer to Note 15 to our Consolidated Financial Statements entitled “Long-term Debt”).

2. Basis of Presentation

The accompanying condensed Parent Company only financial statements are required in accordance with Rule 4-08(e)(3) of Regulation S-X. These condensed financial statements have been presented on a “parent-only” basis. Under a parent-only presentation, the Parent Company’s investment in its consolidated subsidiary is presented under the equity method of accounting. Under the equity method, investment in its subsidiaries is stated at cost plus contributions and equity in undistributed income (loss) of subsidiary less distributions received since the date of acquisition. For purposes of presenting net income, this presentation assumes that the Parent Company was in existence for the full year ended December 31, 2016. These parent-only financial statements should be read in conjunction with PQ Group Holdings’ audited Consolidated Financial Statements included elsewhere herein.

3. Stock-Based Compensation

Refer to Note 21 of the notes to consolidated financial statements in this prospectus for a description of Stock-Based Compensation.

4. Common Stock

Refer to Note 20 of the notes to consolidated financial statements in this prospectus for a description of Common Stock.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except share and per share amounts)
(unaudited)

	June 30, 2017	December 31, 2016
ASSETS		
Cash and cash equivalents	\$ 50,457	\$ 70,742
Receivables, net	224,605	160,581
Inventories	236,508	227,048
Prepaid and other current assets	26,804	34,307
Total current assets	538,374	492,678
Investments in affiliated companies	467,670	459,406
Property, plant and equipment, net	1,203,925	1,181,388
Goodwill	1,294,675	1,241,429
Other intangible assets, net	808,851	816,573
Other long-term assets	76,536	68,197
Total assets	<u>\$ 4,390,031</u>	<u>\$ 4,259,671</u>
LIABILITIES		
Notes payable and current maturities of long-term debt	\$ 86,335	\$ 14,481
Accounts payable	128,183	128,478
Accrued liabilities	75,052	99,433
Total current liabilities	289,570	242,392
Long-term debt	2,589,713	2,547,717
Deferred income taxes	323,033	318,463
Other long-term liabilities	123,299	123,155
Total liabilities	<u>3,325,615</u>	<u>3,231,727</u>
Commitments and contingencies (Note 16)		
EQUITY		
Common stock, Class B (\$0.01 par); authorized shares 30,000,000; issued shares 6,727,685; outstanding shares 6,711,756 and 6,726,907 on June 30, 2017 and December 31, 2016, respectively	67	67
Common stock, Class A (\$0.01 par); authorized shares 160,500,000; issued shares 627,251; outstanding shares 625,172 and 626,135 on June 30, 2017 and December 31, 2016, respectively	6	6
Additional paid-in capital	1,169,965	1,167,137
Accumulated deficit	(94,443)	(90,380)
Treasury stock, at cost; shares 15,929 (Class B) and 2,079 (Class A) on June 30, 2017 and 778 (Class B) and 1,116 (Class A) on December 31, 2016	(239)	(239)
Accumulated other comprehensive loss	(15,798)	(53,711)
Total PQ Group Holdings Inc. equity	1,059,558	1,022,880
Noncontrolling interest	4,858	5,064
Total equity	<u>1,064,416</u>	<u>1,027,944</u>
Total liabilities and equity	<u>\$ 4,390,031</u>	<u>\$ 4,259,671</u>

See accompanying notes to condensed consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except share and per share amounts)
(unaudited)

	Six months ended June 30,	
	2017	2016
Sales	\$ 722,198	\$ 371,467
Cost of goods sold	532,072	283,068
Gross profit	190,126	88,399
Selling, general and administrative expenses	69,738	38,014
Other operating expense, net	27,324	25,588
Operating income	93,064	24,797
Equity in net (income) loss from affiliated companies	(14,622)	4,693
Interest expense	94,961	45,752
Debt extinguishment costs	—	11,858
Other expense, net	16,613	3,024
Income (loss) before income taxes and noncontrolling interest	(3,888)	(40,530)
Provision for income taxes	97	39,549
Net loss	(3,985)	(80,079)
Less: Net (loss) income attributable to the noncontrolling interest	78	314
Net loss attributable to PQ Group Holdings Inc.	<u>\$ (4,063)</u>	<u>\$ (80,393)</u>
Loss per share:		
Basic		
Class B shares	\$ —	\$ —
Class A shares	\$ (9.45)	\$ (186.90)
Diluted		
Class B shares	\$ —	\$ —
Class A shares	\$ (9.45)	\$ (186.90)
Weighted average shares outstanding:		
Basic		
Class B shares	6,679,077	3,224,645
Class A shares	429,985	430,136
Diluted		
Class B shares	6,679,077	3,224,645
Class A shares	429,985	430,136

See accompanying notes to condensed consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)
(unaudited)

	Six months ended	
	June 30,	
	2017	2016
Net loss	<u>\$ (3,985)</u>	<u>\$ (80,079)</u>
Other comprehensive income (loss), net of tax:		
Pension and postretirement benefits	(203)	324
Net (loss) gain from hedging activities	(3,025)	1,101
Foreign currency translation	41,642	(9,205)
Total other comprehensive income (loss)	<u>38,414</u>	<u>(7,780)</u>
Comprehensive income (loss)	<u>34,429</u>	<u>(87,859)</u>
Less: Comprehensive income (loss) attributable to noncontrolling interest	579	(165)
Comprehensive income (loss) attributable to PQ Group Holdings Inc.	<u>\$ 33,850</u>	<u>\$ (87,694)</u>

See accompanying notes to condensed consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)
(unaudited)

	Common stock, Class B	Common stock, Class A	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Balance, December 31, 2016	\$ 67	\$ 6	\$1,167,137	\$ (90,380)	\$ (239)	\$ (53,711)	\$ 5,064	\$1,027,944
Net (loss) income	—	—	—	(4,063)	—	—	78	(3,985)
Other comprehensive income (loss)	—	—	—	—	—	37,913	501	38,414
Dividend distribution	—	—	—	—	—	—	(785)	(785)
Stock compensation expense	—	—	2,828	—	—	—	—	2,828
Balance, June 30, 2017	<u>\$ 67</u>	<u>\$ 6</u>	<u>\$1,169,965</u>	<u>\$ (94,443)</u>	<u>\$ (239)</u>	<u>\$ (15,798)</u>	<u>\$ 4,858</u>	<u>\$1,064,416</u>

	Common stock, Class B	Common stock, Class A	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Balance, December 31, 2015	\$ —	\$ —	\$ 245,279	\$ (10,634)	\$ —	\$ 648	\$ —	\$ 235,293
Business Combination	67	6	912,127	—	—	—	6,569	918,769
Net (loss) income	—	—	—	(80,393)	—	—	314	(80,079)
Other comprehensive income (loss)	—	—	—	—	—	(7,301)	(479)	(7,780)
Stock repurchase	—	—	(2,540)	—	—	—	—	(2,540)
Equity contribution	—	—	5,100	—	—	—	—	5,100
Dividend distribution	—	—	—	—	—	—	(476)	(476)
Stock compensation expense	—	—	3,778	—	—	—	—	3,778
Balance, June 30, 2016	<u>\$ 67</u>	<u>\$ 6</u>	<u>\$1,163,744</u>	<u>\$ (91,027)</u>	<u>\$ —</u>	<u>\$ (6,653)</u>	<u>\$ 5,928</u>	<u>\$1,072,065</u>

See accompanying notes to condensed consolidated financial statements.

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PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)
(unaudited)

	Six months ended June 30,	
	2017	2016
Cash flows from operating activities:		
Net loss	\$ (3,985)	\$ (80,079)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:		
Depreciation	58,030	29,868
Amortization	25,176	12,123
Acquisition accounting valuation adjustments on inventory sold	871	17,714
Amortization of deferred financing costs and original issue discount	4,348	2,356
Debt extinguishment costs	—	7,182
Debt modification creditor fees capitalized	—	(1,932)
Foreign currency exchange loss	16,356	3,090
Pension and postretirement healthcare benefit expense	2,090	1,566
Pension and postretirement healthcare benefit funding	(3,605)	(311)
Deferred income tax expense	(5,270)	26,003
Net loss on asset disposals	2,925	1,661
Supplemental pension plan mark-to-market gain	(499)	(164)
Stock compensation	2,828	3,778
Equity in net (income) loss from affiliated companies	(14,622)	4,693
Dividends received from affiliated companies	15,071	136
Working capital changes that provided (used) cash, excluding the effect of business combinations:		
Receivables	(44,046)	(8,014)
Inventories	2,015	2,836
Prepays and other current assets	(1,440)	648
Accounts payable	(7,408)	(7,869)
Accrued liabilities	(25,812)	(17,197)
Other, net	(1,272)	(2,460)
Net cash provided by (used in) operating activities	<u>21,751</u>	<u>(4,372)</u>
Cash flows from investing activities:		
Purchases of property, plant and equipment	(60,613)	(38,360)
Investment in affiliated companies	(5,000)	—
Change in restricted cash, net	9,376	(7,556)
Loan receivable under the New Market Tax Credit arrangement	(6,221)	(7,823)
Business combinations, net of cash acquired	(41,572)	(1,777,740)
Other, net	474	—
Net cash used in investing activities	<u>(103,556)</u>	<u>(1,831,479)</u>
Cash flows from financing activities:		
Draw down of revolver	250,000	103,000
Repayments of revolver	(185,000)	(75,000)
Issuance of long-term debt under the New Market Tax Credit arrangement	8,820	11,000
Issuance of long-term debt, net of original issue discount and financing fees	—	1,174,709
Issuance of long-term notes, net of original issue discount and financing fees	—	1,122,079
Debt issuance costs	—	(5,397)
Repayments of long-term debt	(6,216)	(473,001)
Equity contribution	—	5,100
Stock repurchase	—	(2,540)
Distributions to noncontrolling interests	(785)	(476)
Net cash provided by financing activities	<u>66,819</u>	<u>1,859,474</u>
Effect of exchange rate changes on cash and cash equivalents	(5,299)	(1,284)
Net change in cash and cash equivalents	(20,285)	22,339
Cash and cash equivalents at beginning of period	70,742	25,155
Cash and cash equivalents at end of period	<u>\$ 50,457</u>	<u>\$ 47,494</u>
Supplemental cash flow information:		
Cash paid for taxes	<u>\$ 15,904</u>	<u>\$ 5,565</u>
Cash paid for interest	<u>\$ 91,710</u>	<u>\$ 35,055</u>
Non-cash investing activity:		
Capital expenditures acquired on account but unpaid as of the period end	<u>\$ 11,681</u>	<u>\$ 9,414</u>
Non-cash financing activity		
Equity consideration for the Business Combination	<u>\$ —</u>	<u>\$ 910,800</u>
Debt assumed in the Business Combination	<u>\$ —</u>	<u>\$ 22,911</u>
Debt assumed in the Acquisition	<u>\$ 16,609</u>	<u>\$ —</u>

See accompanying notes to condensed consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
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1. Background and Basis of Presentation:

Description of Business

PQ Group Holdings Inc. and subsidiaries (the “Company” or “PQ Group Holdings”) conducts operations through two principal businesses: Performance Materials & Chemicals: a fully integrated, global leader in silicate technology, producing sodium silicate, specialty silicas, zeolites, spray dry silicates, magnesium silicate, and other high performance chemical products used in a variety of end-uses such as adsorbents for surface coatings, clarifying agents for beverages, cleaning and personal care products and engineered glass products for use in highway safety, polymer additives, metal finishing and electronics end uses; and Environmental Catalysts & Services: an industry-leading refinery services company that is also a merchant sulfuric acid producer operating a network of plants serving a variety of end uses, including the oil refining, nylon, mining, general industrial and chemical industries and as an integrated silica catalyst and specialty zeolite-based catalyst producer, producing silica catalyst used in the production of high-density polyethylene (“HDPE”) and methyl methacrylate (“MMA”), and specialty zeolite-based catalysts sold to the emissions control industry, the petrochemical industry and other areas of the broader chemicals industry.

The Company experiences some seasonality, primarily with respect to the performance materials and refining services product groups. With respect to the performance materials product group, sales and earnings are generally higher during the second and third quarters of the year as highway striping projects typically occur during warmer weather months. Additionally, the refining services product group typically experiences similar seasonal fluctuations as a result of higher demand for gasoline products in the summer months. As a result, working capital requirements tend to be higher in the first and fourth quarters of the year, while higher cash generation occurs in the second and third quarters of the year.

Basis of Presentation

On August 17, 2015, the Company, PQ Holdings Inc. (“PQ Holdings”), Eco Services Operations LLC (“Eco Services”), certain investment funds affiliated with CCMP Capital Advisors, LLC (now known as CCMP Capital Advisors, LP; “CCMP”), and stockholders of PQ Holdings and Eco Services entered into a reorganization and transaction agreement pursuant to which the companies consummated a series of transactions to reorganize and combine the businesses of PQ Holdings and Eco Services (the “Business Combination”), under a new holding company, PQ Group Holdings Inc. The Business Combination was consummated on May 4, 2016.

In accordance with accounting principles generally accepted in the United States (“GAAP”), Eco Services is the accounting predecessor to PQ Group Holdings. Certain investment funds affiliated with CCMP held a controlling interest position in Eco Services prior to the Business Combination. In addition, certain investment funds affiliated with CCMP owned a non-controlling interest in PQ Holdings prior to the Business Combination and the merger with Eco Services constituted a change in control under the PQ Holdings credit agreements and bond indenture that were in place at the time of the Business Combination. Therefore, Eco Services is deemed to be the accounting acquirer. These condensed consolidated financial statements are the continuation of Eco Services’ business prior to the Business Combination.

The condensed consolidated financial statements included herein are unaudited. Certain information and footnote disclosures normally included in annual financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations for interim reporting. In the opinion of management, all adjustments of a normal and recurring nature necessary to state fairly the financial position and results of operations have been included. The results of operations are not necessarily indicative of the results to

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be expected for the full year. The accompanying unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto for the year ended December 31, 2016. The Company has continued to follow the accounting policies set forth in those consolidated financial statements.

2. New Accounting Standards:

Recently Adopted Accounting Standards

In October 2016, the Financial Accounting Standards Board ("FASB") issued guidance which eliminates the deferral of the tax effects of intra-entity transfers of an asset other than inventory. Current GAAP prohibits the recognition of current and deferred income taxes for an intra-entity asset transfer until the asset has been sold to an outside party which has resulted in diversity in practice and increased complexity within financial reporting. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The Company early adopted the guidance effective January 1, 2017.

In March 2016, the FASB issued guidance that includes targeted improvements to the accounting for employee stock-based compensation. The updates in the guidance include changes in the income tax consequences, balance sheet classification and cash flow statement reporting of stock-based payment transactions. The guidance also includes certain modifications applicable only to nonpublic entities. For public companies, the new guidance is effective for annual periods beginning after December 15, 2016, and interim periods within those years. The Company adopted this new guidance as required on January 1, 2017, with no material impact upon adoption to the Company's consolidated financial statements. On a prospective basis from the adoption date, the Company will record all tax effects related to stock-based compensation through the statement of operations, and all tax-related cash flows resulting from stock-based award payments will be reported as operating activities in the statement of cash flows. The Company made an accounting policy election under the new guidance to account for forfeitures of stock-based compensation awards as they occur.

In July 2015, the FASB issued new guidance that changes the measurement principle for inventory from the lower of cost or market to the lower of cost or net realizable value. The amendments in this guidance do not apply to inventory that is measured using LIFO or the retail inventory method; rather, the amendments apply to all other inventory, which includes inventory that is measured using FIFO or average cost. Within the scope of this new guidance, an entity should measure inventory at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling price in the ordinary course of business, less reasonably predictable costs of completion, disposal and transportation, which is consistent with existing GAAP. The Company adopted the new guidance on January 1, 2017 as required. The guidance did not have a material impact on the Company's consolidated financial statements.

Accounting Standards Not Yet Adopted

In May 2017, the FASB issued guidance to clarify which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting. Under the new guidance, an entity should not account for the effects of a change in a share-based payment award using modification accounting unless the fair value, vesting conditions and classification as either a liability or equity are all the same with respect to the award immediately prior to modification and the modified award itself. The new guidance is effective for annual periods beginning after December 15, 2017, including interim periods within those years. Early adoption is permitted, and the new guidance should be applied prospectively to awards modified on or after the adoption

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date. Based on the Company's existing policies regarding the application of modification accounting to its share-based payment awards, the Company does not believe that the new guidance will have a material impact on its consolidated financial statements.

In March 2017, the FASB issued guidance to improve the presentation of net periodic pension cost and net periodic postretirement benefit cost (collectively, "pension costs"). Under current GAAP, there are several components of pension costs which are presented net to arrive at pension costs as included in the income statement and disclosed in the notes. As part of this amendment to the existing guidance, the service cost component of pension costs will be bifurcated from the other components and included in the same line item of the income statement as compensation costs are reported. The remaining components will be reported together below operating income on the income statement, either as a separate line item or combined with another line item on the income statement and disclosed. Additionally, with respect to capitalization to inventory, fixed assets, etc., only the service cost component will be eligible for capitalization upon adoption of the guidance. The new guidance is effective for public companies for annual periods beginning after December 15, 2017, including interim periods within those years. Early adoption is permitted. The amendments should be applied retrospectively upon adoption with respect to the presentation of the service and other cost components of pension costs in the income statement, and prospectively for the capitalization of the service cost component in assets. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In January 2017, the FASB issued guidance which eliminates the second step from the traditional two-step goodwill impairment test. Under current guidance, an entity performed the first step of the goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount; if an impairment loss was indicated, the entity computed the implied fair value of goodwill to determine whether an impairment loss existed, and if so, the amount to recognize. Under the new guidance, an impairment loss is recognized for the amount by which the carrying amount exceeds the reporting unit's fair value (the Step 1 test), with no further testing required. Any impairment loss recognized is limited to the amount of goodwill allocated to the reporting unit. The new guidance is effective for public companies that are SEC registrants for fiscal years beginning after December 15, 2019, with early adoption permitted for goodwill impairment tests performed on testing dates after January 1, 2017. All entities are required to apply the guidance prospectively to goodwill impairment tests subsequent to adoption of the standard. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In January 2017, the FASB issued guidance which clarifies the definition of a business and provides revised criteria and a framework to determine whether an integrated set of assets and activities is a business. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, including interim periods within those years. Early adoption is permitted. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In November 2016, the FASB issued guidance which clarifies the classification and presentation of changes in restricted cash on the statement of cash flows. The updates in the guidance require that the statement of cash flows explain the change during the period in the total of cash, cash equivalents and restricted cash when reconciling the beginning-of-period and end-of-period total amounts. The updates also require a reconciliation between cash, cash equivalents and restricted cash presented on the balance sheet to the total of the same amounts presented on the statement of cash flows. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those years. Early adoption is permitted, and the new guidance should be applied retrospectively to each period presented. The Company is evaluating the

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impact that the new guidance will have on its consolidated financial statements. As of June 30, 2017, the Company had \$4,405 of restricted cash included in prepaid and other current assets on its balance sheet related to its New Market Tax Credit financing arrangements as well as other small restricted cash balances.

In August 2016, the FASB issued guidance which clarifies the classification of certain cash receipts and cash payments in the statement of cash flows, including debt prepayment or extinguishment costs and distributions from certain equity method investees. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. Early adoption is permitted, and the new guidance should be applied retrospectively to each period presented. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In February 2016, the FASB issued guidance that amends the accounting for leases. Under the new guidance, a lessee will recognize assets and liabilities for most leases (including those classified under existing GAAP as operating leases, which based on current standards are not reflected on the balance sheet), but will recognize expenses similar to current lease accounting. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those years. Early adoption is permitted. The new guidance must be adopted using a modified retrospective transition and provides for certain practical expedients. The Company is currently evaluating the impact that the new guidance will have on its consolidated financial statements. The Company has operating lease agreements for which it expects to recognize right of use assets and corresponding liabilities on its balance sheet upon adoption of the new guidance. A complete discussion of these leases is included in the Company's audited consolidated financial statements for the year ended December 31, 2016 in Note 20, Commitments and Contingent Liabilities.

In May 2014, the FASB issued accounting guidance (with subsequent targeted amendments) that will significantly enhance comparability of revenue recognition practices across entities, industries, jurisdictions and capital markets. The core principle of the guidance is that revenue recognized from a transaction or event that arises from a contract with a customer should reflect the consideration to which an entity expects to be entitled in exchange for goods or services provided. To achieve that core principle, the new guidance sets forth a five-step revenue recognition model that will need to be applied consistently to all contracts with customers, except those that are within the scope of other topics in the Accounting Standards Codification ("ASC"). Also required are enhanced disclosures to help users of financial statements better understand the nature, amount, timing and uncertainty of revenues and cash flows from contracts with customers. The enhanced disclosures include qualitative and quantitative information about contracts with customers, significant judgments made in applying the revenue guidance, and assets recognized related to the costs to obtain or fulfill a contract. For public companies, the new requirements are effective for annual reporting periods beginning after December 15, 2017, including interim periods within those years. The Company is reviewing its key revenue streams and assessing the underlying customer contracts within the framework of the new guidance. The Company has evaluated the key aspects of its revenue streams for impact under the new guidance and is currently performing a detailed analysis of its customer agreements to quantify the potential changes under the guidance. The Company has not yet determined whether the guidance will have a material impact on its existing revenue recognition practices, but there are new robust disclosure requirements that will have an impact on the Company's reporting. The Company anticipates adopting the new guidance in the first quarter of 2018 as required, and expects to implement the guidance under the modified retrospective transition method of adoption.

3. Fair Value Measurements:

Fair values are based on quoted market prices when available. When market prices are not available, fair values are generally estimated using discounted cash flow analyses, incorporating current market inputs for

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similar financial instruments with comparable terms and credit quality. In instances where there is little or no market activity for the same or similar instruments, the Company estimates fair values using methods, models and assumptions that management believes a hypothetical market participant would use to determine a current transaction price. These valuation techniques involve some level of management estimation and judgment that becomes significant with increasingly complex instruments or pricing models. Where appropriate, adjustments are included to reflect the risk inherent in a particular methodology, model or input used.

The Company's financial assets and liabilities carried at fair value have been classified based upon a fair value hierarchy. The hierarchy gives the highest ranking to fair values determined using unadjusted quoted prices in active markets for identical assets and liabilities (Level 1) and the lowest ranking to fair values determined using methodologies and models with unobservable inputs (Level 3). The classification of an asset or a liability is based on the lowest level input that is significant to its measurement. For example, a Level 3 fair value measurement may include inputs that are both observable (Levels 1 and 2) and unobservable (Level 3). The levels of the fair value hierarchy are as follows:

- Level 1—Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets.
- Level 2—Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves.
- Level 3—Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company's best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date.

The following table presents information about the Company's assets and liabilities that were measured at fair value on a recurring basis as of June 30, 2017 and December 31, 2016, and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value.

	As of June 30, 2017	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts	\$ 1,653	\$ —	\$ 1,653	\$ —
Restoration plan assets	<u>5,604</u>	<u>5,604</u>	<u>—</u>	<u>—</u>
Total	<u>\$ 7,257</u>	<u>\$ 5,604</u>	<u>\$ 1,653</u>	<u>\$ —</u>
Liabilities:				
Derivative contracts	<u>\$ 117</u>	<u>\$ —</u>	<u>\$ 117</u>	<u>\$ —</u>

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	As of December 31, 2016	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts	\$ 6,434	\$ —	\$ 6,434	\$ —
Restoration plan assets	5,594	5,594	—	—
Total	<u>\$ 12,028</u>	<u>\$ 5,594</u>	<u>\$ 6,434</u>	<u>\$ —</u>

Restoration plan assets

The fair values of the Company's restoration plan assets are determined through quoted prices in active markets. Restoration plan assets are assets held in a Rabbi trust to fund the obligations of the Company's defined benefit supplementary retirement plans and include various stock and fixed income mutual funds. See Note 15 to these condensed consolidated financial statements regarding the Company's supplementary retirement plans.

Derivative contracts

Derivative assets and liabilities can be exchange-traded or traded over-the-counter ("OTC"). The Company generally values exchange-traded derivatives using models that calibrate to market transactions and eliminate timing differences between the closing price of the exchange-traded derivatives and their underlying instruments. OTC derivatives are valued using market transactions and other market evidence whenever possible, including market-based inputs to models, model calibration to market transactions, broker or dealer quotations or alternative pricing sources with reasonable levels of price transparency. When models are used, the selection of a particular model to value an OTC derivative depends on the contractual terms of, and specific risks inherent in, the instrument as well as the availability of pricing information in the market. The Company generally uses similar models to value similar instruments. Valuation models require a variety of inputs, including contractual terms, market prices and rates, forward curves, measures of volatility, and correlations of such inputs. For OTC derivatives that trade in liquid markets, such as forward contracts, swaps and options, model inputs can generally be corroborated by observable market data by correlation or other means, and model selection does not involve significant management judgment.

The Company has interest rate caps and natural gas swaps that are valued using Level 2 inputs. In addition, the Company applies a credit valuation adjustment to reflect credit risk which is calculated based on credit default swaps. To the extent that the Company's net exposure under a specific master agreement is an asset, the Company utilizes the counterparty's default swap rate. If the net exposure under a specific master agreement is a liability, the Company utilizes a default swap rate comparable to PQ Group Holdings. The credit valuation adjustment is added to the discounted fair value to reflect the exit price that a market participant would be willing to receive to assume the Company's liabilities or that a market participant would be willing to pay for the Company's assets. As of June 30, 2017 and December 31, 2016, the credit valuation adjustment resulted in a minimal change in the fair value of the derivatives. See Note 13 to these condensed consolidated financial statements regarding the Company's use of derivative financial instruments.

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4. Accumulated Other Comprehensive Income (Loss):

The following table presents the tax effects of each component of other comprehensive income (loss) for the six months ended June 30, 2017 and 2016:

	Six months ended June 30,					
	2017			2016		
	Pre-tax amount	Tax benefit / (expense)	After-tax amount	Pre-tax amount	Tax benefit / (expense)	After-tax amount
Defined benefit and other postretirement plans						
Amortization and unrealized losses	\$ (228)	\$ 25	\$ (203)	\$ 324	\$ —	\$ 324
Benefit plans, net	(228)	25	(203)	324	—	324
Net (loss) gain from hedging activities	(4,887)	1,862	(3,025)	1,776	(675)	1,101
Foreign currency translation	47,859	(6,217)	41,642	(6,875)	(2,330)	(9,205)
Other comprehensive income (loss)	<u>\$ 42,744</u>	<u>\$ (4,330)</u>	<u>\$ 38,414</u>	<u>\$ (4,775)</u>	<u>\$ (3,005)</u>	<u>\$ (7,780)</u>

The following table presents the change in accumulated other comprehensive loss, net of tax, by component for the six months ended June 30, 2017 and 2016:

	Defined benefit and other postretirement plans	Net gain (loss) from hedging activities	Foreign currency translation	Total
December 31, 2016	\$ 7,513	\$ 4,557	\$ (65,781)	\$ (53,711)
Other comprehensive income (loss) before reclassifications	(269)	(3,038)	41,141	37,834
Amounts reclassified from accumulated other comprehensive income (a)	66	13	—	79
Net current period other comprehensive income (loss)	(203)	(3,025)	41,141	37,913
June 30, 2017	<u>\$ 7,310</u>	<u>\$ 1,532</u>	<u>\$ (24,640)</u>	<u>\$ (15,798)</u>
December 31, 2015	\$ 648	\$ —	\$ —	\$ 648
Other comprehensive income (loss) before reclassifications	324	650	(8,726)	(7,752)
Amounts reclassified from accumulated other comprehensive income (a)	—	451	—	451
Net current period other comprehensive income (loss)	324	1,101	(8,726)	(7,301)
June 30, 2016	<u>\$ 972</u>	<u>\$ 1,101</u>	<u>\$ (8,726)</u>	<u>\$ (6,653)</u>

(a) See the following table for details about these reclassifications.

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The following table presents the reclassifications out of accumulated other comprehensive loss for the six months ended June 30, 2017 and 2016. Amounts in parenthesis indicate debits to profit/loss.

<u>Details about Accumulated Other Comprehensive Income Components</u>	<u>Amount Reclassified from Accumulated Other Comprehensive Income</u>		<u>Affected Line Item in the Statement Where Net Income is Presented</u>
	<u>Six months ended June 30,</u>		
	<u>2017</u>	<u>2016</u>	
Defined benefit and other postretirement plans			
Amortization of prior service cost	\$ 40	\$ —	(a)
Amortization of net gain (loss)	37	—	(a)
	77	—	Total before tax
	(11)	—	Tax (expense) benefit
	<u>\$ 66</u>	<u>\$ —</u>	Net of tax
Net gain (loss) from hedging activities			
Interest rate caps	\$ 11	\$ —	Interest expense
Natural gas swaps	10	728	Cost of goods sold
	21	728	Total before tax
	(8)	(277)	Tax (expense) benefit
	<u>\$ 13</u>	<u>\$ 451</u>	Net of tax
Total reclassifications for the period	<u>\$ 79</u>	<u>\$ 451</u>	Net of tax

(a) These accumulated other comprehensive income (loss) components are included in the computation of net periodic pension and other postretirement cost (see Note 15 to these condensed consolidated financial statements for additional details).

5. Acquisition:

On June 12, 2017 (the "Closing Date"), the Company acquired the facilities of Sovitec Mondial S.A. ("Sovitec") located in Belgium, Spain, Argentina and France as part of a stock transaction (the "Acquisition") for \$41,572 in cash, excluding assumed debt. Based in Fleurus, Belgium, Sovitec is a high quality producer of engineered glass products used in transportation safety, metal finishing and polymer additives.

The Acquisition was accounted for using the acquisition method of accounting. Under the acquisition method, the purchase price was allocated to the identifiable net assets acquired based on the fair values of the identifiable assets acquired and liabilities assumed as of the Closing Date. The excess of the purchase price over the fair values of the identifiable net assets acquired was recorded to goodwill.

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The following table sets forth the calculation and preliminary allocation of the purchase price to the identifiable net assets acquired with respect to the Acquisition:

Total consideration, net of cash acquired	<u>\$ 41,572</u>
Recognized amounts of identifiable assets acquired and liabilities assumed:	
Receivables	\$ 14,305
Inventories	7,645
Prepaid and other current assets	230
Property, plant and equipment	9,020
Other long-term assets	<u>1,810</u>
Fair value of assets acquired	33,010
Current debt	(6,420)
Accounts payable	(10,748)
Long-term debt	(10,189)
Other long-term liabilities	<u>(154)</u>
Fair value of net assets acquired	5,499
Goodwill	<u>36,073</u>
	<u>\$ 41,572</u>

The valuation of the identifiable assets and liabilities included in the table above is preliminary and is subject to change, as the Company is in the process of evaluating the information required to determine the fair values of certain identifiable assets and liabilities acquired, including inventory, property, plant and equipment, and intangible assets. An increased portion of the purchase price allocated to the identifiable net assets acquired will reduce the amount recognized for goodwill and may result in increased cost of goods sold, depreciation and/or amortization expense. Adjustments to the provisional amounts during the measurement period that result in changes to depreciation, amortization or other income effects will be recognized in the reporting period(s) in which the adjustments are determined.

The Company's condensed consolidated financial statements include Sovitec's results of operations for the period from the Closing Date through June 30, 2017. Net sales and operating income attributable to Sovitec during this period are included in the Company's condensed consolidated statement of operations and total \$3,704 and \$679, respectively, for the six months ended June 30, 2017. Acquisition costs of \$1,328 are included in other operating expense, net in the Company's condensed consolidated statement of operations for the six months ended June 30, 2017.

The Company believes that the Acquisition will enable it to offer a more comprehensive, cost-effective and high-quality portfolio of products and services to its customers worldwide when combined with its existing business, which contributed to a total purchase price that resulted in the recognition of goodwill. All of the goodwill was assigned to the Company's Performance Materials and Chemicals segment. The goodwill associated with the Acquisition is not deductible for tax purposes.

6. Business Combination

As described in Note 1 to these condensed consolidated financial statements, on May 4, 2016, the Company, PQ Holdings, Eco Services, certain investment funds affiliated with CCMP and certain other stockholders of PQ

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Holdings and Eco Services completed the Business Combination. Eco Services is the accounting predecessor to PQ Group Holdings. Certain investment funds affiliated with CCMP held a controlling interest position in Eco Services prior to the Business Combination. In addition, certain investment funds affiliated with CCMP owned a noncontrolling interest in PQ Holdings prior to the Business Combination and the merger with Eco constituted a change in control under the various PQ Holdings credit agreements and bond indenture. Therefore, Eco Services is deemed to be the accounting acquirer. These condensed consolidated financial statements are the continuation of Eco Services' business prior to the Business Combination.

Total consideration for the Business Combination included \$1,777,740 of cash, \$910,800 of equity in the acquired PQ Holdings entities and \$1,401 of assumed stock awards of PQ Holdings. The fair value of the equity consideration was determined based on an estimated enterprise value using a market approach as of the date of the Business Combination, reduced by borrowings to arrive at the fair value of equity. The existing PQ Holdings credit facilities were not legally assumed as part of the Business Combination and the extinguishment of the debt concurrent with the Business Combination was included as part of the consideration transferred. Acquisition costs of \$502 are included in other operating expense, net in the Company's consolidated statement of operations for the six months ended June 30, 2016.

In accordance with the requirements of the purchase method of accounting for acquisitions, inventories were recorded at fair market value (which is defined as estimated selling prices less the sum of (a) costs of disposal and (b) a reasonable profit allowance for the selling effort of the acquiring entity), which was \$53,866 higher than the historical cost. The Company's cost of goods sold includes a pre-tax charge of \$17,714 for the six months ended June 30, 2016 relating to the portion of the step-up on inventory sold during the period. A separate portion of the fair value step-up related to the domestic inventory accounted for under the LIFO method was included in inventory on the consolidated balance sheet as of December 31, 2016 as part of the new LIFO base layer on the acquired inventory.

Pro Forma Financial Information

The unaudited pro forma financial information for the six months ended June 30, 2016 has been derived from the Company's historical consolidated financial statements and prepared to give effect to the Business Combination, assuming that the Business Combination occurred on January 1, 2015. These pro forma adjustments primarily relate to incremental depreciation expense on the step up of fixed assets, amortization of acquired intangibles, higher cost of goods sold related to the sale of revalued inventory, incremental interest expense related to the additional debt that needed to fund the Business Combination, and the estimated impact of these adjustments on the Company's tax provision. The unaudited pro forma consolidated results of operations are provided for illustrative purposes only and are not indicative of the Company's actual consolidated results of operations had the Business Combination been made as of January 1, 2015. The unaudited pro forma results of operations do not reflect any operating efficiencies or potential cost savings which may result from the Business Combination.

	Six months ended June 30, 2016 (unaudited)
Pro forma sales	\$ 710,331
Pro forma net loss	(46,379)

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Certain non-recurring charges included in the Company's results of operations for the six months ended June 30, 2016 were allocated to the respective prior year periods for pro forma purposes. For the six months ended June 30, 2016, non-recurring charges allocated to the prior year period include a debt prepayment penalty of \$26,250, refinancing charges of \$4,616 and transaction fee charges of \$714, all of which are excluded from the pro forma net loss for the six months ended June 30, 2016.

7. Goodwill

The changes in the carrying amount of goodwill for the six months ended June 30, 2017 is summarized as follows:

	Performance Materials & Chemicals	Environmental Catalysts & Services	Total
Balance as of December 31, 2016	\$ 852,506	\$ 388,923	\$ 1,241,429
Goodwill recognized	36,073	—	36,073
Foreign exchange impact	15,808	1,365	17,173
Balance as of June 30, 2017	<u>904,387</u>	<u>390,288</u>	<u>1,294,675</u>

8. Other Operating Expense, Net:

A summary of other operating expense, net is as follows:

	Six months ended June 30,	
	2017	2016
Restructuring and other related costs (Note 18)	\$ 1,472	\$ 9,584
Amortization expense	14,124	7,992
Net loss on asset disposals	2,925	1,661
Transaction and other related costs ⁽¹⁾	4,329	4,451
Management advisory fees	2,500	1,083
Other, net	1,974	817
	<u>\$27,324</u>	<u>\$25,588</u>

(1) Transaction and other related costs primarily include acquisition costs directly attributable to the Acquisition (see Note 5 to these condensed consolidated financial statements for further information) and the Business Combination (see Note 6 to these condensed consolidated financial statements for further information), as well as other business development costs.

9. Inventories:

Inventories are classified and valued as follows:

	June 30, 2017	December 31, 2016
Finished products and work in process	\$ 180,089	\$ 175,182
Raw materials	56,419	51,866
	<u>\$ 236,508</u>	<u>\$ 227,048</u>

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	June 30, 2017	December 31, 2016
Valued at lower of cost or market:		
LIFO basis	\$ 143,350	\$ 135,605
FIFO or average cost basis	93,158	91,443
	<u>\$ 236,508</u>	<u>\$ 227,048</u>

10. Investments in Affiliated Companies:

The Company accounts for investments in affiliated companies under the equity method. Affiliated companies accounted for on the equity basis as of June 30, 2017 are as follows:

Company	Country	Percent Ownership
PQ Silicates Ltd.	Taiwan	50%
Zeolyst International	USA	50%
Zeolyst C.V.	Netherlands	50%
Quaker Holdings	South Africa	49%

Following is summarized information of the combined investments:

	Six months ended June 30,	
	2017	2016
Net sales	\$ 141,787	\$ 44,787
Gross profit	58,586	22,306
Operating income	37,695	15,654
Net income	39,844	15,643

The Company's investments in affiliated companies balance as of June 30, 2017 and December 31, 2016 includes net purchase accounting fair value adjustments of \$267,117 and \$273,300, respectively, related to the Business Combination, consisting primarily of goodwill and intangible assets such as customer relationships, technical know-how and trade names. Consolidated equity in net income from affiliates is net of \$5,283 of amortization expense related to purchase accounting fair value adjustments for the six months ended June 30, 2017 and \$12,316 for the six months ended June 30, 2016.

11. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	June 30, 2017	December 31, 2016
Land	\$ 190,638	\$ 186,327
Buildings	179,270	157,944
Machinery and equipment	905,811	788,175
Construction in progress	179,815	204,138
	<u>1,455,534</u>	<u>1,336,584</u>
Less: accumulated depreciation	<u>(251,609)</u>	<u>(155,196)</u>
	<u>\$ 1,203,925</u>	<u>\$ 1,181,388</u>

Depreciation expense was \$58,030 and \$29,868 for the six months ended June 30, 2017 and 2016, respectively.

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12. Long-term Debt:

The summary of long-term debt is as follows:

	June 30, 2017	December 31, 2016
Senior secured USD term loans with interest at 5.25% (due May 2022)	\$ 920,792	\$ 925,430
Senior secured Euro term loans with interest at 5.00% (due May 2022)	321,752	297,317
Senior secured notes with interest at 6.75% (due November 2022)	625,000	625,000
Senior unsecured notes with interest at 11.75% (due May 2022)	525,000	525,000
Senior unsecured notes with interest at 8.50% (due November 2022)	200,000	200,000
ABL revolving credit facility (due May 2021)	65,000	—
Other	70,944	45,223
Total debt	2,728,488	2,617,970
Original issue discount	(26,447)	(28,497)
Deferred financing costs	(25,993)	(27,275)
Total debt, net of original issue discount and deferred financing costs	2,676,048	2,562,198
Less: current portion	(86,335)	(14,481)
Total long-term debt	<u>\$ 2,589,713</u>	<u>\$ 2,547,717</u>

The fair value of a financial instrument is the amount at which the instrument could be exchanged in a current transaction. As of June 30, 2017 and December 31, 2016, the fair value of the senior secured term loans and senior secured and unsecured notes was higher than book value by \$67,738 and \$68,477, respectively. The fair value of the senior secured term loans and senior secured and unsecured notes was derived from published loan prices as of June 30, 2017 and December 31, 2016, as applicable. The fair value is classified as Level 2 based upon the fair value hierarchy (see Note 3 to these condensed consolidated financial statements for further information on fair value measurements).

New Markets Tax Credit Financing

On June 22, 2017, the Company's subsidiary Potters Industries, LLC ("Potters") entered into a New Markets Tax Credit ("NMTC") financing arrangement with U.S Bank N.A. and several of its affiliates ("USB") and Business Conduit No. 28, LLC, an affiliate of Community Reinvestment Fund, Inc. ("CRF") whereby USB agreed to contribute \$3,054 and an additional \$6,221 in funds lent to USB by Potters Leveraged Lender LLC to USB. CRF, in turn, lent \$8,820 in the form of \$6,221 and \$2,599 of notes to Potters, which used the proceeds to acquire equipment for the expansion of Potters' manufacturing facility in Paris, Texas (the "June 2017 NMTC Agreement"). The June 2017 NMTC Agreement provides the Company with certain monetary benefits as an offset to specifically identified capital expenditures. The June 2017 NMTC Agreement requires that certain commitments and covenants are maintained over a period of seven years in order to legally recognize the benefit. The \$8,820 was outstanding as of June 30, 2017. The capital expenditures associated with the June 2017 NMTC Agreement are expected to be completed in 2017.

In connection with the June 2017 NMTC Agreement, the Company provided an indemnification related to its actions or inactions which cause either a NMTC disallowance or recapture event. In the event that the Company causes either a recapture or disallowance of the tax credits expected to be generated under this program, then the Company will be required to repay the disallowed or recaptured tax credits plus an amount

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sufficient to pay the taxes on such repayment to the counterparty of the agreement. This indemnification covers the Company's actions and inactions prior to June 22, 2024. The maximum potential amount of future payments under this indemnification is approximately \$3,682. The Company currently believes that the likelihood of a required payment under this indemnification is remote.

13. Financial Instruments:

The Company uses interest rate derivative instruments to manage its exposure to changes in interest rates on its variable-rate debt instruments and uses commodity derivatives to manage its exposure to commodity price fluctuations. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates and commodity prices, the Company exposes itself to credit risk and market risk. Credit risk is the failure of the counterparty to perform under the terms of the derivative contract. When the fair value of a derivative contract is an asset, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is a liability, the Company owes the counterparty and therefore, the Company is not exposed to the counterparty's credit risk in those circumstances. The Company minimizes counterparty credit risk in derivative instruments by entering into transactions with high quality counterparties. The derivative instruments entered into by the Company do not contain credit-risk-related contingent features.

Market risk is the adverse effect on the value of a derivative instrument that results from a change in interest rates, currency exchange rates, or commodity prices. The market risk associated with interest rate and commodity price contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

Use of Derivative Financial Instruments to Manage Commodity Price Risk. The Company is exposed to risks in energy costs due to fluctuations in energy prices, particularly natural gas. The Company has a hedging program in the United States which allows the Company to mitigate exposure to natural gas volatility with natural gas swap agreements. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices of comparable contracts. The respective current and non-current liabilities are recorded in accrued liabilities and other long-term liabilities and the respective current and non-current assets are recorded in prepaid and other current assets and other long-term assets, as applicable. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains or losses are recorded in stockholders' equity as a component of other comprehensive income (loss), net of tax. Realized gains and losses on natural gas hedges are included in production cost and subsequently charged to cost of goods sold in the consolidated statements of operations in the period in which inventory is sold. The Company's natural gas swaps have a remaining notional quantity of 950,000 MMBTU to mitigate commodity price volatility through December 2018.

Use of Derivative Financial Instruments to Manage Interest Rate Risk. The Company is exposed to fluctuations in interest rates on its senior secured credit facilities and senior unsecured notes. Changes in interest rates will not affect the market value of such debt but will affect the amount of the Company's interest payments over the term of the loans. Likewise, an increase in interest rates could have a material impact on the Company's cash flow. The Company hedges the interest rate fluctuations on its variable-rate debt obligations through interest rate cap agreements. The Company records these agreements at fair value as assets or liabilities. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains

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or losses are deferred in stockholders' equity as a component of other comprehensive income (loss), net of tax. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices.

In July 2016, the Company entered into interest rate cap agreements, paying a premium of \$1,551 to mitigate interest rate volatility from July 2016 through July 2020 by employing varying cap rates, ranging from 1.50% to 3.00% on \$1,000,000 of notional variable-rate debt.

The fair values of derivative instruments held as of June 30, 2017 and December 31, 2016 are shown below:

	Balance sheet location	June 30, 2017	December 31, 2016
Asset derivatives:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Current assets	\$ —	\$ 573
Natural gas swaps	Other long-term assets	—	58
Interest rate caps	Other long-term assets	1,653	5,803
Total asset derivatives		<u>\$ 1,653</u>	<u>\$ 6,434</u>
Liability derivatives:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	\$ 111	\$ —
Natural gas swaps	Other long-term liabilities	6	—
Total liability derivatives		<u>\$ 117</u>	<u>\$ —</u>

The following tables show the effect of the Company's derivative instruments designated as hedges on other comprehensive income (loss) ("OCI") and the statement of income for the six months ended June 30, 2017 and 2016:

		Six months ended June 30,			
		2017		2016	
		Amount of gain (loss) recognized in OCI on derivatives (effective portion)	Amount of gain (loss) reclassified from accumulated OCI into income (effective portion)	Amount of gain (loss) recognized in OCI on derivatives (effective portion)	Amount of gain (loss) reclassified from accumulated OCI into income (effective portion)
Derivatives designated as cash flow hedges:	Location in Earnings				
Interest rate caps	Interest expense	\$ (4,150)	\$ 11	\$ —	\$ —
Natural gas swaps	Cost of goods sold	(759)	10	(1,420)	728
		<u>\$ (4,909)</u>	<u>\$ 21</u>	<u>\$ (1,420)</u>	<u>\$ 728</u>

Amounts of unrealized losses in OCI that are expected to be reclassified to the consolidated statement of operations over the next twelve months are \$233 as of June 30, 2017.

14. Income Taxes:

The effective income tax rate for the six month period ended June 30, 2017 was (2.5%) compared to (97.6%) for the six month period ended June 30, 2016. The Company's effective income tax rate fluctuates based primarily on changes in income mix, repatriation of income from foreign subsidiaries and, for the comparative periods, the change in Eco Services' tax status.

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Prior to the Business Combination on May 4, 2016, Eco Services was a single member limited liability company and taxed as a partnership for federal and state income tax purposes. As such, all income tax liabilities and/or benefits of Eco Services were passed through to their members. Because Eco Services was taxed as a partnership, it did not record deferred taxes on the basis difference on its financial statements. Following the Business Combination on May 4, 2016, Eco Services had a change in tax status and is now taxed as a C-Corporation subject to federal and state corporate level income taxes at prevailing corporate rates. Minimal taxes were recorded on the book losses incurred by Eco Services during the periods preceding the Business Combination included in the six months ended June 30, 2016, causing the fluctuation to the Company's effective income tax rate in comparison to the taxes recorded for the six months ended June 30, 2017.

The difference between the U.S. federal statutory income tax rate and the Company's effective income tax rate for 2017 was mainly due to the tax effect of repatriating foreign earnings back to the United States as dividends offset by lower tax rates in foreign jurisdictions as compared to the U.S. tax rate, foreign withholding taxes, state taxes and non-deductible transaction costs.

15. Benefit Plans:

The following information is provided for (1) the Company-sponsored defined benefit pension plans covering employees in the U.S. and certain employees at its foreign subsidiaries, (2) the Company-sponsored unfunded plans to provide certain health care benefits to retired employees in the U.S. and Canada, and (3) the Company's defined benefit supplementary retirement plans which provide benefits for certain U.S. employees in excess of qualified plan limitations.

Components of net periodic expense are as follows:

Defined Benefit Pension Plans

	U.S.		Foreign	
	Six months ended		Six months ended	
	June 30,		June 30,	
	2017	2016	2017	2016
Service cost	\$ 609	\$ 1,093	\$ 1,783	\$ 542
Interest cost	5,072	2,715	2,685	566
Expected return on plan assets	(6,122)	(3,072)	(2,217)	(511)
Net periodic expense (benefit)	<u>\$ (441)</u>	<u>\$ 736</u>	<u>\$ 2,251</u>	<u>\$ 597</u>

Supplemental Retirement Plans

	Six months ended	
	June 30,	
	2017	2016
Interest cost	\$ 246	\$ 81
Net periodic expense	<u>\$ 246</u>	<u>\$ 81</u>

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Other Postretirement Benefit Plans

	Six months ended June 30,	
	2017	2016
Service cost	\$ 10	\$ 19
Interest cost	81	56
Amortization of prior service credit	(39)	—
Amortization of net gain	(38)	—
Net periodic expense	\$ 14	\$ 75

	Six months ended June 30,	
	2017	2016
Contributions		
Pension Benefits - Foreign	\$ 2,865	\$ 198
Supplemental Retirement Plans	102	17
Other Postretirement Benefit Plans	638	96

16. Commitments and Contingent Liabilities:

There is a risk of environmental impact in chemical manufacturing operations. The Company's environmental policies and practices are designed to ensure compliance with existing laws and regulations and to minimize the possibility of significant environmental impact. The Company is also subject to various other lawsuits and claims with respect to matters such as governmental regulations, labor and other actions arising out of the normal course of business. No accrual for these matters currently exists, with the exception of those listed below, because management believes that the liabilities resulting from such lawsuits and claims are not probable or reasonably estimable.

The Company triggered the requirement of New Jersey's Industrial Site Recovery Act ("ISRA") statute with the PQ Holdings stock transfer/corporate merger in December 2004. As required under ISRA, a General Information Notice with respect to the Company's two New Jersey locations was filed with the New Jersey Department of Environmental Protection ("NJDEP") in December 2004 and again in July 2007. Based on an initial review of the facilities by the NJDEP in 2005, the Company estimated that \$500 will be required for contamination assessment and removal work of one specific contaminant (polychlorinated biphenyls) that exceeded applicable NJDEP standards at these facilities, and had recorded a reserve for such amount as of December 31, 2005. During subsequent years, it was determined that additional assessment, removal and remediation work would be required and the reserve was increased to cover the estimated cost of such work. In addition, during this period, work had been performed and the reserve was reduced for actual costs incurred for the assessment and remediation work. Work at the Carlstadt facility has been completed and is closed from an ISRA standpoint, but as of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$605 and \$700, respectively, for costs required for contamination assessment and removal work at Rahway. There may be additional costs related to the remediation of Rahway, but until further investigation takes place, the Company cannot reasonably estimate the amount of additional liability that may exist.

As part of a Delaware River Basin Commission ("DRBC") required Pollutant Minimization Plan ("PMP"), in July 2013, the Company's Chester facility conducted limited paint sampling for polychlorinated biphenyls

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("PCBs"). Also, as part of demolition, repair and maintenance projects scheduled for the Company's Baltimore facility in 2014, the Company conducted limited paint sampling during the fall of 2013 for waste categorization purposes. Paint samples were analyzed for PCB Aroclor 1254, the specific PCB congener commonly used in the manufacture of paint until the late 1970s. The Company's analytical results indicated that PCB Aroclor 1254 is present in paint on some structures (e.g., piping, structural steel, tanks) in excess of the fifty (50) parts per million ("ppm") regulatory threshold. Under the Toxic Substances Control Act ("TSCA"), there is no requirement to test in use paint for PCB content. However, once PCB content is identified at concentrations at or above the regulatory threshold, absent specific approval from the U.S. Environmental Protection Agency ("EPA"), the PCB-containing paint is regulated as an unauthorized use of PCBs, and the paint must be addressed. The Company abated painted surfaces that have tested positive for PCBs at levels exceeding 50 ppm at Baltimore in 2015 and early 2016. Similar abatement of painted structures as necessary at Chester has also been substantially completed. Characterization studies to evaluate whether soils have been impacted at Baltimore have been initiated as required under the TSCA, and have yet to commence at Chester. As of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$527 and \$1,048, respectively, for the remediation costs of PCB-impacted soils at the Company's facilities.

In 2011, the Company installed a Continuous Emissions Monitor ("CEM") to measure CO, NOx and Opacity emissions from a furnace at the Company's Chester facility in Pennsylvania, and the Company conducted Relative Accuracy Test Audits ("RATA") as part of its efforts to certify the CEM. On May 5, 2014, the Pennsylvania Department of Environmental Protection ("PADEP") officially notified the Company that it was certifying the CEM based on RATA test results dating back to November 2011 and instructed the Company to start entering data previously recorded by the CEM into the Agency's on-line database. During the third and fourth quarters of 2014, the Company officially entered data recorded from the CEM up until the second quarter of 2013. In November 2015, PADEP issued an Assessment of Civil Penalty in the amount of \$1,739 for alleged violations under the Pennsylvania Air Pollution Control Act during the period from August 11, 2011 through June 30, 2013. The Company appealed, and PADEP reduced the penalty assessment to \$1,550. In January 2017, a hearing to review the merits of PQ's appeal to the Environmental Hearing Board was held, followed by a 90 to 120 day briefing period after which the judge should render an opinion. As of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$1,500 associated with the PADEP penalty.

The Company has a manufacturing facility at Warrington, United Kingdom. Asbestos-containing building material is present at the site, and asbestos removal and insulation replacement initiatives are underway. As of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$561 and \$532, respectively, for costs related to this program.

In 2008, the Company sold the property of a manufacturing facility located in the United States to the local port authority. In 2009, the port authority commissioned an environmental investigation of portions of the property. In 2010, the port authority advised the Company of alleged soil and groundwater contamination on the property and alleged the Company liable for certain conditions. The Company received and reviewed the environmental investigation documentation and determined it may have liability with respect to some, but not all, of the alleged contamination. As of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$867 and \$913, respectively, for costs related to this potential liability.

The Company has recorded a reserve of \$1,503 and \$1,776 as of June 30, 2017 and December 31, 2016, respectively, to address remaining subsurface remedial and wetlands/marsh management activities at the Company's Martinez, CA site. Although currently a sulfuric acid regeneration plant, the site originally was operated by Mountain Copper Company ("Mococo") as a copper smelter. Also, the site sold iron pyrite to various

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
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customers and allowed their customers to deposit waste iron pyrite cinder and slag on the site. The property is adjacent to Peyton Slough, where Mococo had a permitted discharge point from its process. In 1997, the San Francisco Bay Regional Water Quality Control Board ("RWQCB") required characterization and remediation of Peyton Slough for Copper, Zinc and Acidic Soils. Various remediation activities were undertaken and completed, and the site has received final concurrence from the Army Corps with respect to the completed work. The RWQCP has agreed that Eco Services has achieved the goals for vegetative cover, but the current marsh condition is not sustainable without continued operation of the tide gates. The Company is continuing to work with the RWQCP on a plan to involve the County and work towards development of an alliance for operating, maintaining and funding the tide gates in the future.

As of June 30, 2017 and December 31, 2016, the Company has recorded a reserve of \$1,558 and \$1,755, respectively, for subsurface remediation and the Soil Vapor Extraction Project at the Company's Dominguez, CA site. In the 1980s and 1990s, the EPA and the Los Angeles Regional Water Quality Control Board conducted investigations of the site due to historic chlorinated pesticide and chlorinated solvent use. Soil and groundwater beneath the site were impacted by chlorinated solvents and associated breakdown products, petroleum hydrocarbons, chlorinated pesticides and metals. A Corrective Measures Plan approved in October 2011 requires (1) soil vapor extraction ("SVE") in affected areas, (2) covering of unpaved areas containing pesticide impacted soil, and (3) annual groundwater monitoring of the perched water-bearing zone. Installation of the SVE unit has been completed and startup has occurred. The California Department of Toxic Substances Control ("DTSC") has granted conditional approval of the Company's soil management, and monitoring and maintenance plans. Most recently, the DTSC is requiring the Company to delineate the PCE plume on the eastern boundary of the site. The Company has submitted an action plan to address this matter and is awaiting comments from the DTSC.

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17. Reportable Segments:

Summarized financial information for the Company's (1) Performance Materials and Chemicals and (2) Environmental Catalysts and Services reportable segments is shown in the following table:

	Six months ended June 30,	
	2017	2016
Net sales:		
Performance Materials & Chemicals	\$ 488,709	\$ 173,648
Environmental Catalysts & Services ⁽¹⁾	235,273	198,219
Eliminations ⁽²⁾	(1,784)	(400)
Total	<u>\$ 722,198</u>	<u>\$ 371,467</u>
	Six months ended June 30,	
	2017	2016
Segment Adjusted EBITDA ⁽³⁾		
Performance Materials & Chemicals	\$ 118,856	\$ 46,574
Environmental Catalysts & Services ⁽⁴⁾	120,678	78,703
Total Segment Adjusted EBITDA ⁽⁵⁾	<u>\$ 239,534</u>	<u>\$ 125,277</u>

(1) Excludes the Company's proportionate share of sales from the Zeolyst International and Zeolyst C.V. joint ventures (collectively, the "Zeolyst Joint Venture") accounted for using the equity method (see Note 10 to these condensed consolidated financial statements for further information). The proportionate share of sales is \$63,369 and \$20,276 for the six months ended June 30, 2017 and 2016, respectively.

(2) The Company eliminates intersegment sales when reconciling to the Company's consolidated statements of operations.

(3) The Company defines Adjusted EBITDA as EBITDA adjusted for certain items as noted in the reconciliation below. Management evaluates the performance of its segments and allocates resources based on several factors, of which the primary measure is Adjusted EBITDA. Adjusted EBITDA should not be considered as an alternative to net income as an indicator of the Company's operating performance. Adjusted EBITDA as defined by the Company may not be comparable with EBITDA or Adjusted EBITDA as defined by other companies.

(4) The equity in net income included in the Environmental Catalysts & Services segment is \$19,782 and \$7,585 for the six months ended June 30, 2017 and 2016, respectively.

(5) Total Segment Adjusted EBITDA differs from the Company's consolidated Adjusted EBITDA due to unallocated corporate expenses.

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A reconciliation from net loss to Segment Adjusted EBITDA is as follows:

	Six months ended	
	June 30,	
	2017	2016
Reconciliation of net loss attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA		
Net loss attributable to PQ Group Holdings Inc.	\$ (4,063)	\$ (80,393)
Provision for income taxes	97	39,549
Interest expense, net	94,961	45,752
Depreciation and amortization	83,206	41,991
Segment EBITDA	174,201	46,899
Unallocated corporate expenses	15,589	6,624
Joint venture depreciation, amortization, and interest	5,510	1,844
Amortization of investment in affiliate step-up	5,282	12,315
Amortization of inventory step-up	871	17,714
Debt extinguishment costs	—	11,858
Losses on disposal of fixed assets	2,925	1,661
Foreign currency exchange losses	16,356	3,090
Non-cash revaluation of inventory, including LIFO	2,479	446
Management advisory fees	\$ 2,500	\$ 1,083
Transaction and other related costs	4,334	4,544
Equity-based and other non-cash compensation	2,828	3,779
Restructuring, integration and business optimization expenses	3,052	11,728
Defined benefit pension plan cost	1,409	1,398
Other	2,198	294
Segment Adjusted EBITDA	\$ 239,534	\$ 125,277

18. Restructuring and Other Related Costs:

The following table presents the components of restructuring and other related costs for the six months ended June 30, 2017 and 2016:

	Six months ended	
	June 30,	
	2017	2016
Severance and other employee costs related to restructuring plan	\$ 830	\$4,496
Other related costs	642	5,088
	<u>\$1,472</u>	<u>\$9,584</u>

Restructuring Plan

On July 30, 2014, Eco Services, a newly formed Delaware limited liability company and indirect subsidiary of certain investment funds affiliated with CCMP, entered into an Asset Purchase Agreement with Solvay USA, Inc. (“Solvay”), a Delaware corporation, which provided for the sale, transfer and assignment by Solvay and the acquisition, acceptance and assumption by Eco Services, of substantially all of the assets of Solvay’s Eco Services business unit of Solvay’s regeneration and virgin sulfuric acid production business operations in the United States (the “2014 Acquisition”). Prior to the Asset Purchase Agreement with Solvay, Eco Services operated as a business unit within Solvay, which is an indirect, wholly owned subsidiary of Solvay SA.

Subsequent to the 2014 Acquisition, the Company initiated a restructuring plan designed to improve organizational efficiency and streamline the operations of Eco Services as a stand-alone company. The primary

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impact of the plan to the Company's consolidated results of operations was the recognition of severance costs related to a reduction-in-force. These costs primarily included benefits payable under ongoing Company severance plan arrangements, whereby payments are attributable to employee services rendered with benefits that accumulate over time. The liabilities and associated charges related to these severance costs are recognized by the Company when payment of the benefits becomes probable and estimable. Charges related to severance costs for the restructuring plan were \$830 and \$4,496 for the six months ended June 30, 2017 and 2016, respectively.

The activity in the accrued liability balance associated with the restructuring plan, all of which related to severance and other employee costs, was as follows for the six months ended June 30, 2017:

Balance at December 31, 2016	\$ 1,643
Restructuring charges	830
Cash payments	<u>(1,527)</u>
Balance at June 30, 2017	<u>\$ 946</u>

The remaining accrued liability balance associated with the restructuring plan at June 30, 2017 is expected to be paid in 2017.

Other Related Costs

The Company incurred severance and other business optimization costs of \$642 and \$5,088 for the six months ended June 30, 2017 and 2016, respectively. These costs were not associated with formal restructuring plans and primarily related to severance charges for certain executives, transition/duplicate staffing, professional fees and other expenses related to the Company's organizational changes.

19. Earnings per Share

Basic earnings per share is calculated as income (loss) available to common stockholders, divided by the weighted average number of common shares outstanding during the period for each class of common stock. In periods of income, the income is shared equally amongst Class A and B common stockholders. In the event of liquidation, the holders of Class B common stock have preference to receiving distributions before the holders of Class A common stock. As a result, holders of Class B common stock are considered preferential participating securities and will not be allocated any losses in the periods of net losses, but will be allocated income in the periods of net income using the two-class method.

Diluted earnings per share is calculated as income (loss) available to common stockholders, divided by the weighted average number of common and potential common shares outstanding during the period for each class of common stock, if dilutive. Potential shares reflect unvested Class A and Class B restricted stock as well as options to purchase Class A shares (subsequent to the Business Combination) and Eco Services membership units (prior to the Business Combination), which have been included in the diluted earnings per share calculation using the treasury stock method. Note that for the six month periods ended June 30, 2017 and 2016, potential common shares only include those with service vesting conditions, as the performance vesting conditions associated with certain of the Company's restricted stock and stock options were not met as of the respective reporting dates. For purposes of calculating diluted earnings per share, income has been reallocated between the classes based on the diluted weighted average number of common shares outstanding for each class. In periods of net loss, inclusion of potential common shares would be antidilutive.

For both the basic and dilutive weighted average shares calculations, as a result of the Business Combination, the number of Eco Services membership units outstanding for the six months ended June 30, 2016 were computed on the basis of the weighted average units outstanding for Eco Services during the period multiplied by the exchange ratio established for Class B shares as part of the Business Combination. For the periods preceding the Business Combination during the six months ended June 30, 2016, units of Eco Services

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were retrospectively reflected as Class B shares for earnings per share purposes, since during the periods preceding the Business Combination, this was the only class of shares in existence to absorb income and losses.

The reconciliation from basic to diluted weighted average shares outstanding is as follows:

	Six months ended June 30,	
	2017	2016
Weighted average shares outstanding – Basic - Class B:	6,679,077	3,224,645
Dilutive effect of unvested Class B shares with service conditions and assumed stock option exercises and conversions	—	—
Weighted average shares outstanding – Diluted - Class B:	<u>6,679,077</u>	<u>3,224,645</u>
Weighted average shares outstanding – Basic - Class A:	429,985	430,136
Dilutive effect of assumed stock option exercises and conversions	—	—
Weighted average shares outstanding – Diluted - Class A:	<u>429,985</u>	<u>430,136</u>

The following table reconciles the components of basic and diluted loss per share for the six months ended June 30, 2017 and 2016:

	Six months ended June 30,	
	2017	2016
Numerator:		
Net loss attributable to PQ Group Holdings Inc.	\$ (4,063)	\$ (80,393)
Denominator:		
Weighted average shares outstanding – Basic:		
Class B shares	6,679,077	3,224,645
Class A shares	429,985	430,136
Total weighted average shares outstanding – Basic	<u>7,109,062</u>	<u>3,654,781</u>
Weighted average shares outstanding – Diluted:		
Class B shares	6,679,077	3,224,645
Class A shares	429,985	430,136
Total weighted average shares outstanding – Diluted	<u>7,109,062</u>	<u>3,654,781</u>
Basic net loss per share:		
Class B shares	\$ —	\$ —
Class A shares	\$ (9.45)	\$ (186.90)
Diluted net loss per share:		
Class B shares	\$ —	\$ —
Class A shares	\$ (9.45)	\$ (186.90)

20. Subsequent Events:

On August 7, 2017, the Company re-priced the existing \$927,750 U.S. dollar-denominated tranche and the existing €283,338 Euro-denominated tranche of its term loans to reduce the applicable interest rates. The new term loans have substantially identical terms to the existing term loans, except that borrowings under the new term loans bear interest at a rate equal to the LIBOR rate plus a margin of 3.25% with respect to U.S. dollar-denominated LIBOR rate loans, and the EURIBOR rate plus a margin of 3.25% with respect to Euro-denominated EURIBOR rate loans. In addition, the LIBOR rate elected under the facilities is subject to a floor of 0% and the EURIBOR rate elected under the facilities is subject to a floor of 0.75%.

The Company has evaluated subsequent events since the balance sheet date through August 9, 2017, the date the financial statements were available to be issued, and determined there are no additional items to disclose.

Report of Independent Auditors

To the Board of Directors
PQ Holdings Inc. and Subsidiaries:

We have audited the accompanying consolidated financial statements of PQ Holdings Inc. and its subsidiaries, which comprise the consolidated balance sheets as of December 31, 2015 and 2014, and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity and cash flows for the three years in the period ended December 31, 2015.

Management's Responsibility for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on the consolidated financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the Company's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of PQ Holdings Inc. and its subsidiaries as of December 31, 2015 and 2014, and the results of their operations and their cash flows for the three years in the period ended December 31, 2015 in accordance with accounting principles generally accepted in the United States of America.

Emphasis of Matter

As discussed in Note 3 to the consolidated financial statements, the Company changed the manner in which it classifies deferred taxes in 2015 due to the adoption of Accounting Standards Update 2015-17, Balance Sheet Classification of Deferred Taxes and in which it classifies deferred finance costs in 2015 due to the adoption of Accounting Standards Update 2015-03, Simplifying the Presentation of Debt Issuance Costs. Our opinion is not modified with respect to this matter.

/s/ PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
March 5, 2016

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PQ HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(in thousands)

	December 31, 2015	December 31, 2014
ASSETS		
Cash and cash equivalents	\$ 53,507	\$ 100,836
Receivables, net	117,438	122,577
Inventories	197,093	189,286
Prepaid and other current assets	19,006	18,733
Total current assets	387,044	431,432
Investments in affiliated companies	224,480	202,745
Property, plant and equipment, net	569,168	546,716
Goodwill	717,460	721,341
Tradenames	104,415	108,972
Other intangible assets, net	219,617	251,403
Other long-term assets	45,900	47,653
Total assets	<u>\$ 2,268,084</u>	<u>\$ 2,310,262</u>
LIABILITIES		
Notes payable and current maturities of long-term debt	\$ 14,508	\$ 14,534
Accounts payable	104,645	102,717
Accrued liabilities	73,497	78,098
Total current liabilities	192,650	195,349
Long-term debt	1,789,255	1,792,870
Deferred income taxes	113,197	114,485
Other long-term liabilities	96,865	110,010
Total liabilities	<u>2,191,967</u>	<u>2,212,714</u>
Commitments and contingencies (Note 20)		
EQUITY		
Common stock, Class A (\$0.01 par); authorized shares 150,000,000; issued shares 680,678; outstanding shares 582,280 and 582,593 on December 31, 2015 and December 31, 2014, respectively	6	6
Common stock, Class B (\$0.01 par); authorized shares 30,000,000; issued shares 5,100,795; outstanding shares 5,087,995 on December 31, 2015 and December 31, 2014, respectively	51	51
Common stock, Class C (\$0.01 par); authorized shares 10,000,000; issued shares 48,820; outstanding shares 48,820 on December 31, 2015 and December 31, 2014, respectively	—	—
Common stock, Class D (\$0.01 par); authorized shares 1,500,000; issued shares 84,258 and 5,800; outstanding shares 84,258 and 5,800 on December 31, 2015 and December 31, 2014, respectively	1	—
Additional paid-in capital	466,476	459,819
Accumulated deficit	(264,013)	(271,864)
Treasury stock, at cost; shares 98,398 and 98,085 (Class A), 12,800 (Class B), 0 (Class C), 0 (Class D) on December 31, 2015 and December 31, 2014, respectively	(916)	(916)
Accumulated other comprehensive loss	(131,973)	(96,637)
Total PQ Holdings Inc. equity	69,632	90,459
Noncontrolling interest	6,485	7,089
Total equity	<u>76,117</u>	<u>97,548</u>
Total liabilities and equity	<u>\$ 2,268,084</u>	<u>\$ 2,310,262</u>

See accompanying notes to consolidated financial statements.

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PQ HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands)

	Twelve months ended		
	December 31,		
	2015	2014	2013
Sales	\$ 1,024,326	\$ 1,114,904	\$ 1,085,019
Cost of goods sold	748,756	818,483	795,416
Gross profit	275,570	296,421	289,603
Selling, general and administrative expenses	107,097	110,886	111,229
Other operating expense, net	51,516	71,148	49,373
Operating income	116,957	114,387	129,001
Equity in net income from affiliated companies	45,325	29,359	53,808
Interest expense	108,375	111,553	120,347
Debt extinguishment costs	—	2,476	20,287
Other expense, net	21,383	23,886	3,316
Income before income taxes and noncontrolling interest	32,524	5,831	38,859
Provision for income taxes	22,902	7,548	10,608
Net income (loss)	9,622	(1,717)	28,251
Less: Net income attributable to the noncontrolling interest	1,771	1,894	1,521
Net income (loss) attributable to PQ Holdings Inc.	<u>\$ 7,851</u>	<u>\$ (3,611)</u>	<u>\$ 26,730</u>

See accompanying notes to consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE (LOSS) INCOME
(in thousands)

	Twelve months ended		
	December 31,		
	<u>2015</u>	<u>2014</u>	<u>2013</u>
Net income (loss)	\$ 9,622	\$ (1,717)	\$ 28,251
Other comprehensive (loss) income, net of tax:			
Pension and postretirement benefits	1,776	(18,411)	17,265
Net gain (loss) from hedging activities	257	(2,426)	1,700
Foreign currency translation	<u>(38,415)</u>	<u>(24,883)</u>	<u>(17,774)</u>
Total other comprehensive (loss) income	<u>(36,382)</u>	<u>(45,720)</u>	<u>1,191</u>
Comprehensive (loss) income	(26,760)	(47,437)	29,442
Less: Comprehensive income attributable to non-controlling interests	725	1,056	1,620
Comprehensive (loss) income attributable to PQ Holdings Inc.	<u><u>\$ (27,485)</u></u>	<u><u>\$ (48,493)</u></u>	<u><u>\$ 27,822</u></u>

See accompanying notes to consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)

	Common stock, Class A	Common stock, Class B	Common stock, Class C	Common stock, Class D	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Balance, December 31, 2012	\$ 7	\$ 51	\$ —	\$ —	\$ 458,807	\$ (294,983)	\$ (731)	\$ (52,847)	\$ 7,059	\$117,363
Net income	—	—	—	—	—	26,730	—	—	7,059	28,251
Other comprehensive income	—	—	—	—	—	—	—	1,092	99	1,191
Stock repurchase	(1)	—	—	—	1	—	(185)	—	—	(185)
Dividend distribution	—	—	—	—	—	—	—	—	(745)	(745)
Stock compensation for restricted stock awards	—	—	—	—	1,011	—	—	—	—	1,011
Balance, December 31, 2013	\$ 6	\$ 51	\$ —	\$ —	\$ 459,819	\$ (268,253)	\$ (916)	\$ (51,755)	\$ 7,934	\$146,886
Net income	—	—	—	—	—	(3,611)	—	—	1,894	(1,717)
Other comprehensive loss	—	—	—	—	—	—	—	(44,882)	(838)	(45,720)
Dividend distribution	—	—	—	—	—	—	—	—	(1,901)	(1,901)
Stock compensation for restricted stock awards	—	—	—	—	—	—	—	—	—	—
Balance, December 31, 2014	\$ 6	\$ 51	\$ —	\$ —	\$ 459,819	\$ (271,864)	\$ (916)	\$ (96,637)	\$ 7,089	\$ 97,548
Net income	—	—	—	—	—	7,851	—	—	1,771	9,622
Other comprehensive loss	—	—	—	—	—	—	—	(35,336)	(1,046)	(36,382)
Equity contribution	—	—	—	1	3,299	—	—	—	—	3,300
Dividend distribution	—	—	—	—	—	—	—	—	(1,329)	(1,329)
Stock compensation for restricted stock awards	—	—	—	—	3,358	—	—	—	—	3,358
Balance, December 31, 2015	\$ 6	\$ 51	\$ —	\$ 1	\$ 466,476	\$ (264,013)	\$ (916)	\$ (131,973)	\$ 6,485	\$ 76,117

See accompanying notes to consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Twelve months ended December 31,		
	2015	2014	2013
Cash flows from operating activities:			
Net income (loss)	\$ 9,622	\$ (1,717)	\$ 28,251
Adjustments to reconcile net income to net cash used in operating activities:			
Depreciation	62,586	59,904	57,089
Amortization	30,536	31,438	32,217
Impairment of long-lived assets	425	—	948
Amortization of deferred financing costs and original issue discount	8,735	8,899	9,427
Hedge premium amortization	398	1,434	1,778
Debt extinguishment costs	—	2,476	20,287
Foreign currency exchange loss	21,059	23,387	4,414
Pension and postretirement healthcare benefit expense	3,631	1,672	3,281
Pension and postretirement healthcare benefit funding	(4,607)	(6,957)	(6,877)
Deferred income tax provision (benefit)	7,664	(10,478)	(6,644)
Net loss on asset disposals	1,548	694	653
Supplemental pension plan mark-to-market loss (gain)	231	(798)	(930)
Stock compensation	3,358	—	1,011
Equity in net income from affiliated companies, net	(45,325)	(29,359)	(53,808)
Dividends received from affiliated companies	30,089	34,255	33,050
Working capital changes that (used) provided cash:			
Receivables	(4,946)	(1,816)	1,995
Inventories	(17,535)	(2,283)	(16,710)
Prepays and other current assets	(2,663)	(2,743)	983
Accounts payable	3,252	5,164	6,732
Accrued liabilities	(8,440)	7,639	(344)
Other, net	(722)	(401)	(905)
Net cash provided by operating activities	<u>98,896</u>	<u>120,410</u>	<u>115,898</u>
Cash flows from investing activities:			
Purchases of property, plant and equipment	(103,118)	(120,932)	(73,221)
Investment in affiliated companies	(10,000)	(10,000)	(18,000)
Change in restricted cash, net	—	16,890	(16,890)
Business acquisitions, net of cash acquired	(12,000)	—	—
Loan receivable under the New Market Tax Credit arrangement	—	—	(15,632)
Other, net	(26)	10	(1,615)
Net cash used in investing activities	<u>(125,144)</u>	<u>(114,032)</u>	<u>(125,358)</u>
Cash flows from financing activities:			
Draw down of revolver	68,000	—	—
Repayments of revolver	(68,000)	—	—
Issuance of long-term debt under the New Market Tax Credit arrangement	—	—	20,175
Issuance of long-term debt, net of original issue discount	—	1,222,114	1,222,800
Debt issuance costs	—	—	(1,771)
Repayments of long-term debt	(12,350)	(1,235,000)	(1,232,350)
Interest hedge premium	—	—	(995)
Equity contribution	3,300	—	—
Stock repurchase	—	—	(185)
Distributions to noncontrolling interests	(1,329)	(1,901)	(745)
Net cash (used in) provided by financing activities	<u>(10,379)</u>	<u>(14,787)</u>	<u>6,929</u>
Effect of exchange rate changes on cash	<u>(10,702)</u>	<u>(8,504)</u>	<u>(4,171)</u>
Net change in cash and cash equivalents	(47,329)	(16,913)	(6,702)
Cash and cash equivalents at beginning of period	100,836	117,749	124,451
Cash and cash equivalents at end of period	<u>\$ 53,507</u>	<u>\$ 100,836</u>	<u>\$ 117,749</u>
Non-cash investing activity:			
Capital expenditures acquired on account but unpaid as of the period end	21,897	15,042	16,820

See accompanying notes to consolidated financial statements.

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1. Background and Basis of Presentation:

PQ Holdings Inc. and subsidiaries (the “Company”) conducts operations through three principal businesses: Performance Chemicals: a fully integrated, global leader in silicate technology, producing sodium silicate, specialty silicas, zeolites, spray dry silicates, magnesium silicate, and other high performance chemical products used in a variety of end-uses such as adsorbents for surface coatings, clarifying agents for beverages, cleaning and personal care products; Catalysts: an integrated silica catalyst and specialty zeolite-based catalyst producer with leading global market positions, producing silica catalyst used in the production of high-density polyethylene (“HDPE”), and specialty zeolite-based catalysts sold to the emissions control industry, the petrochemical industry and other areas of the broader chemicals industry; and Specialty Glass Materials: a leading global producer of engineered glass products for use in highway safety, polymer additives, metal finishing and electronics end markets, which is comprised of Highway Safety and Engineered Glass Materials (“EGM”). Highway Safety manufactures glass beads used for airport, highway and road safety applications to improve visibility in wet and nighttime driving conditions, where EGM produces solid and hollow glass spheres for use as polymer additives and fillers in specialized plastics, as engineered peening beads in metal finishing and as conductives in consumer electronics and other applications.

We experience some seasonality, primarily with respect to the Specialty Glass Materials business. As the road striping season occurs during warmer weather, sales and earnings are generated primarily during the second and third quarters. Working capital is built during the first half of the year, while cash generation occurs primarily in the second half of the fiscal year.

On May 31, 2007, PQ Corporation and its parent company, Niagara Holdings, Inc., entered into an Agreement and Plan of Merger with affiliates of The Carlyle Group (“2007 Sponsor”), including CPQ Holdings LLC (“CPQ Holdings”), and an affiliate of the previous owner of the Company, J.P. Morgan Partners, pursuant to which PQ Corporation continued as the surviving corporation and an indirect, wholly-owned subsidiary of CPQ Holding Corporation, which was a direct, wholly-owned subsidiary of CPQ Holdings (the “2007 Merger”). The 2007 Merger was consummated on July 30, 2007.

On July 2, 2008, the Company acquired certain assets and liabilities from and certain stock of the entities that comprised INEOS Silicas, a division of INEOS Group that was a global manufacturer of inorganic chemicals based on silica and alumina technology, from INEOS Capital Partners, formerly named INEOS Investments Partnership (“INEOS”) in exchange for cash and shares of CPQ Holding Corporation (the “2008 INEOS Silicas Acquisition”). After the closing of the 2008 INEOS Silicas Acquisition, INEOS Silicas was incorporated into the Performance Chemicals and Catalyst divisions of the Company. Since July 2, 2008, the financial statements include the results of operations of the acquired business.

On January 29, 2014, CPQ Holding Corporation changed its name to PQ Holdings Inc. (“Holdings”).

On September 11, 2014, Holdings entered into a stock purchase agreement (as amended on November 18, 2014) pursuant to which certain investment funds affiliated with CCMP Capital Advisors, LLC (now known as CCMP Capital Advisors, LP; “CCMP” or “2014 Sponsor”) and INEOS, one of the existing stockholders of Holdings, acquired stock of Holdings from CPQ Holdings and certain other selling stockholders (the “2014 Stock Purchase”). The 2014 Stock Purchase was consummated on December 29, 2014. Following consummation of the sale, The Carlyle Group no longer holds any shares of Holdings. The 2014 Stock Purchase did not qualify as a business combination.

On August 18, 2015, the Company announced that Eco Services Holdings LLC (“Eco Services”), the Company and certain of their respective affiliates had signed a definitive agreement (the “*Business Combination*”).

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Agreement) pursuant to which the Company and Eco Services will reorganize under a newly formed holding company (the “*Combined Company*”). The Combined Company will retain the PQ Corporation name. The Company’s existing indirect shareholders (affiliates of CCMP, affiliates of INEOS Capital Partners and management) and Eco Services’ existing indirect equity holders (affiliates of CCMP and management) will constitute the sole shareholders of the Combined Company immediately following the closing of the business combination. The completion of the transactions is subject to certain closing conditions that are customary for transactions of this type, including regulatory clearance.

2. Summary of Significant Accounting Policies:

Principles of Consolidation. The consolidated financial statements include the accounts of the Company and its controlled subsidiaries. Investments in affiliated companies are recorded at cost plus the Company’s equity in their undistributed earnings. All intercompany transactions have been eliminated.

All assets and liabilities of foreign subsidiaries and affiliated companies are translated to U.S. dollars using exchange rates in effect at the balance sheet date. Adjustments resulting from translation of the balance sheets and intercompany loans, which are considered permanent, are included in stockholders’ equity as part of accumulated other comprehensive loss. Adjustments resulting from translation of certain intercompany loans, which are not considered permanent and are denominated in foreign currencies, are included in other expense (income), net in the consolidated statement of operations. Income and expense items are translated at average exchange rates during the year. Net foreign exchange included in other expense, net was a loss of \$21,059, \$23,387, and \$4,414 for the years ended December 31, 2015, 2014, and 2013, respectively. The foreign currency losses realized in 2015, 2014, and 2013, were primarily driven by the non-permanent intercompany debt denominated in local currency translated to U.S. dollars.

Cash and Cash Equivalents. Cash and cash equivalents include investments with original terms to maturity of 90 days or less from the time of purchase.

Restricted Cash. Restricted cash, which is restricted as to withdrawal or usage, is classified separately from cash and cash equivalents on our consolidated balance sheet. The proceeds from the New Markets Tax Credit (“NMTC”) financing arrangement are restricted for use and are classified on our consolidated balance sheet as a noncurrent asset. As of December 31, 2013, there remained \$16,890 restricted cash that is required to be used to fund the capital expenditure associated with the NMTC agreement and is recorded in other long-term assets on the consolidated balance sheet. During 2014, the balance was fully used to fund the capital expenditure associated with the NMTC agreement. See Note 13 to these consolidated financial statements for further information.

Accounts Receivable and Allowance for Doubtful Accounts. Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is the Company’s best estimate of the amount of probable credit losses in its existing accounts receivable. A specific reserve for bad debt is recorded for known or suspected doubtful accounts receivable. For all other accounts, the Company recognizes a reserve for bad debt based on the length of time receivables are past due and historical write-off experience. Account balances are charged off against the allowance when the Company believes it is probable the receivable will not be recovered. If the financial condition of the Company’s customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances would be required. The Company does not have any off-balance sheet credit exposure related to its customers.

Inventories. All inventories are stated at the lower of cost or market. All domestic inventories are valued on the last-in, first-out (“LIFO”) method, and all other inventories are valued on the average cost and first-in,

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first-out (“FIFO”) methods. When necessary, the Company provides allowances to adjust the carrying value of its inventory to the lower of cost or net realizable value, including any costs to sell or dispose. Appropriate consideration is given to obsolescence, excessive inventory levels, product deterioration and other factors in evaluating net realizable value.

Prepaid and Other Current Assets. Prepaid and other current assets primarily include prepayments on insurance and property tax, current deposits, income tax receivables, current deferred tax assets, value-added taxes, receivables from affiliates and other current assets.

Property, Plant, and Equipment. Property, plant and equipment are carried at cost and include expenditures for new facilities and major renewals and betterments. The Company capitalizes the cost of furnace rebuilds as part of property, plant and equipment. Plant and equipment under capital leases are carried at the present value of minimum lease payments. Maintenance, repairs and minor renewals are charged to expense as incurred. The Company capitalizes internal costs associated with the implementation of purchased software. When property, plant and equipment is retired or otherwise disposed of, the net carrying amount is eliminated with any gain or loss on disposition recognized in earnings at that time.

Depreciation is generally provided on the straight-line method based on estimated useful lives of the assets, ranging up to thirty-three years for buildings, ten to twelve years for machinery and equipment, and three to seven years for computer hardware and software.

Investments. Investments are accounted for using the equity method of accounting if the investment provides us the ability to exercise significant influence, but not control, over the investee. Significant influence is generally deemed to exist if the Company’s ownership interest in the voting stock of the investee ranges between 20% and 50%, although other factors, such as representation on the investee’s board of directors and the impact of commercial arrangements, are considered in determining whether the equity method of accounting is appropriate. Under the equity method of accounting, the investments in equity-method investees are recorded in the consolidated balance sheets as investments in affiliated companies and the investees’ earnings or losses together with other-than temporary impairments in value is recorded as equity in net income from affiliated companies in the consolidated statements of operations.

Goodwill and Intangible Assets. Definite-lived intangible assets are amortized over their estimated useful life. Goodwill and intangible assets with indefinite lives are not amortized, but are tested for impairment annually or more frequently if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. A write-down occurs in periods in which it is determined that a reporting unit’s fair value is less than its book value.

Generally accepted accounting principles require the Company to perform an impairment test at least annually. When evaluating goodwill for impairment, the Company can perform a qualitative step zero assessment. If the Company elects to skip or fails the qualitative assessment, then a quantitative assessment on the reporting units is performed. Under a qualitative assessment, the Company will consider the relevant events and circumstances and the extent to which they could affect the comparison of a reporting unit’s fair value to its carrying amount and form a conclusion indicating whether it is more likely than not that the reporting unit’s fair value is less than its carrying amount. The quantitative assessment is a two-step test. In step one the estimated fair value of the reporting unit is compared to its carrying value. If the estimated fair value is less than the carrying value, then step two is required. In step two the actual amount of the goodwill impairment is calculated by comparing the implied fair value of the reporting unit’s goodwill with the carrying amount of that goodwill. The implied fair value is determined in the same manner as the amount of goodwill recognized in a business

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combination. See Note 11 to these consolidated financial statements for further discussion on goodwill impairment.

Other Long-term Assets. Other long-term assets primarily include pension benefits, deferred tax assets, and spare parts.

Valuation of Long-Lived Assets. The Company performs an impairment review of property, plant, and equipment and definite-lived intangible assets when facts and circumstances indicate the carrying value may not be recoverable from its undiscounted cash flows. When evaluating long-lived assets for impairment, if the carrying amount of an asset or asset group is found not to be recoverable, then an impairment loss is recognized. Any impairment loss is measured by comparing the carrying amount of the asset to its fair value. Fair value is determined using quoted market prices where available, or other techniques including discounted cash flows. The Company's estimates of future cash flows involve assumptions concerning future operating performance, economic conditions, and technological changes that may affect the future useful lives of the assets.

Derivative Financial Instruments. The Company utilizes certain derivative financial instruments to enhance its ability to manage risk, including exposures to interest rates and natural gas price fluctuations that exist as part of ongoing business operations. Derivative instruments are entered into for periods consistent with the related underlying exposures and do not constitute positions independent of those exposures.

All derivatives designated as hedges are recognized on the balance sheet at fair value. On the date a derivative contract is entered into, the Company may designate the derivative as a hedge of a forecasted transaction or the variability of cash flows to be received or paid related to a recognized asset or liability (cash flow hedge). Changes in the fair value of a derivative that is highly effective and that is designated and qualifies as a cash-flow hedge are recorded in other comprehensive income (loss) to the extent that the derivative is effective as a hedge, until earnings are affected by the variability in cash flows of the designated hedged item, and the ineffective portion is reported in earnings. Changes in the fair value of a derivative that is not designated or does not qualify as a cash flow hedge are recorded in the consolidated statement of operations. Cash flows from derivative instruments are reported in the same cash flow category as the cash flows from the items being hedged.

The Company formally documents all relationships between hedging instruments and hedged items, as well as its risk management objective and strategy for undertaking various hedge transactions. This process includes relating all derivatives that are designated cash flow hedges to underlying forecasted transactions. The Company also formally assesses both at the inception of the hedge and on an ongoing basis, whether each hedging relationship is highly effective in achieving offsetting changes in fair values or cash flows of the hedged item during the period. If it is determined that a derivative is not highly effective as a hedge, or if a derivative ceases to be a highly effective hedge, hedge accounting would be discontinued with respect to that derivative prospectively.

Fair Value Measurements. The Company measures fair value using the guidelines under U.S. generally accepted accounting principles. Fair value is defined as the price at which an asset could be exchanged in a current transaction between market participants. A liability's fair value is defined as the amount that would be paid to transfer the liability to a market participant, not the amount that would be paid to settle the liability with the creditor. See Note 4 to these consolidated financial statements regarding the application of fair value measurements.

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The carrying values of cash, accounts receivable, accounts payable and accrued liabilities approximate fair value due to the short-term nature of these items. See Note 13 to these consolidated financial statements regarding the fair value of debt and Note 15 regarding other financial instruments.

Revenue Recognition. Revenue, net of related discounts and allowances, is recognized when both title and risk of loss of the product have been transferred to the customer, the seller's price to the buyer is fixed or determinable, collectability is reasonably assured, and persuasive evidence of an arrangement exists. Customers take title and assume all the risks of ownership based on delivery terms, which are generally included in customer contracts of sale, order confirmation documents and invoices.

The Company recognizes rebates given to customers as a reduction of revenue based on an allocation of the cost of honoring rebates earned and claimed to each of the underlying revenue transactions that result in progress by the customer toward earning the rebate. Rebates are recognized at the time revenue is recorded. The Company measures the rebate obligation based on the estimated amount of sales that will result in a rebate at the adjusted sales price per the respective sales agreement.

Shipping and Handling Costs. Amounts billed to a customer in a sale transaction related to shipping and handling, if any, represent revenues earned for the goods provided and is classified as revenue. Costs related to shipping and handling of products shipped to customers are classified as cost of goods sold.

Research and Development. Research and development costs of \$10,264, \$9,142, and \$8,661, for the years ended December 31, 2015, 2014, and 2013, respectively, were expensed as incurred and reported in selling, general and administrative expenses in the consolidated statements of operations.

Income Taxes. The Company operates within multiple taxing jurisdictions and is subject to tax filing requirements and audit within these jurisdictions. The Company uses the asset and liability method in accounting for income taxes. Deferred tax assets and liabilities are recorded for temporary differences between the tax basis of assets and liabilities and their reported amounts in the financial statements, using statutory tax rates in effect for the year in which the differences are expected to reverse. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the results of operations in the period that includes the enactment date. A valuation allowance is recorded to reduce the carrying amounts of deferred tax assets unless it is more likely than not that those assets will be realized.

In determining the provision for income taxes, the Company provides deferred income taxes on income from foreign subsidiaries as such earnings are taxable upon remittance to the United States. The Company establishes contingent liabilities for possible assessments by taxing authorities resulting from uncertain tax positions including, but not limited to, transfer pricing, deductibility of certain expenses and other state, local, and foreign tax matters. The Company recognizes a financial statement benefit for positions taken for tax return purposes when it will be more-likely-than-not that the positions will be sustained. The Company recognizes potential accrued interest and penalties related to unrecognized tax benefits in income tax expense. Tax examinations are often complex as tax authorities may disagree with the treatment of items reported by the Company and may require several years to resolve. These accrued liabilities represent a provision for taxes that are reasonably expected to be incurred on the basis of available information but which are not certain.

Asset Retirement Obligation. The Company records a liability when the fair value of any future obligation to retire a long-lived asset as a result of an existing or enacted law, statute, ordinance or contract is reasonably estimable. The Company also records a liability for the fair value of a conditional asset retirement obligation if

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the fair value can be reasonably estimated. When the liability is initially recorded, the Company capitalizes the cost by increasing the amount of the related long-lived asset. Over time, the Company adjusts the liability to its present value by recognizing accretion expense as an operating expense in the consolidated statement of operations each period, and the capitalized cost is depreciated over the useful life of the related asset. Upon settlement of the liability, the Company records a gain or loss if the actual costs differ from the accrued amount.

The Company has recorded asset retirement obligations (“ARO”) in other long-term liabilities in order to recognize legal obligations associated with the retirement of tangible long-lived assets. The Company has assessed whether an ARO is required at each manufacturing facility and has recorded an obligation for those location for which an obligation exists. The most significant of these are primarily attributable to environmental remediation liabilities associated with current operations that were incurred during the course of normal operations. The Company has AROs that are conditional in nature. The Company identified certain conditional AROs upon which it was able to reasonably estimate their fair value and recorded a liability. These AROs were triggered upon commitments by the Company to comply with local, state, and national laws to remove environmentally hazardous materials. The AROs have been recognized on a discounted basis using a credit adjusted risk free rate. Accretion of the AROs is recorded in other operating expense and amounted to \$304, \$296, and \$305, for the years ended December 31, 2015, 2014, and 2013, respectively. Following are changes in the ARO liability during the years ended December 31, 2015, 2014, and 2013:

	Year ended December 31,		
	2015	2014	2013
Beginning balance	\$ 3,452	\$ 3,310	\$ 3,065
Liabilities incurred	—	—	—
Liabilities settled	—	—	—
Accretion expense	304	296	305
Foreign exchange impact	(224)	(154)	(60)
Ending balance	<u>\$ 3,532</u>	<u>\$ 3,452</u>	<u>\$ 3,310</u>

Environmental Expenditures. Environmental expenditures that pertain to current operations or to future revenues are expensed or capitalized consistent with the Company’s capitalization policy for property, plant and equipment. Expenditures that result from the remediation of an existing condition caused by past operations and that do not contribute to current or future revenues are expensed. Liabilities are recognized for remedial activities when the remediation is probable and the cost can be reasonably estimated. Recoveries of expenditures for environmental remediation are recognized as assets only when recovery is deemed probable. See Note 20 to these consolidated financial statements regarding commitments and contingencies and Note 12 regarding the accrued environmental reserve.

Stock-Based Compensation. The Company applies the fair value based method to account for stock options and awards. See Note 18 to these consolidated financial statements regarding compensation expense associated with stock options and awards.

Pensions and Postretirement Benefits. The Company maintains qualified and non-qualified defined benefit pension plans that cover employees in the United States and Canada, as well as certain employees in other international locations. Benefits for a majority of the plans are based on average final pay and years of service. Our funding policy, consistent with statutory requirements, is based on actuarial computations utilizing the projected unit credit method of calculation. Not all defined benefit pension plans are funded. In the United States and Canada, the pension plans’ assets include equity and fixed income securities. In our other international

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locations, the pension plans' assets include equity and fixed income securities, as well as insurance policies. Certain assumptions are made regarding the occurrence of future events affecting pension costs, such as mortality, withdrawal, disablement and retirement, changes in compensation and benefits, and discount rates to reflect the time value of money.

The major elements in determining pension income and expense are pension liability discount rates and the expected return on plan assets. The Company references rates of return on high-quality, fixed income investments when estimating the discount rate, and the expected period over which payments will be made based upon historical experience. The long-term rate of return used to calculate the expected return on plan assets is the average rate of return estimated to be earned on invested funds for providing pension benefits.

In addition to pension benefits, the Company provides certain health care benefits for employees who meet age, participation and length of service requirements at retirement. These plans were closed to new retirees in the United States and Canada as of December 31, 2006. The Company uses explicit assumptions using the best estimates available of the plan's future experience. Principal actuarial assumptions include: discount rates, present value factors, retirement age, participation rates, mortality rates, cost trend rates, Medicare reimbursement rates and per capita claims cost by age. Current interest rates, as of the measurement date, are used for discount rates in present value calculations.

The Company also has defined contribution plans covering domestic employees of the Company and certain subsidiaries.

Contingencies. Certain conditions may exist as of the date the financial statements are issued, which may result in a loss to the Company but which will only be resolved when one or more future events occur or fail to occur. The Company's management and its legal counsel assess such contingent liabilities, and such assessment inherently involves an exercise of judgment. In assessing loss contingencies related to legal proceedings that are pending against the Company or unasserted claims that may result in such proceedings, the Company and legal counsel evaluates the perceived merits of any legal proceedings or unasserted claims as well as the perceived merits of the amount of relief sought or expected to be sought therein. If the assessment of a contingency indicates that it is probable that a loss has been incurred and the amount of the liability can be estimated, then the estimated liability is accrued in the Company's financial statements. If the assessment indicates that a loss contingency is not probable, but is reasonably possible, or is probable but cannot be estimated, then the nature of the contingent liability, together with an estimate of the range of possible loss if determinable and material, would be disclosed. Loss contingencies considered remote are generally not disclosed unless they involve guarantees, in which case the nature of the guarantee would be disclosed, including the approximate term, how the guarantee arose, and the events or circumstances that would require the guarantor to perform under the guarantee.

Use of Estimates. The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Out of period adjustment. Included in the 2015 financial statements are certain out of period adjustments relating to errors that originated in 2014 and 2013. During 2015, the Company recorded a \$3,064 charge to the provision for income taxes and a corresponding credit to deferred taxes related to an out of period adjustment associated with the accounting for deferred taxes of Convertible Preferred Equity Instrument (CPEC), a hybrid

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equity instrument. The Company has determined that the impact of these out of period adjustments were not material to any of the years presented.

3. Recently Issued Accounting Standards:

In February 2016, the FASB issued guidance that amends the accounting for leases. Under the new guidance, a lessee will recognize assets and liabilities for most leases but will recognize expenses similar to current lease accounting. The guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018. Early adoption is permitted. The new guidance must be adopted using a modified retrospective transition, and provides for certain practical expedients. The Company is currently evaluating the impact that the new guidance will have on its consolidated financial statements.

In November 2015, the Financial Accounting Standards Board (“FASB”) issued ASU2015-17, *Balance Sheet Classification of Deferred Taxes*. This guidance provides companies with the option to classify deferred tax liabilities and assets as non-current amounts, in a classified statement of financial position. For a particular tax paying component of an entity within a particular tax jurisdiction, all deferred tax liabilities and assets, as well as any related valuation allowance, shall be offset and presented as a single non-current amount. These new requirements for nonpublic entities become effective for annual reporting periods beginning after December 15, 2017 and interim periods with annual reporting periods after December 15, 2018. A nonpublic entity may elect early application as of the beginning of an interim or annual period. The Company has elected to adopt the requirements of this standard as of December 31, 2015. In accordance with ASU 2015-17, in the December 31, 2014 consolidated balance sheet, the Company credited the current deferred tax asset by \$8,076 and debited the current deferred tax liability by \$6, concurrently debiting the non-current deferred tax asset and the non-current deferred tax liability by \$1,653 and \$6,417, respectively.

In September 2015, the FASB issued guidance that will change the requirements for reporting measurement period adjustments to provisional amounts initially recognized in conjunction with a business combination. Under GAAP, an acquiring entity currently is required to retrospectively adjust, in prior period financial statements, the provisional amounts to reflect new information obtained during the measurement period (a period, which may not exceed one year from the date of the business combination, during which the acquiring entity may receive information about the facts and circumstances existing as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of the acquisition date). Under the new guidance, adjustments to the provisional amounts will be reflected in the financial statements for the reporting period in which the adjustments are determined, including by recognizing in current period earnings the full effect of changes in depreciation, amortization or other income effects. The guidance requires that the acquiring entity either present separately on the face of the current period income statement or disclose in the notes to the current period financial statement, by line item, the amount of the adjustments made during the current period. The new guidance will be effective for fiscal years beginning after December 15, 2016, and interim periods within fiscal years beginning after December 15, 2017. The amendments should be applied prospectively to adjustments to provisional amounts that occur after the effective date of the guidance with earlier application permitted for financial statements that have not yet been made available for issuance. The Company does not expect this guidance to have a significant impact on its consolidated financial statements.

In April 2015, the FASB issued accounting guidance (ASU2015-03, *Simplifying the Presentation of Debt Issuance Costs*) that requires deferred financing costs to be presented as a direct reduction from the related debt liability in the financial statements rather than as a separately recognized asset, as is the current requirement under U.S. GAAP. Under the new guidance, amortization of such costs will continue to be reported as interest expense. In August 2015, the FASB issued updated guidance (ASU 2015-15 *Presentation and Subsequent*

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Measurement of Debt Issuance Costs Associated with Line-of-Credit Arrangements) to include similar treatment for deferred financing costs associated with line of credit arrangements. The new guidance will be effective for interim and annual periods beginning after December 15, 2015 and must be adopted on a retrospective basis. Early adoption is permitted. The Company has elected to adopt the requirements of this standard as of December 31, 2015. In accordance with ASU 2015-03, the Company has presented net deferred financing costs of \$4,228 and \$6,141 as of December 31, 2015 and 2014, respectively, as a direct reduction of long term debt.

In January 2015, the FASB issued ASU 2015-01, *Simplifying Income Statement Presentation by Eliminating the Concept of Extraordinary Items*. Under this ASU, an entity will no longer be allowed to separately disclose extraordinary items, net of tax, in the income statement after income from continuing operations if an event or transaction is unusual in nature and occurs infrequently. ASU 2015-01 is effective for interim and annual reporting periods beginning after December 15, 2015 with early adoption permitted. The Company has adopted ASU 2015-01 effective December 31, 2015. The adoption did not have any impact on the Company's financial position, results of operations or cash flows.

In November 2014, the FASB issued new accounting guidance ASU 2015-08 that provides companies with the option to apply pushdown accounting in its separate financial statements upon occurrence of an event in which an acquirer obtains control of the acquired entity. The acquired entity may elect the option to apply pushdown accounting in the reporting period in which the change-in-control event occurs. If pushdown accounting is not applied in the reporting period in which the change-in-control event occurs, an acquired entity will have the option to elect to apply pushdown accounting in a subsequent reporting period as a change in accounting principle under GAAP. If pushdown accounting is applied to an individual change-in-control event, that election is irrevocable. This guidance also requires an acquired entity that elects the option to apply pushdown accounting in its separate financial statements to disclose information in the current reporting period that enables users of financial statements to evaluate the effect of pushdown accounting. The Company has adopted this guidance effective November 18, 2014, as the amendments are effective upon issuance. The adoption of this new guidance did not have any impact on its consolidated financial statements and related disclosures.

In August 2014, the FASB issued guidance regarding management's responsibility to evaluate whether there is substantial doubt about an entity's ability to continue as a going concern within one year of the issuance of the financial statements. If substantial doubt exists, additional disclosures would be required. This guidance will be effective beginning in the fourth quarter of fiscal year 2017, with early adoption permitted. The Company does not expect this guidance to have a significant impact on its consolidated financial statements.

In May 2014, the FASB issued accounting guidance that will significantly enhance comparability of revenue recognition practices across entities, industries, jurisdictions and capital markets. The core principle of the guidance is that revenue recognized from a transaction or event that arises from a contract with a customer should reflect the consideration to which an entity expects to be entitled in exchange for goods or services provided. To achieve that core principle the new guidance sets forth a five-step revenue recognition model that will need to be applied consistently to all contracts with customers, except those that are within the scope of other topics in the Accounting Standards Codification ("ASC"). Also required are enhanced disclosures to help users of financial statements better understand the nature, amount, timing and uncertainty of revenues and cash flows from contracts with customers. The enhanced disclosures include qualitative and quantitative information about contracts with customers, significant judgments made in applying the revenue guidance, and assets recognized related to the costs to obtain or fulfill a contract. These new requirements for nonpublic entities become effective for annual reporting periods beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. A nonpublic entity may elect early application, but no earlier than

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December 15, 2017, the effective date for public entities. The Company is assessing the impact of these new requirements on our financial statements.

In April 2014, the FASB issued authoritative guidance amending existing requirements for reporting discontinued operations. Under the new guidance, discontinued operations reporting will be limited to disposal transactions that represent strategic shifts having a major effect on operations and financial results. The amended guidance also enhances disclosures and requires assets and liabilities of a discontinued operation to be classified as such for all periods presented in the financial statements. Public entities will apply the amended guidance prospectively to all disposals occurring within annual periods beginning on or after December 15, 2014 and interim periods within those years. The Company has adopted this standard on January 1, 2015. Due to the change in requirements for reporting discontinued operations described above, presentation and disclosures of future disposal transactions after adoption may be different than under current standards.

In July 2013, the FASB issued ASU 2013-11 *Presentation of an Unrecognized Tax Benefit When a Net Operating Loss Carryforward, a Similar Tax Loss, or a Tax Credit Carryforward Exists*. This update is intended to improve the consistency surrounding the presentation of an unrecognized tax benefit when a net operating loss carryforward exists, requiring the unrecognized tax benefit to be presented as a reduction to a deferred tax asset for a net operating loss carryforward, a similar tax loss, or a tax credit carryforward. The new requirements for nonpublic entities are effective for fiscal years beginning after December 15, 2014, and for interim periods within those fiscal years, with early adoption permitted. The Company has implemented the provisions of ASU 2013-11 in 2015.

4. Fair Value Measurements:

Fair values are based on quoted market prices when available. When market prices are not available, fair value is generally estimated using discounted cash flow analyses, incorporating current market inputs for similar financial instruments with comparable terms and credit quality. In instances where there is little or no market activity for the same or similar instruments, the Company estimates fair value using methods, models and assumptions that management believes a hypothetical market participant would use to determine a current transaction price. These valuation techniques involve some level of management estimation and judgment which becomes significant with increasingly complex instruments or pricing models. Where appropriate, adjustments are included to reflect the risk inherent in a particular methodology, model or input used.

The Company's financial assets and liabilities carried at fair value have been classified based upon a fair value hierarchy. The hierarchy gives the highest ranking to fair values determined using unadjusted quoted prices in active markets for identical assets and liabilities (Level 1) and the lowest ranking to fair values determined using methodologies and models with unobservable inputs (Level 3). The classification of an asset or a liability is based on the lowest level input that is significant to its measurement. For example, a Level 3 fair value measurement may include inputs that are both observable (Levels 1 and 2) and unobservable (Level 3). The levels of the fair value hierarchy are as follows:

- Level 1—Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets.
- Level 2—Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves.

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- Level 3—Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company’s best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date.

The following table presents information about the Company’s assets and liabilities that are measured at fair value on a recurring basis as of December 31, 2015 and 2014, and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value. Financial assets and liabilities measured at fair value on a recurring basis are summarized as follows:

	As of December 31, 2015	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Restoration plan assets	\$ 5,927	\$ 5,927	\$ —	\$ —
Total	\$ 5,927	\$ 5,927	\$ —	\$ —
Liabilities:				
Derivative contracts	\$ 3,946	\$ —	\$ 3,946	\$ —
Total	\$ 3,946	\$ —	\$ 3,946	\$ —

	As of December 31, 2014	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts	\$ 49	\$ —	\$ 49	\$ —
Restoration plan assets	7,134	7,134	—	—
Total	\$ 7,183	\$ 7,134	\$ 49	\$ —
Liabilities:				
Derivative contracts	\$ 4,209	\$ —	\$ 4,209	\$ —
Total	\$ 4,209	\$ —	\$ 4,209	\$ —

Restoration plan assets

The fair values of the Company’s restoration plan assets are determined through quoted prices in active markets. Restoration plan assets are assets held in a Rabbi trust to fund the obligations of the Company’s defined benefit supplementary retirement plans and include various stock and fixed income mutual funds. See Note 17 to these consolidated financial statements regarding defined supplementary retirement plans.

Derivative contracts

Derivative assets and liabilities can be exchange-traded or traded over the counter (“OTC”). The Company generally values exchange-traded derivatives using models that calibrate to market transactions and eliminate timing differences between the closing price of the exchange-traded derivatives and their underlying instruments. OTC derivatives are valued using market transactions and other market evidence whenever possible, including market-based inputs to models, model calibration to market transactions, broker or dealer quotations or

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alternative pricing sources with reasonable levels of price transparency. When models are used, the selection of a particular model to value an OTC derivative depends on the contractual terms of, and specific risks inherent in, the instrument as well as the availability of pricing information in the market. The Company generally uses similar models to value similar instruments. Valuation models require a variety of inputs, including contractual terms, market prices and rates, forward curves, measures of volatility, and correlations of such inputs. For OTC derivatives that trade in liquid markets, such as forward contracts, swaps and options, model inputs can generally be corroborated by observable market data by correlation or other means, and model selection does not involve significant management judgment.

The Company has interest rate caps and natural gas caps and swaps that are fair valued using Level 2 inputs. In addition, the Company applies a credit valuation adjustment to reflect credit risk which is calculated based on credit default swaps. To the extent that the Company's net exposure under a specific master agreement is an asset the Company utilizes the counterparty's default swap rate. If the net exposure under a specific master agreement is a liability the Company utilizes a default swap rate comparable to PQ Holdings Inc. The credit valuation adjustment is added to the discounted fair value to reflect the exit price that a market participant would be willing to receive to assume the Company's liabilities or that a market participant would be willing to pay for the Company's assets. As of December 31, 2015 and 2014 the credit valuation adjustment resulted in a minimal change in the fair value of the derivatives.

5. Accumulated Other Comprehensive Loss:

The following table presents cumulative changes in accumulated other comprehensive loss, net of tax for December 31, 2015, 2014, and 2013:

	December 31,		
	2015	2014	2013
Amortization and unrealized losses on pension and post retirement plans, net of tax of \$26,739, \$26,515, and \$16,637	\$ (47,587)	\$ (49,474)	\$ (31,176)
Unrecognized prior service credits (costs) on pension and post retirement plans, net of tax of \$207, \$174, and \$137	(619)	(508)	(395)
Net changes in fair values of derivatives, net of tax of \$1,735, \$1,899, and \$352	(2,624)	(2,881)	(455)
Foreign currency translation adjustments, net of tax of (\$14,839), (\$10,778), and (\$5,881)	(81,143)	(43,774)	(19,729)
	<u>\$ (131,973)</u>	<u>\$ (96,637)</u>	<u>\$ (51,755)</u>

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The following tables present the pre-tax, tax, and after-tax components of other comprehensive income (loss) for the twelve months ended December 31, 2015, 2014, and 2013:

	Twelve months ended December 31,								
	2015			2014			2013		
	Pre-tax amount	Tax benefit / (expense)	After-tax amount	Pre-tax amount	Tax benefit / (expense)	After-tax amount	Pre-tax amount	Tax benefit / (expense)	After-tax amount
Defined benefit and other postretirement plans									
Amortization and unrealized gains (losses)	\$ 1,664	\$ 224	\$ 1,888	\$(28,176)	\$ 9,878	\$(18,298)	\$ 26,783	\$ (9,389)	\$ 17,394
Unrecognized prior service costs	(145)	33	(112)	(150)	37	(113)	(171)	42	(129)
Benefit plans, net	1,519	257	1,776	(28,326)	9,915	(18,411)	26,612	(9,347)	17,265
Net gain (loss) from hedging activities	421	(164)	257	(3,973)	1,547	(2,426)	2,765	(1,065)	1,700
Foreign currency translation	(34,354)	(4,061)	(38,415)	(19,986)	(4,897)	(24,883)	(18,233)	459	(17,774)
Other comprehensive (loss) income	<u>\$ (32,414)</u>	<u>\$ (3,968)</u>	<u>\$ (36,382)</u>	<u>\$ (52,285)</u>	<u>\$ 6,565</u>	<u>\$ (45,720)</u>	<u>\$ 11,144</u>	<u>\$ (9,953)</u>	<u>\$ 1,191</u>

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The following table presents the change in accumulated other comprehensive loss, net of tax, by component for the twelve months ended December 31, 2015, 2014, and 2013. Amounts in parentheses indicate debits.

	Defined benefit and other postretirement plans	Net gain (loss) from hedging activities	Foreign currency translation	Total
December 31, 2012	\$ (48,836)	\$ (2,155)	\$ (1,856)	\$ (52,847)
Other comprehensive income (loss) before reclassifications	15,513	437	(17,873)	(1,923)
Amounts reclassified from accumulated other comprehensive income ^(a)	1,752	1,263	—	3,015
Net current period other comprehensive income (loss)	17,265	1,700	(17,873)	1,092
December 31, 2013	\$ (31,571)	\$ (455)	\$ (19,729)	\$ (51,755)
Other comprehensive income (loss) before reclassifications	(19,249)	(2,526)	(24,045)	(45,820)
Amounts reclassified from accumulated other comprehensive income ^(a)	838	100	—	938
Net current period other comprehensive income (loss)	(18,411)	(2,426)	(24,045)	(44,882)
December 31, 2014	\$ (49,982)	\$ (2,881)	\$ (43,774)	\$ (96,637)
Other comprehensive income (loss) before reclassifications	3,359	3,124	(37,369)	(30,886)
Amounts reclassified from accumulated other comprehensive income ^(a)	(1,583)	(2,867)	—	(4,450)
Net current period other comprehensive income (loss)	1,776	257	(37,369)	(35,336)
December 31, 2015	<u>\$ (48,206)</u>	<u>\$ (2,624)</u>	<u>\$ (81,143)</u>	<u>\$ (131,973)</u>

(a) See following table for details about these reclassifications

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The following table presents the reclassifications out of accumulated other comprehensive loss for the twelve months ended December 31, 2015, 2014, and 2013. Amounts in parentheses indicate debits to profit / loss.

<u>Details about Accumulated Other Comprehensive Income Components</u>	<u>Amount Reclassified from Accumulated Other Comprehensive Income</u>			<u>Affected Line Item in the Statement Where Net Income is Presented</u>
	<u>Twelve months ended</u>			
	<u>December 31,</u>			
	<u>2015</u>	<u>2014</u>	<u>2013</u>	
Defined benefit and other postretirement plans				
Amortization of prior service cost	\$ 151	\$ 151	\$ 178	(a)
Amortization of net gain (loss)	(2,506)	(1,375)	(2,725)	(a)
	<u>(2,355)</u>	<u>(1,224)</u>	<u>(2,547)</u>	Total before tax
	772	386	795	Tax (expense) benefit
	<u>\$ (1,583)</u>	<u>\$ (838)</u>	<u>\$ (1,752)</u>	Net of tax
Net gain (loss) from hedging activities				
Interest rate caps	\$ (398)	\$ (1,434)	\$ (1,703)	Interest expense
Natural gas swaps	(4,226)	1,271	(350)	Cost of goods sold
	<u>(4,624)</u>	<u>(163)</u>	<u>(2,053)</u>	Total before tax
	1,757	63	790	Tax (expense) benefit
	<u>\$ (2,867)</u>	<u>\$ (100)</u>	<u>\$ (1,263)</u>	Net of tax
Total reclassifications for the period	<u>\$ (4,450)</u>	<u>\$ (938)</u>	<u>\$ (3,015)</u>	Net of tax

(a) These accumulated other comprehensive income (loss) components are included in the computation of net periodic pension cost (see Note 17 for additional details)

6. Other Operating Expense:

A summary of significant other operating expense is as follows:

	<u>Year ended December 31,</u>		
	<u>2015</u>	<u>2014</u>	<u>2013</u>
Amortization expense	\$ 30,536	\$ 31,438	\$ 32,217
Transaction related costs	10,665	24,279	5,800
Management advisory fee	5,000	5,000	5,000
Environmental related costs	1,817	5,015	1,946
Demolition related costs	—	2,314	1,111
Restructuring, plant closure and severance related costs	3,672	729	1,010
Asset impairment	425	—	948
Net loss on asset disposals	1,548	694	653
Asset retirement obligation accretion	304	296	305
Sales of NOx credits	(4,037)	—	—
Bad debt, net	231	390	246
Other, net	1,355	993	137
	<u>\$ 51,516</u>	<u>\$ 71,148</u>	<u>\$ 49,373</u>

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7. Accounts Receivable and Allowance for Doubtful Accounts:

The components of accounts receivable are presented as follows:

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Trade accounts receivable	\$ 119,908	\$ 125,287
Allowance for doubtful accounts	(2,470)	(2,710)
	<u>\$ 117,438</u>	<u>\$ 122,577</u>

Following are changes in the allowance for doubtful accounts during the years ended December 31, 2015, 2014, and 2013:

	<u>Year ended December 31,</u>		
	<u>2015</u>	<u>2014</u>	<u>2013</u>
Beginning balance	\$(2,710)	\$(3,652)	\$(3,607)
Decreases (increases)	(231)	(374)	(253)
Write-offs, net of recoveries	221	1,078	213
Foreign exchange impact	250	238	(5)
Ending balance	<u>\$(2,470)</u>	<u>\$(2,710)</u>	<u>\$(3,652)</u>

8. Inventories:

Inventories were classified and valued as follows:

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Finished products and work in process	\$ 149,723	\$ 140,780
Raw materials	47,370	48,506
	<u>\$ 197,093</u>	<u>\$ 189,286</u>
Valued at lower of cost or market:		
LIFO basis	\$ 115,654	\$ 103,090
FIFO or average cost basis	81,439	86,196
	<u>\$ 197,093</u>	<u>\$ 189,286</u>

If inventories valued under the LIFO basis had been valued using the FIFO method, inventories would have been \$4,729 and \$2,641 lower than reported at December 31, 2015 and 2014, respectively. The higher LIFO basis of inventory compared to the FIFO method is due to the purchase accounting fair value step-up of inventory associated with the 2007 Merger and subsequent acquisitions.

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9. Investments in Affiliated Companies:

The Company accounts for investments in affiliated companies under the equity method. Affiliated companies accounted for on the equity basis as of December 31, 2015 are as follows:

Company	Country	Percent Ownership
PQ Silicates Ltd.	Taiwan	50%
Zeolyst International	USA	50%
Zeolyst C.V.	Netherlands	50%
Quaker Holdings	South Africa	49%

Following is summarized information of the combined investments:

	December 31,	
	2015	2014
Current assets	\$ 174,458	\$ 162,854
Noncurrent assets	197,370	171,525
Current liabilities	37,803	40,724
Noncurrent liabilities	17,112	24,921

	Twelve months ended December 31,		
	2015	2014	2013
Net sales	\$ 344,632	\$ 240,254	\$ 337,277
Gross profit	133,966	89,436	142,781
Operating income	97,149	54,728	112,171
Net income	95,432	63,502	112,419

The Company's investment in affiliates balance as of December 31, 2015 and 2014 includes net purchase accounting fair value adjustments of \$66,207 and \$68,593, respectively, consisting primarily of intangible assets such as customer relationships, formulations and product technology, and tradenames. Consolidated equity in net income from affiliates is net of \$2,387, \$2,387, and \$2,387, of amortization expense related to purchase accounting fair value adjustments for the year ended December 31, 2015, 2014, and 2013.

The following table summarizes the activity related to the investments in affiliates balance on the consolidated balance sheet:

	Twelve months ended December 31,		
	2015	2014	2013
Balance at beginning of period	\$ 202,745	\$ 201,911	\$ 163,223
Equity in net income of affiliated companies	47,712	31,746	56,195
Charges related to purchase accounting fair value adjustments	(2,387)	(2,387)	(2,387)
Dividends received	(30,089)	(34,255)	(33,050)
Investment in Zeolyst C.V.	10,000	10,000	18,000
Dissolution of investment in Nippon Highway Materials	—	—	9
Changes in foreign currency translation adjustments	(3,501)	(4,270)	(79)
Balance at end of period	<u>\$ 224,480</u>	<u>\$ 202,745</u>	<u>\$ 201,911</u>

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The Company had net receivables due from affiliates of \$4,410 and \$3,407 as of December 31, 2015 and 2014, respectively, which are included in prepaid and other current assets. Net receivables due from affiliates are generally non-trade receivables. Sales to and purchases from affiliates were not material for the years presented.

10. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Land	\$ 77,239	\$ 82,494
Buildings	177,723	174,295
Machinery and equipment	600,682	570,629
Construction in progress	115,336	91,380
	<u>970,980</u>	<u>918,798</u>
Less: accumulated depreciation	<u>(401,812)</u>	<u>(372,082)</u>
	<u>\$ 569,168</u>	<u>\$ 546,716</u>

Depreciation expense was \$62,586, \$59,904, and \$57,089, for the years ended December 31, 2015, 2014, and 2013, respectively.

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11. Goodwill and Other Intangible Assets:

The changes in the carrying amount of goodwill for the years ended December 31, 2015 and 2014 is summarized as follows:

	Performance Chemicals Americas & Australia	Performance Chemicals EMEA & Asia	Catalysts	Specialty Glass Materials	Total
Balance as of January 1, 2015					
Goodwill	\$ 277,153	\$ 166,776	\$ 132,770	\$ 209,673	\$ 786,372
Accumulated impairment losses	—	—	—	(65,031)	(65,031)
Total	277,153	166,776	132,770	144,642	721,341
Goodwill acquired during the year	9,896	—	—	—	9,896
Foreign exchange impact	(979)	(11,012)	(1,635)	(151)	(13,777)
Balance as of December 31, 2015					
Goodwill	286,070	155,764	131,135	209,522	782,491
Accumulated impairment losses	—	—	—	(65,031)	(65,031)
Total	<u>\$ 286,070</u>	<u>\$ 155,764</u>	<u>\$ 131,135</u>	<u>\$ 144,491</u>	<u>\$ 717,460</u>
Balance as of January 1, 2014					
Goodwill	\$ 277,528	\$ 175,851	\$ 134,059	\$ 209,887	\$ 797,325
Accumulated impairment losses	—	—	—	(65,031)	(65,031)
Total	277,528	175,851	134,059	144,856	732,294
Foreign exchange impact	(375)	(9,075)	(1,289)	(214)	(10,953)
Balance as of December 31, 2014					
Goodwill	277,153	166,776	132,770	209,673	786,372
Accumulated impairment losses	—	—	—	(65,031)	(65,031)
Total	<u>\$ 277,153</u>	<u>\$ 166,776</u>	<u>\$ 132,770</u>	<u>\$ 144,642</u>	<u>\$ 721,341</u>

On May 1, 2015, the Company acquired certain assets and liabilities of a sodium silicate plant within the Performance Chemicals business of the Company for a total purchase price of \$12,000. The Company accounted for the acquisition of these assets in accordance with ASC 805, "Business Combinations." Under the purchase method of accounting, the acquired assets were recorded at their respective fair values as of the date of acquisition. The purchase price was allocated to tangible assets acquired and liabilities assumed based upon their estimated fair values. The fair value of identifiable assets acquired and liabilities assumed was \$3,143 and \$1,039, respectively, and principally included the acquisition of property, plant and equipment of \$2,454, inventory of \$689, and assumed liabilities of \$1,039. The purchase price allocation, which is based on the estimated fair value of net assets acquired, resulted in the Company recording goodwill of \$9,896. The Company believes that expected synergies of the acquisition is the primary reason that contributed to a total purchase price that resulted in the recognition of goodwill. Goodwill is expected to be fully deductible for tax purposes. The pro forma impact of this acquisition would not have been material to the Company's results of operations for the years ended December 31, 2015 and 2014 respectively.

The Company completed its annual impairment assessments as of October 1, 2015 and 2014. For the annual assessments, the Company performed the two-step quantitative assessment for each of the reporting units. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly

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transaction between market participants at the measurement date. To determine the fair value of each reporting unit, the Company generally uses a market approach and an income, or discounted cash flow, approach.

In 2014, the Company determined fair value of its reporting units using only a market approach. The market value was estimated using publicly traded comparable company values by applying their most recent EBITDA multiples to the reporting unit's trailing twelve months EBITDA as well as indicative values from the 2014 Stock Purchase. As part of the 2014 Stock Purchase, the Company received bids on the various businesses which were used to value its reporting units as part of the market approach.

In 2015, the Company determined fair value of its reporting units using both a market approach and an income, or discounted cash flow, approach. Estimating the fair value of a reporting unit requires various assumptions including the use of projections of future cash flows and discount rates that reflect the risks associated with achieving those cash flows. The key assumptions used in estimating the fair values were the operating margin growth rates, revenue growth rates from implementation of strategic plans, the weighted average cost of capital, the perpetual growth rate, and the estimated earnings market multiples of each reporting unit. The market value was estimated using publicly traded comparable company values by applying their most recent EBITDA multiples to the reporting unit's trailing twelve months EBITDA. The income approach value was estimated using a discounted cash flow approach. The assumptions about future cash flows and growth rates are based on management's assessment of a number of factors including the reporting unit's recent performance against budget as well as management's ability to execute on planned future strategic initiatives. Discount rate assumptions are based on an assessment of the risk inherent in those future cash flows.

At October 1, 2015 and 2014, the fair value of each of the five reporting units exceeded their respective carrying values and, therefore, step two was not required.

The Company has trade names that are not subject to amortization of \$104,415 and \$108,972 as of December 31, 2015 and 2014, respectively. The change in trade names during the year was due to the foreign currency impact. The Company performed an annual quantitative assessment on its intangibles not subject to amortization and concluded that no impairment charge was warranted.

Gross carrying amounts and accumulated amortization for intangible assets with estimable useful lives are as follows:

	December 31, 2015			December 31, 2014		
	Gross Amounts	Accumulated Amortization	Net Balance	Gross Amounts	Accumulated Amortization	Net Balance
Formulations and product technology	\$ 54,263	\$ (37,192)	\$ 17,071	\$ 55,490	\$ (33,361)	\$ 22,129
Customer relationships	412,029	(209,809)	202,220	415,671	(186,949)	228,722
Trademarks	1,650	(1,471)	179	1,650	(1,306)	344
Patents	511	(364)	147	574	(366)	208
Total	<u>\$ 468,453</u>	<u>\$ (248,836)</u>	<u>\$ 219,617</u>	<u>\$ 473,385</u>	<u>\$ (221,982)</u>	<u>\$ 251,403</u>

The amortization periods for formulations and product technology range from seven to twelve years. The Company amortizes customer relationships over periods that range from nine to twenty years. Amortizable trademarks are amortized over a ten year period. The amortization periods for the patents range from eight to fourteen years.

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During the year ended December 31, 2015, 2014 and 2013, the Company wrote off fully amortized patents totaling \$63, \$4,047 and \$338, respectively. During the year ended December 31, 2014 and 2013, the Company wrote off fully amortized noncompete agreements totaling \$3,269 and \$231, respectively

Total amortization of intangibles was \$30,536, \$31,438, and \$32,217, for the years ended December 31, 2015, 2014, and 2013, respectively and is recorded in other operating expense in the consolidated statement of operations

Estimated future aggregate amortization expense of intangible assets is as follows:

Year	Amount
2016	\$ 30,273
2017	27,663
2018	25,270
2019	23,863
2020	21,355
Thereafter	91,193
Total estimated future aggregate amortization expense	<u>\$ 219,617</u>

12. Accrued Liabilities:

The following table summarizes the components of accrued liabilities as follows:

	December 31,	
	2015	2014
Compensation and bonus	\$26,490	\$31,133
Interest	11,730	11,710
Pension and other post retirement benefits	1,048	1,317
Supplemental retirement plans	1,168	1,167
Income taxes	8,161	8,150
Natural gas hedge agreements	3,119	3,606
Commissions and rebates	2,367	2,471
Environmental reserves	6,919	7,615
Property tax	1,229	1,082
Management sponsor fee	2,781	41
INEOS Group liability (see Note 20)	2,294	2,341
Other	6,191	7,471
Total	<u>\$73,497</u>	<u>\$78,104</u>

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13. Long-term Debt:

The summary of long-term debt is as follows:

	December 31,	
	2015	2014
Senior secured term loans with interest at 4.00% as of December 31, 2015 and as of December 31, 2014 (due August 2017)	\$ 1,197,950	\$ 1,210,300
Senior secured notes with interest at 8.75% as of December 31, 2015 and as of December 31, 2014 (due November 2018)	600,000	600,000
Revolving credit facility (due May 2017)	—	—
Other	23,158	23,184
Total debt	1,821,108	1,833,484
Original issue discount	(13,117)	(19,939)
Deferred financing costs	(4,228)	(6,141)
Total debt, net of original issue discount and deferred financing costs	1,803,763	1,807,404
Less: current portion	(14,508)	(14,534)
Total long-term debt	\$ 1,789,255	\$ 1,792,870

As discussed in Note 3, the Company has elected to adopt the requirements of ASU2015-03 as of December 31, 2015. In accordance with ASU2015-03, the Company has presented net deferred financing costs of \$4,228 and \$6,141 as of December 31, 2015 and 2014, respectively, as a direct reduction of long term debt in the table above.

On February 15, 2013, the Company re-priced its senior secured terms loans to lower the applicable interest rate. The Company repaid all outstanding senior secured term loans in the aggregate amount of \$1,220,000 including accrued interest of \$11,762 and a prepayment premium of 1.00% of the principal amount of the existing term loans, or \$12,200, and issued new senior secured term loans in an aggregate principal amount of \$1,235,000 (the "2013 Term Loans"). The Company incurred early debt repayment fees of \$12,200, of which \$6,508 was recorded as original issue discount to long-term debt and \$5,692 was immediately written off as debt extinguishment costs. The Company also recorded \$1,771 of new third party financing costs as deferred financing fees. In addition, previous unamortized deferred financing costs of \$2,592 and original issue discount of \$11,993 associated with the old debt were written off as debt extinguishment costs.

On March 27, 2014, the Company re-priced its senior secured terms loans to lower the applicable interest rate. The Company repaid all outstanding senior secured term loans in the aggregate amount of \$1,222,650 including accrued interest of \$2,971 and issued new senior secured term loans in an aggregate principal amount of \$1,222,650 (the "2014 Term Loans"). The 2014 Term Loans have substantially identical terms to the existing term loans except borrowings under the 2014 Term Loans bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of borrowing plus a margin of 3.00% or 2.00%, respectively. In addition, a prepayment premium of 1.00% will be payable on the 2014 Term Loans in the event of a re-pricing transaction prior to the one year anniversary of the effective date of the 2014 Term Loans. The Company recorded \$536 of new creditor fees as original issue discount in long-term debt. In addition, previous unamortized deferred financing costs of \$264 and original issue discount of \$2,212 associated with the old debt were written off to debt extinguishment costs.

The Company incurred deferred financing fees associated with the financing of its debt. Such deferred financing costs are amortized over the terms of the related agreements. Amortization of deferred costs of \$1,913,

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\$1,967, and \$1,892, for the years ended December 31, 2015, 2014, and 2013, were included in interest expense. In addition, the Company paid original issue discount associated with the financing of its debt. The original issue discount is amortized over the terms of the related agreements. Amortization of original issue discount of \$6,822, \$6,932, and \$7,535, for the years ended December 31, 2015, 2014, and 2013, were included in interest expense.

Senior Secured Term Loans and Revolving Credit Facility

On November 8, 2012, the Company entered into a new senior secured credit facility having a first lien term loan in the amount of \$1,220,000 with a maturity date of May 8, 2017. Borrowings under the first lien term facilities bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of borrowing plus a margin of 4.25% or 3.25%, respectively. Further, the LIBOR or base rate elected under the facilities are also subject to a floor of 1.00% and 2.00%, respectively. The senior credit facility requires minimum quarterly principal payments of \$3,050 on the first lien term loan, though such minimum payments may be reduced in accordance with any prepayments or increased if the amount of the Term Loans is increased.

On February 15, 2013, the Company re-priced its senior secured terms loans to lower the applicable interest rate and issued the 2013 Term Loans of \$1,235,000. The 2013 Term Loans have substantially identical terms to the existing term loans except borrowings under the 2013 Term Loans bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of borrowing plus a margin of 3.50% or 2.50%, respectively. In addition, the minimum quarterly principal payments increased to \$3,088, the maturity date was extended to August 7, 2017, and the prepayment premium of 1.00% will be payable on the 2013 Term Loans in the event of a re-pricing transaction prior to the one year anniversary of the effective date of the 2013 Term Loans.

On March 27, 2014, the Company re-priced its senior secured terms loans to lower the applicable interest rate and issued the 2014 Term Loans of \$1,222,650. The 2014 Term Loans have substantially identical terms to the existing term loans except borrowings under the 2014 Term Loans bear interest at a rate equal to the LIBOR rate or the base rate elected by the Company at the time of borrowing plus a margin of 3.00% or 2.00%, respectively. In addition, a prepayment premium of 1.00% will be payable on the 2014 Term Loans in the event of a re-pricing transaction prior to the one year anniversary of the effective date of the 2014 Term Loans.

The loans and guarantees under the senior credit facility are secured by first-priority liens in substantially all of the tangible and intangible assets of PQ Corporation and certain of its material subsidiaries, including pledges of all present and future shares of capital stock of PQ Corporation and certain guarantors and each of PQ Corporation's and such guarantors' material directly wholly-owned domestic subsidiaries and 65% of the present and future shares of capital stock of each of PQ Corporation's and such guarantors' directly owned foreign restricted subsidiaries (other than certain Cayman subsidiaries which guarantee the senior credit facility), in each case subject to certain thresholds, exceptions and customary permitted liens.

The senior credit facility further requires prepayments from all "net cash proceeds" received and "excess cash flow," if applicable. In accordance with the senior credit facility, net cash proceeds generally relate to proceeds received from the issuance or incurrence of certain indebtedness or proceeds received on the disposition of assets, adjusted for certain costs and expenses, and are payable promptly upon receipt, subject in the case of net cash proceeds from asset dispositions, to meeting the thresholds described below. Net cash proceeds in respect of asset dispositions are not payable if such proceeds are reinvested in the Company's business within a certain specified time period or if they are under certain minimum amounts, both on an individual basis for any given disposition and in the aggregate for dispositions that, individually, would not meet the threshold. Excess cash flow is to be calculated annually and is defined as consolidated net income adjusted for various expenditures

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and/or proceeds commencing with the fiscal year ending on December 31, 2014. Prepayments with respect to excess cash flow, if any, are to be made on an annual basis due within 10 days after the annual audited financials are delivered to the lenders thereunder of each year. The detailed calculations supporting those two prepayments are defined in the credit agreement. The remaining principal balance of the term loans are due upon maturity.

The senior credit facility provides for up to \$150,000 in revolving credit borrowings. Borrowings under the revolving facility bear interest at a rate equal to the LIBOR or base rate elected by the Company at the time of borrowing plus a margin of 4.25% or 3.25%, respectively, subject to reduction based on certain leverage thresholds. In addition, there is an annual commitment fee equal to 0.50%, with a step-down to 0.25% based on certain leverage thresholds of the unused revolving credit borrowings available under the senior credit facility. Revolving credit borrowings are payable at the option of the Company throughout the term of the senior credit facility with the balance due May 8, 2017. As of December 31, 2015, there were no revolving credit borrowings under the senior credit facility. In accordance with the terms of the Company's senior credit facility, repayments made by the Company relating to outstanding revolver borrowings are applied to all lenders on a pro-rata basis, subject to certain exceptions.

The senior credit facility contains various non-financial restrictive covenants. It limits the ability of PQ Corporation and its restricted subsidiaries to incur certain indebtedness or liens, merge, consolidate or liquidate, dispose of certain property, make investments or declare or pay dividends, make optional payments, modify certain debt instruments, enter into certain transactions with affiliates, or enter into certain sales and leasebacks, and it also provides limitation on other non-financial restrictive covenants. The Senior Credit Facility also contains one financial restrictive covenant. Commencing at the end of the first full fiscal quarter after the effective date of the Agreement, which was November 8, 2012, as of the end of any fiscal quarter of the Company for the four fiscal quarter period ending on such date, the Company's Total Net First Lien Leverage Ratio, as defined, must be less than 5.75:1.00 (4.75:1.00 as of December 31, 2015), with annual step-downs. At December 31, 2015, the Company was in compliance with all loan covenants.

The Company may at any time or from time to time voluntarily prepay the senior secured loans in whole or in part without premium or penalty, except prior to the one year anniversary of the closing date, the Company shall pay a prepayment premium in an amount equal to 1.00% of the principal amount prepaid.

The Company has a \$35,000 letter of credit sublimit under the senior credit facility subject to the availability under the revolving credit facility. The Company has letters of credit outstanding of \$5,279 as of December 31, 2015, which reduce available borrowings under the revolving credit facility by such amounts.

Senior Secured Notes

On November 8, 2012, the Company issued \$600,000 of 8.750% second lien senior secured notes due 2018 in transactions exempt from or not subject to registration under the Securities Act pursuant to Rule 144A and Regulation S under the Securities Act of 1933. The notes are senior secured obligations of the Company and rank equally in right of payment with all of the Company's existing and future senior debt and senior in right of payment to all of the Company's existing and future subordinated debt. The notes will be effectively subordinated to all of the Company's first lien senior secured debt, including the senior secured credit facility, to the extent of the value of the assets securing such debt. The notes will also be structurally subordinated to the liabilities of PQ Corporation's existing and future non-guarantor subsidiaries. The indenture relating to the notes contains various limitations on the Company's and its restricted subsidiaries' ability to incur additional indebtedness, pay dividends or repay certain debt, make loans and investments, sell assets, create liens, enter into transactions with affiliates, enter into agreements restricting PQ Corporation's subsidiaries ability to pay dividends, and merge and

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consolidate with other companies, among other things. Interest on the notes is payable on May 1 and November 1 of each year, commencing May 1, 2013. No principal payments are required with respect to the notes prior to their final maturity. The notes mature on November 1, 2018. The obligations of the Company under the notes and the indenture are guaranteed by Holdings and CPQ Midco I Corporation, PQ Corporation's direct parent, and each of PQ Corporation's subsidiaries that is a guarantor under the new senior secured credit facility. The obligations of the Company under the notes and the indenture are secured by second-priority liens over substantially all of the tangible and intangible assets of Holdings and certain of its material subsidiaries, including pledges of all present and future shares of capital stock of CPQ Midco I Corporation, PQ Corporation and certain guarantors and each of PQ Corporation's and such guarantors' material directly wholly-owned domestic subsidiaries and 65% of the present and future shares of capital stock of each of PQ Corporation's and such guarantors' directly owned foreign restricted subsidiaries (other than certain Cayman subsidiaries which guarantee the notes), in each case subject to certain thresholds, exceptions and customary permitted liens.

If any event of default (other than a default relating to certain events of bankruptcy or insolvency of PQ Corporation or certain of its subsidiaries) shall occur and be continuing, the trustee or holders of at least 25% in principal amount of outstanding notes under the indenture may declare the principal of, premium, if any, and accrued but unpaid interest on all the notes to be due and payable and the same shall become immediately due and payable. If an event of default arising from certain events of bankruptcy or insolvency of the Company occurs, the principal of, premium, if any, and interest on all the notes shall become immediately due and payable without any declaration or other act on the part of the trustee or any holders.

Upon the occurrence of a Change of Control, each holder will have the right to require the Company to purchase all or any part of such holder's notes at a purchase price in cash equal to 101% of the principal amount, plus accrued and unpaid interest.

Other Debt

On October 24, 2013, the Company's subsidiary Potters Industries, LLC ("Potters") entered into a New Markets Tax Credit ("NMTC") financing arrangement with JPMorgan Chase Bank N.A. and several of its affiliates ("Chase") and TX CDE V LLC, an affiliate of Texas LIC Development Company LLC d/b/a Texas Community Development Capital ("TX CDE") to fund the expansion of Potters' manufacturing facility in Paris, Texas (the "NMTC Agreement"). The NMTC program, which is administered by the United States Treasury Department requires certain balance sheet commitments. The NMTC Agreement will provide the Company with certain monetary benefits as an offset to specifically identified capital expenditures. The NMTC Agreement requires that certain commitments and covenants be maintained over the course of the next 7 years, in order to legally recognize the benefit. Chase agreed to contribute \$6,634 and an additional \$15,632 in funds lent to Chase by Potters Holdings II, L.P. to TX CDE. TX CDE, in turn, lent \$21,000 in the form of \$5,368 and \$15,632 notes, or the Loans, to Potters, which used the proceeds of the Loans to finance the expansion of Potters' manufacturing facility in Paris, Texas. The capital expenditures associated with the NMTC Agreement were completed in 2014. The \$21,000 was outstanding as of December 31, 2015 and 2014.

In connection with the NMTC transaction, the Company has provided an indemnification related to our actions or inactions which cause either a NMTC disallowance or recapture event. In the event that we cause either a recapture or disallowance of the tax credits expected to be generated under this program, then we will be required to repay the disallowed or recaptured tax credits plus an amount sufficient to pay the taxes on such repayment, to the counterparty of the agreement. This indemnification covers our actions and inactions prior to September 6, 2020. The maximum potential amount of future payments under this indemnification is approximately \$12,600. The Company currently believe that the likelihood of us being required to make a payment under this indemnification is remote.

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The Company also has several note payable agreements denominated in Japanese Yen which currently enables the Company to borrow up to a total of 260,000 Japanese Yen, or \$2,158. Borrowings bear interest at either TIBOR (“Tokyo Interbank Offered Rate”) plus a margin or the short-term prime rate with a weighted average rate of 0.63% as of December 31, 2015 and as of December 31, 2014. The terms of the agreements vary and are renewable upon expiration of the term with the balances due in 2016. Borrowings under the agreement are payable at the option of the Company throughout the term of the agreements. Borrowings outstanding under these agreements were \$2,158 and \$2,184 as of December 31, 2015 and 2014, respectively.

Certain of the Company’s foreign subsidiaries maintain other note payable agreements. These agreements are not further described as they are not significant to the consolidated financial statements.

The fair value of a financial instrument is the amount at which the instrument could be exchanged in a current transaction. As of December 31, 2015 and 2014, the fair value of the senior secured term loan and senior secured bond was lower than book value by \$30,760 and \$3,206, respectively. The fair value of the senior secured term loans and notes were derived from published loan prices at December 31, 2015 and 2014, as applicable. The fair value is classified as Level 1 based upon the fair value hierarchy and is determined using unadjusted quoted prices in active markets for identical liabilities.

The aggregate long-term debt maturities are:

Year	Amount
2016	\$ 14,508
2017	1,185,600
2018	600,000
2019	—
2020	—
Thereafter	21,000
	<u>\$ 1,821,108</u>

Cash payments for interest were \$103,108, \$104,917, and \$109,337, for the years ended December 31, 2015, 2014, and 2013, respectively.

14. Other Long-term Liabilities:

The following table summarizes the components of other long-term liabilities as follows:

	December 31,	
	2015	2014
Pension benefits	\$ 58,725	\$ 61,028
Other postretirement benefits	4,566	5,116
Supplemental retirement plans	12,960	13,851
Reserve for uncertain tax positions	9,941	17,631
Asset retirement obligation	3,532	3,452
INEOS Group liability (see Note 20)	3,091	4,116
Natural gas hedge agreements	732	603
Other	3,318	4,213
Total	<u>\$ 96,865</u>	<u>\$ 110,010</u>

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15. Financial Instruments:

The Company uses interest rate related derivative instruments to manage its exposure related to changes in interest rates on its variable-rate debt instruments and uses commodity derivatives to manage its exposure to commodity price fluctuations. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates and commodity prices, the Company exposes itself to credit risk and market risk. Credit risk is the failure of the counterparty to perform under the terms of the derivative contract. When the fair value of a derivative contract is an asset, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is a liability, the Company owes the counterparty and, therefore, the Company is not exposed to the counterparty's credit risk in those circumstances. The Company minimizes counterparty credit risk in derivative instruments by entering into transactions with high quality counterparties. The derivative instruments entered into by the Company do not contain credit-risk-related contingent features.

Market risk is the adverse effect on the value of a derivative instrument that results from a change in interest rates, currency exchange rates, or commodity prices. The market risk associated with interest rate and commodity price contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

Use of Derivative Financial Instruments to Manage Commodity Price Risk. The Company is exposed to risks in energy costs due to fluctuations in energy prices, particularly natural gas. The Company has a hedging program in the United States which allows the Company to mitigate exposure to natural gas volatility with natural gas swap agreements. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices of comparable contracts. The respective current and non-current liabilities are recorded in accrued liabilities and other long-term liabilities and the respective current and non-current assets are recorded in prepaid and other current assets and other long-term assets, as applicable. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains or losses are recorded in stockholders' equity as a component of other comprehensive income (loss), net of tax. Realized gains and losses on natural gas hedges are included in production cost and subsequently charged to cost of goods sold in the consolidated statements of operations in the period in which inventory is sold.

Use of Derivative Financial Instruments to Manage Interest Rate Risk. The Company is exposed to fluctuations in interest rates on the long-term senior secured term loan and revolving credit facility. Changes in interest rates will not affect the market value of such debt but will affect the amount of our interest payments over the term of the loans. Likewise, an increase in interest rates could have a material impact on the Company's cash flow. The Company hedges the interest rate fluctuations on debt obligations through interest rate cap agreements. The Company records these agreements at fair value as assets or liabilities. As the derivatives are highly effective and are designated and qualify as cash-flow hedges, the related unrealized gains or losses are deferred in stockholders' equity as a component of other comprehensive income (loss), net of tax. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices.

During 2013, the Company entered into interest rate cap agreements, paying a premium of \$995 to mitigate interest rate volatility from September 2013 until March 2016, by employing a 2% cap rates on \$800,000 of notional variable debt.

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The fair values of derivative instruments held are shown below:

	Balance sheet location	December 31,	
		2015	2014
Asset derivatives:			
Derivatives designated as cash flow hedges:			
Interest rate caps	Other long-term assets	—	\$ 49
Total asset derivatives		\$ —	\$ 49
Liability derivatives:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	\$3,004	\$3,205
Natural gas swaps	Other long-term liabilities	732	603
Derivatives not designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	210	401
Total liability derivatives		\$3,946	\$4,209

The following table shows the effect of the Company's derivative instruments designated as hedges on other comprehensive income (loss) (OCI) and the statement of income:

	Location in Earnings	Year ended December 31,		
		2015	2014	2013
Derivatives designated as cash flow hedges:				
AOCI derivative loss at beginning of year		\$(4,220)	\$ (202)	\$(2,966)
Effective portion of changes in fair value recognized in OCI:				
Interest rate caps		(49)	(900)	(47)
Natural gas swaps		(4,154)	(3,566)	839
Natural gas caps		—	174	(81)
Amount of loss reclassified from OCI to earnings:				
Interest rate caps	Interest expense	398	1,434	1,703
Natural gas swaps	Cost of goods sold	4,226	(1,160)	350
AOCI derivative loss at end of year		\$(3,799)	\$(4,220)	\$ (202)

Amounts of unrealized losses in OCI that are expected to be reclassified to the consolidated statement of operations over the next twelve months are \$3,004 as of December 31, 2015.

16. Income Taxes:

Income (loss) before income taxes and noncontrolling interest within or outside the United States are shown below:

	December 31,		
	2015	2014	2013
Domestic	\$(50,677)	\$(71,392)	\$(31,277)
Foreign	83,201	77,223	70,136
Total	\$ 32,524	\$ 5,831	\$ 38,859

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The provision (benefit) for income taxes as shown in the accompanying consolidated statements of operations consists of the following:

	December 31,		
	2015	2014	2013
Current:			
Federal	\$ 4	\$ (682)	\$ 1,136
State	303	317	(84)
Foreign	14,362	18,641	16,200
	<u>14,669</u>	<u>18,276</u>	<u>17,252</u>
Deferred:			
Federal	8,812	(9,686)	(1,795)
State	1,650	(1,175)	(2,291)
Foreign	(2,229)	133	(2,558)
	<u>8,233</u>	<u>(10,728)</u>	<u>(6,644)</u>
Provision (benefit) for income taxes	<u>\$22,902</u>	<u>\$ 7,548</u>	<u>\$ 10,608</u>

A reconciliation of income tax expense (benefit) at the U.S. federal statutory income tax rate of 35% to actual income tax expense (benefit) is as follows:

	December 31,		
	2015	2014	2013
Tax at statutory rate	\$ 11,383	\$ 2,041	\$ 13,600
State income taxes, net of federal income tax benefit	(2,760)	(2,011)	(2,858)
Repatriation of non-US earnings	22,869	5,919	10,011
Changes in uncertain tax positions	(1,919)	506	(732)
Change in valuation allowances	3,157	2,318	(1,816)
Change in state effective rates	214	(1,337)	308
Foreign withholding taxes	1,505	2,223	1,639
Foreign tax rate differential	(13,230)	(11,013)	(11,883)
Non-deductible transaction costs	322	6,782	—
Other, net	1,361	2,120	2,339
Provision (benefit) for income taxes	<u>\$ 22,902</u>	<u>\$ 7,548</u>	<u>\$ 10,608</u>

The total tax provision of \$22,902 for the twelve months ended December 31, 2015 on the Company's consolidated pre-tax income for the period differs from the U.S. statutory tax rate of 35% principally due to the repatriation of non-US earnings, foreign income tax in jurisdictions with statutory rates different than the U.S. rate, state taxes, non-deductible transaction costs, foreign withholding taxes, changes in valuation allowance, and changes in uncertain tax positions.

The total tax provision of \$7,548 for the twelve months ended December 31, 2014 on the Company's consolidated pre-tax income for the period differs from the U.S. statutory tax rate of 35% principally due to the repatriation of non-US earnings, foreign income tax in jurisdictions with statutory rates different than the U.S. rate, state taxes, non-deductible transaction costs, foreign withholding taxes, changes in valuation allowance, and changes in uncertain tax positions.

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The total tax provision of \$10,608 for the twelve months ended December 31, 2013 on the Company's consolidated pre-tax income for the period differs from the U.S. statutory tax rate of 35% principally due to the repatriation of non-US earnings, foreign income tax in jurisdictions with statutory rates different than the U.S. rate, state taxes, foreign withholding taxes, changes in valuation allowance, and changes in uncertain tax positions.

Deferred tax assets (liabilities) are comprised of the following:

	December 31,	
	2015	2014
Deferred tax assets:		
Net operating loss carryforwards	\$ 117,825	\$ 125,972
Pension	23,327	24,713
Postretirement health	1,451	1,601
Transaction costs	2,409	3,380
Natural gas contracts	1,421	1,447
Interest rate swaps	25	158
Unrealized translation losses	7,145	7,552
Other	26,556	19,873
Valuation allowance	(40,078)	(39,178)
	<u>\$ 140,081</u>	<u>\$ 145,518</u>
Deferred tax liabilities:		
Depreciation	\$ (42,962)	\$ (43,079)
Undistributed earnings of non-US subsidiaries	(49,767)	(43,317)
LIFO reserve	(4,981)	(5,089)
Intangible assets	(132,556)	(142,072)
Other accruals	(18,821)	(19,759)
	<u>\$ (249,087)</u>	<u>\$ (253,316)</u>
Net deferred tax liabilities	<u>\$ (109,006)</u>	<u>\$ (107,798)</u>

Included in the 2015 deferred tax asset and liability amounts for depreciation, intangible assets, LIFO reserve, natural gas contracts, and other above is \$42,451 of a net deferred tax liability related to the Company's investment in Potters Industries, LLC, which is a partnership for Federal income tax purposes. The Company and one of its subsidiaries own in aggregate 100% of Potters Industries, LLC and the assets and liabilities of Potters Industries, LLC are included in the consolidated financial statements of the Company.

The \$109,006 in net deferred tax liabilities as of December 31, 2015 consists of \$4,191 in net non-current deferred tax assets and \$113,197 in net non-current deferred tax liabilities.

The \$107,798 in net deferred tax liabilities as of December 31, 2014 consists of \$6,687 in non-current deferred tax assets and \$114,485 in net non-current deferred tax liabilities.

The change in net deferred tax assets (liabilities) for the year ended December 31, 2015 was primarily related to the increase in deferred tax assets on accrued pension obligations, and book amortization of intangibles with no corresponding tax basis.

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The change in net deferred tax assets (liabilities) for the year ended December 31, 2015 was primarily related to the increase in deferred tax liabilities on the undistributed earnings of non-US subsidiaries, partially offset by the book amortization of intangibles with no corresponding tax basis.

Following are changes in the deferred tax valuation allowance during the years ended December 31, 2015, 2014, and 2013:

	<u>Beginning Balance</u>	<u>Additions</u>	<u>Reductions</u>	<u>Ending Balance</u>
Year ended December 31, 2015	\$ 39,178	3,750	(2,850)	\$40,078
Year ended December 31, 2014	37,141	3,702	(1,665)	39,178
Year ended December 31, 2013	36,649	6,302	(5,810)	37,141

The net change in the total valuation allowance was an increase of \$900 in 2015. The valuation allowance at December 31, 2015 was primarily related to foreign and state net operating loss carryforwards and tax credits that, in the judgment of management, are not more likely than not to be realized. In assessing the realizability of deferred tax assets, management considered whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considered the scheduled reversal of deferred tax liabilities (including the impact of available carryback and carryforward periods), projected future taxable income, and tax-planning strategies that are prudent in making this assessment. In order to fully realize deferred tax assets, the Company will need to generate future taxable income prior to the expiration of the net operating loss and credit carryforwards. The amount of the deferred tax assets considered realizable, however, could be reduced in the near term if estimates of future taxable income during the carryforward period are reduced.

Management considered certain earnings in non-U.S. subsidiaries to be available for repatriation in the future. The tax cost associated with non-U.S. subsidiary earnings and distributions for the years ended December 31, 2015 and 2014 has been recorded as tax expense for the period. In this regard the Company expects to deduct, rather than credit, foreign tax expense in computing the U.S. tax effects of repatriation from non-U.S. subsidiaries in 2015 and 2014. The unremitted earnings of non-U.S. subsidiaries and affiliates that have not been reinvested abroad indefinitely amount to \$129,139 as of December 31, 2015. The deferred U.S. federal and state income tax liability and deferred foreign withholding tax liability on these undistributed earnings is estimated to be \$49,767.

At December 31, 2015, the cumulative unremitted earnings of foreign subsidiaries outside the United States, considered permanently reinvested, for which no income or withholding taxes have been provided, approximated \$94,475. Such earnings are expected to be reinvested indefinitely and, as a result, no deferred tax liability has been recognized with regard to such earnings. Determination of the deferred income tax liability on these unremitted earnings is not practicable principally because such liability, if any, is dependent on circumstances existing if and when remittance occurs.

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The following table summarizes the activity related to our gross unrecognized tax benefits:

	December 31,	
	2015	2014
Balance at beginning of period	\$ 15,503	\$ 16,180
Increases related to prior year tax positions	8,271	163
Decreases related to prior year tax positions	(2,035)	(1,021)
Increases related to current year tax positions	768	740
Decreases related to settlements with taxing authorities	(3,033)	(270)
Decreases related to lapsing of statute of limitations	(55)	(289)
Balance at end of period	<u>\$ 19,419</u>	<u>\$ 15,503</u>

Included in the balance of total unrecognized tax benefits are potential benefits of \$19,419 and \$15,503, that if recognized, would affect the effective tax rate on income from continuing operations as of December 31, 2015 and 2014, respectively.

Interest and penalties recognized related to uncertain tax positions amounted to (\$1,313), \$976 and \$152 in 2015, 2014 and 2013, respectively. To the extent interest and penalties are not assessed with respect to uncertain tax positions, amounts accrued will be reduced and reflected as a reduction of the overall income tax provision in the period for which the event occurs requiring the adjustment. The accrued interest and penalties as of December 31, 2015 and 2014 are \$3,131 and \$5,843, respectively, and are recorded in other long-term liabilities in the consolidated balance sheet.

The Company files numerous consolidated and separate income tax returns in the U.S. Federal jurisdiction and in many state and foreign jurisdictions. The following describes the open tax years, by major tax jurisdiction, as of December 31, 2015:

<u>Jurisdiction</u>	<u>Period</u>
United States—Federal	2011 - Present
United States—State	2008 - Present
Canada (a)	2009 - Present
Germany	2010 - Present
Netherlands	2011 - Present
Mexico	2010 - Present
United Kingdom	2010 - Present
Brazil	2010 - Present

(a)—Includes federal as well as local jurisdictions

Given that the U.S. Company has net operating loss carryforwards, the statute for examination by taxing authorities in the United States, and certain state jurisdictions, will remain open for a period following the use of such net operating loss carryforwards extending the period for examination beyond the years indicated above.

The Company has subsidiaries in various states, provinces and countries that are currently under audit for years ranging from 2003 through 2015. To date, no material adjustments have been proposed as a result of these audits. As of December 31, 2015, the Company does not believe that there are any positions for which it is reasonably possible that the total amount of unrecognized tax benefits will significantly increase or decrease within the next 12 months.

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The Company has a net operating loss carry-forward (“NOL”) available of \$288,017 to reduce future federal taxes payable. The federal carry-forward period is 20 years. \$29,278 relates to periods prior to the 2007 Merger. \$258,559 relates to periods after the 2007 Merger but prior to the 2014 Stock Purchase. \$180 relates to periods after the 2014 Stock Purchase. Both, the 2007 Merger and 2014 Stock Purchase triggered the change in control provisions under IRC §382. Although subject to the limitations of IRC §382, management believes it is more likely than not that the Company will realize the entire \$287,837 in pre-transaction NOLs in future years. The remaining \$180 relates to NOLs generated following the 2014 Stock Purchase and would not be subject to IRC §382.

For state income tax purposes the Company incurred net operating losses of \$14,997 for 2015 that may be carried forward at periods ranging from 5 to 20 years among the states in which the Company is subject to tax to reduce future state income taxes payable. Cumulative state net operating losses carrying forward into 2016 are \$461,980. A valuation allowance of \$12,789 has been applied against the total \$18,511 of state net operating loss deferred tax assets, leaving losses of \$5,722 that have been recognized for financial accounting purposes for the portion of those losses that the Company believes, on a more likely than not basis, will be realized.

Foreign net operating losses of \$43,287, of which \$14,563 will begin to expire in 2029 and the remaining \$28,724 carried forward indefinitely, are available to reduce future foreign income taxes payable. A valuation allowance of \$10,046 has been applied to \$10,622 of deferred tax assets related to foreign net operating loss carry-forwards, leaving a net deferred tax asset relating to foreign net operating losses of \$576 that have been recognized for financial accounting purposes.

Cash payments (refunds) for income taxes are as follows:

	December 31,		
	2015	2014	2013
Domestic	\$ 143	\$ 1,248	\$ 366
Foreign	<u>20,047</u>	<u>15,918</u>	<u>14,019</u>
	<u>\$20,190</u>	<u>\$17,166</u>	<u>\$14,385</u>

17. Benefit Plans:

The Company sponsors defined benefit pension plans covering employees in the United States and Canada and certain employees at its subsidiaries outside of North America (“Other”). Benefits for a majority of the Plans are based on average final pay and years of service. The Company’s funding policy is to fund the minimum required contribution under local statutory requirements. The Company uses a December 31 measurement date for its defined benefit plans.

The Company sponsors unfunded plans to provide certain health care benefits to retired employees in the United States and Canada. These plans were closed to new retirees in the United States and Canada as of December 31, 2006. The plans pay a stated percentage of medical expenses reduced by deductibles and other coverage. The plans are unfunded and obligations are paid out of the Company’s operations.

The Company also has defined benefit supplementary retirement plans which provide benefits for certain U.S. employees in excess of qualified plan limitations. The obligations are paid out of the Company’s general assets, including assets held in a Rabbi trust, or restoration plan assets.

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Defined Benefit Plans

The following tables summarize changes in the benefit obligation, the plan assets and the funded status of our significant benefit plans as well as the components of net periodic benefit costs, including key assumptions.

	U.S. and Canada		Other	
	December 31,		December 31,	
	2015	2014	2015	2014
Change in benefit obligation:				
Benefit obligation at beginning of period	\$ 210,546	\$ 180,248	\$ 86,410	\$ 61,995
Service cost	—	—	3,269	2,708
Interest cost	7,797	8,149	2,490	3,271
Participant contributions	—	—	342	401
Plan amendments	—	—	(354)	—
Settlement	—	—	(102)	—
Benefits paid	(8,554)	(8,459)	(1,202)	(1,405)
Expenses paid	—	—	(214)	(216)
Plan combinations	—	—	—	9,929
Actuarial (gains) losses	(8,458)	32,291	(6,823)	19,374
Translation adjustment	(3,124)	(1,683)	(9,416)	(9,647)
Benefit obligation at end of the period	<u>\$ 198,207</u>	<u>\$ 210,546</u>	<u>\$ 74,400</u>	<u>\$ 86,410</u>
Change in plan assets:				
Fair value of plan assets at beginning of period	\$ 172,445	\$ 158,528	\$ 66,022	\$ 43,466
Actual return on plan assets	(2,925)	21,116	(623)	16,940
Employers contributions	289	2,745	3,224	3,269
Employee contributions	—	—	342	401
Plan settlements	—	—	(102)	—
Benefits paid	(8,554)	(8,459)	(1,202)	(1,405)
Expenses paid	—	—	(214)	(216)
Plan combinations	—	—	—	10,565
Translation adjustment	(2,811)	(1,485)	(7,286)	(6,998)
Fair value of plan assets at end of the period	<u>\$ 158,444</u>	<u>\$ 172,445</u>	<u>\$ 60,161</u>	<u>\$ 66,022</u>
Funded status of the plans (underfunded)	<u>\$ (39,763)</u>	<u>\$ (38,101)</u>	<u>\$ (14,239)</u>	<u>\$ (20,388)</u>

Amounts recognized in the consolidated balance sheets consist of:

	U.S. and Canada		Other	
	December 31,		December 31,	
	2015	2014	2015	2014
Noncurrent asset	\$ —	\$ —	\$ 4,174	\$ 2,066
Current liability	—	—	(300)	(429)
Noncurrent liability	(39,763)	(38,101)	(18,113)	(22,025)
Accumulated other comprehensive loss	(41,863)	(40,731)	(292)	(4,434)
Net amount recognized	<u>\$ (81,626)</u>	<u>\$ (78,832)</u>	<u>\$ (14,531)</u>	<u>\$ (24,822)</u>

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Amounts recognized in accumulated other comprehensive loss consist of:

	U.S. and Canada		Other	
	December 31,		December 31,	
	2015	2014	2015	2014
Prior service credit	\$ —	\$ —	\$ 1,655	\$ 1,619
Net gain (loss)	(66,584)	(63,940)	(2,954)	(8,365)
Gross amount recognized	(66,584)	(63,940)	(1,299)	(6,746)
Deferred income taxes	24,721	23,209	1,007	2,312
Net amount recognized	<u>\$(41,863)</u>	<u>\$(40,731)</u>	<u>\$ (292)</u>	<u>\$(4,434)</u>

Components of net periodic benefit cost consist of:

	U.S. and Canada			Other		
	December 31,			December 31,		
	2015	2014	2013	2015	2014	2013
Service cost	\$ —	\$ —	\$ —	\$ 3,269	\$ 2,708	\$ 2,713
Interest cost	7,797	8,149	7,156	2,490	3,271	2,843
Expected return on plan assets	(10,696)	(11,389)	(10,673)	(2,315)	(2,492)	(2,022)
Amortization of prior service cost	—	—	—	(151)	(151)	(171)
Amortization of net (gain) loss	1,835	1,181	2,226	484	155	348
Settlement loss recognized	—	—	—	3	—	—
Net periodic expense	<u>\$ (1,064)</u>	<u>\$ (2,059)</u>	<u>\$ (1,291)</u>	<u>\$ 3,780</u>	<u>\$ 3,491</u>	<u>\$ 3,711</u>

The estimated net actuarial loss (gain) for the pension plans that will be amortized from accumulated other comprehensive income into benefit cost in 2016 is \$1,926 in the Company's U.S. and Canada pension plans and \$275 for the Company's Other pension plans. The estimated prior service cost (credit) that will be amortized from accumulated other comprehensive income into benefit cost in 2016 is (\$149) for the Company's Other pension plans.

The total accumulated benefit obligation as of December 31, 2015 and 2014 for the U.S. and Canadian plans was \$196,087 and \$207,757, respectively. The total accumulated benefit obligation as of December 31, 2015 and 2014 for the Other pension plans was \$71,551 and \$82,290, respectively.

The following table presents selected information about the Company's pension plans with accumulated benefit obligations in excess of plan assets:

	U.S. and Canada		Other	
	December 31,		December 31,	
	2015	2014	2015	2014
Projected benefit obligation	\$ 182,522	\$ 191,187	\$ 48,334	\$ 57,319
Accumulated benefit obligation	182,522	191,187	45,599	53,587
Fair value of plan assets	143,887	155,454	29,920	34,865

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Significant weighted average assumptions used in determining the pension obligations include the following:

	<u>U.S. and Canada</u>		<u>Other</u>	
	<u>December 31,</u>		<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>	<u>2015</u>	<u>2014</u>
Discount rate	4.20%	3.82%	3.60%	3.26%
Compensation increase	0.28%	0.34%	2.80%	2.81%

Significant weighted average assumptions used in determining net periodic benefit cost include the following:

	<u>U.S. and Canada</u>			<u>Other</u>		
	<u>December 31,</u>			<u>December 31,</u>		
	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>
Discount rate	3.82%	4.64%	3.67%	3.26%	4.69%	4.91%
Compensation increase	0.30%	0.34%	0.40%	2.81%	3.11%	3.53%
Long-term rate of return	6.45%	7.34%	7.34%	3.77%	4.59%	5.04%

The U.S. discount rates were determined by utilizing a yield curve model. The model develops a spot rate curve based on the yields available from a broad based universe of high quality corporate bonds. The discount rate is then set as the weighted average spot rate, using the plan's expected benefit cash flows as the weights.

The rate of compensation increase on the U.S. plan was zero for the years ended December 31, 2015, 2014, and 2013, as all future accruals were frozen in the United States as of December 31, 2006 in accordance with the plan amendment approved in 2005. The rate of compensation increase in determining the pension obligation on the Canadian plan was 3.50% and 3.75% for the year ended December 31, 2015 and 2014, respectively. The rate of compensation increase in determining the net periodic benefit cost on the Canadian plan was 3.75% for the years ended December 31, 2015, 2014 and 2013. In determining the expected return on plan assets, the Company considers the relative weighting of plan assets, the historical performance of total plan assets and individual asset classes, and expected future performance. In addition, the Company may consult with and consider the opinions of our external advisors in developing appropriate return benchmarks.

The investment objective for the U.S. plan is to generate returns sufficient to meet future obligations. The strategy to meet the objective includes generating attractive returns using higher returning assets such as equity securities and balancing risk using less volatile assets such as fixed income securities. The plan invests in an allocation of assets across the three broadly-defined financial asset categories of equity, fixed income and cash. The target allocations for plan assets are 45 percent equity securities and 55 percent fixed income investments.

Similar considerations are applied to the investment objectives of the non-US plans as well as the asset classes available in each location and any legal restrictions on plan investments.

The Company categorized plan assets into a Fair Value Hierarchy. The hierarchy consists of three levels as follows:

- Level 1—Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets. Level 1 assets primarily include investments in

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publicly traded equity securities and mutual funds. These securities (or the underlying investments of the funds) are actively traded and valued using quoted prices for identical securities from the market exchanges.

- Level 2—Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves. Level 2 assets primarily consist of fixed-income securities and comingled funds that are not actively traded or whose underlying investments are valued using observable marketplace inputs. The fair value of plan assets invested in fixed-income securities is generally determined using valuation models that use observable inputs such as interest rates, bond yields, low-volume market quotes and quoted prices for similar assets. Plan assets that are invested in comingled funds are valued using a unit price or net asset value (“NAV”) that is based on the underlying investments of the fund.
- Level 3—Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company’s best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date. Level 3 assets include investments covered by insurance policies and real estate funds valued using significant un-observable inputs.

	Fair value measurements at December 31, 2015			
	Total	Level 1	Level 2	Level 3
Cash and cash equivalents	\$ 1,317	\$ 1,241	\$ 76	\$ —
Equity securities:				
U.S. investment funds	39,064	39,064	—	—
International investment funds	44,655	24,935	19,720	—
Fixed income securities:				
Government securities	20,308	—	20,308	—
Corporate bonds	4,859	—	4,859	—
Investment fund bonds	90,021	79,211	10,810	—
Other:				
Insurance policies	18,295	—	15,237	3,058
Total	\$ 218,519	\$ 144,451	\$ 71,010	\$ 3,058

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	Fair value measurements at December 31, 2014			
	Total	Level 1	Level 2	Level 3
Cash and cash equivalents	\$ 1,247	\$ 1,079	\$ 168	\$ —
Equity securities:				
U.S. investment funds	49,664	49,664	—	—
International investment funds	40,298	19,037	21,261	—
Fixed income securities:				
Government securities	17,277	—	17,277	—
Corporate bonds	4,132	—	4,132	—
Investment fund bonds	104,130	92,485	11,645	—
Other:				
Insurance policies	21,721	—	18,543	3,178
Total	\$ 238,469	\$ 162,265	\$ 73,026	\$ 3,178

The changes in the level 3 pension plan assets for the years ended December 31, 2015 and 2014 were as follows:

	Insurance policies
Balance at December 31, 2013	\$ 3,259
Actual return on plan assets	24
Benefits paid	(43)
Contributions	355
Exchange rate changes	(417)
Balance at December 31, 2014	3,178
Actual return on plan assets	(77)
Benefits paid	(36)
Contributions	317
Exchange rate changes	(324)
Balance at December 31, 2015	<u>\$ 3,058</u>

The Company expects to contribute \$244 to the U.S. and Canada pension plans and \$4,078 to the Other pension plans in 2016.

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

Year	U.S. and Canada	Other
2016	\$10,888	\$ 1,404
2017	11,226	1,961
2018	11,806	1,704
2019	11,666	2,584
2020	11,885	2,255
Years 2021-2025	61,132	15,062

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Certain of the Company's foreign subsidiaries maintain other defined benefit plans that are consistent with statutory practices. These plans are not included in the disclosures above as they are not significant to the consolidated financial statements.

Supplemental Retirement Plans

The following tables summarize changes in the benefit obligation, the plan assets and the funded status of our defined benefit supplementary retirement plans as well as the components of net periodic benefit costs, including key assumptions.

	December 31,	
	2015	2014
Change in benefit obligation:		
Benefit obligation at beginning of period	\$ 15,018	\$ 13,447
Interest cost	529	556
Benefits paid	(1,179)	(1,239)
Actuarial (gain)/losses	(240)	2,254
Benefit obligation at end of period	<u>\$ 14,128</u>	<u>\$ 15,018</u>
Change in plan assets:		
Fair value of plan assets at beginning of period	\$ —	\$ —
Employers contributions	1,179	1,239
Benefits paid	(1,179)	(1,239)
Fair value of plan assets at end of period	<u>\$ —</u>	<u>\$ —</u>
Funded status of the plans (underfunded)	<u>\$ (14,128)</u>	<u>\$ (15,018)</u>

Amounts recognized in the consolidated balance sheets consist of:

	December 31,	
	2015	2014
Current liability	\$ (1,168)	\$ (1,167)
Noncurrent liability	(12,960)	(13,851)
Accumulated other comprehensive loss	<u>(3,519)</u>	<u>(3,822)</u>
Net amount recognized	<u>\$ (17,647)</u>	<u>\$ (18,840)</u>

Amounts recognized in accumulated other comprehensive loss consist of:

	December 31,	
	2015	2014
Net loss	\$(5,726)	\$(6,215)
Gross amount recognized	(5,726)	(6,215)
Deferred income taxes	2,207	2,393
Net amount recognized	<u>\$(3,519)</u>	<u>\$(3,822)</u>

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Components of net periodic benefit cost consist of:

	December 31,		
	2015	2014	2013
Interest cost	\$529	\$556	\$483
Amortization of net loss	248	150	198
Net periodic expense	<u>\$777</u>	<u>\$706</u>	<u>\$681</u>

The estimated net actuarial loss (gain) for the pension plans that will be amortized from accumulated other comprehensive loss into benefits cost in 2016 is \$216 for our defined benefit supplementary retirement plans.

The accumulated benefit obligation of our defined benefit supplemental retirement plans for the years ended December 31, 2015 and 2014 was \$14,128 and \$15,019, respectively.

The discount rate used in determining the supplemental retirement plan pension obligations was 4.00% and 3.60% for the years ended December 31, 2015 and 2014, respectively.

The discount rate used in determining net periodic benefit cost was 3.60%, 4.30%, and 3.30%, for the years ended December 31, 2015, 2014, and 2013, respectively. The rate of compensation increase for the fiscal years ended December 31, 2015, 2014, and 2013, was zero as all future accruals were frozen for the defined supplemental retirement plans as of December 31, 2006 in accordance with the plan amendment approved in 2005.

The Company expects to contribute \$1,168 to the defined benefit supplementary retirement plans in 2016.

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

<u>Year</u>	<u>Amount</u>
2016	\$ 1,168
2017	1,143
2018	1,115
2019	1,085
2020	1,055
Years 2021-2025	4,816

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Other Postretirement Benefit Plans

The following tables summarize changes in the benefit obligation, the plan assets and the funded status of our other postretirement benefit plans as well as the components of net periodic benefit costs, including key assumptions.

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Change in benefit obligation:		
Benefit obligation at beginning of period	\$ 5,586	\$ 6,352
Interest cost	172	201
Employee contributions	279	281
Benefits paid	(1,306)	(1,060)
Medical subsidies received	164	93
Premiums paid	(3)	(3)
Actuarial (gain)/losses	227	(153)
Translation adjustment	(218)	(125)
Benefit obligation at end of period	<u>\$ 4,901</u>	<u>\$ 5,586</u>
Change in plan assets:		
Fair value of plan assets at beginning of period	\$ —	\$ —
Employers contributions	866	689
Employee contributions	279	281
Benefits paid	(1,306)	(1,060)
Medical subsidies received	164	93
Premiums paid	(3)	(3)
Fair value of plan assets at end of period	<u>\$ —</u>	<u>\$ —</u>
Funded status of the plans (underfunded)	<u><u>\$ (4,901)</u></u>	<u><u>\$ (5,586)</u></u>

Amounts recognized in the consolidated balance sheets consist of:

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Current liability	\$ (747)	\$ (888)
Noncurrent liability	(4,154)	(4,698)
Accumulated other comprehensive income	422	500
Net amount recognized	<u><u>\$ (4,479)</u></u>	<u><u>\$ (5,086)</u></u>

Amounts recognized in accumulated other comprehensive income consist of:

	<u>December 31,</u>	
	<u>2015</u>	<u>2014</u>
Net gain	<u>\$ 949</u>	<u>\$ 1,153</u>
Gross amount recognized	949	1,153
Deferred income taxes	(527)	(653)
Net amount recognized	<u><u>\$ 422</u></u>	<u><u>\$ 500</u></u>

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Components of net periodic benefit cost consist of:

	December 31,		
	2015	2014	2013
Interest cost	\$172	\$ 201	\$185
Amortization of net (gain) loss	(61)	(112)	(36)
Net periodic expense	<u>\$111</u>	<u>\$ 89</u>	<u>\$149</u>

The estimated net actuarial loss (gain) for the pension plans that will be amortized from accumulated other comprehensive income into benefits cost in 2016 is (\$51) for our retiree health plans.

Significant weighted average assumptions used in determining the net periodic benefit cost, the postretirement benefit obligations, and trend rate include the following:

	December 31,	
	2015	2014
Benefit obligation:		
Discount rate (benefit obligation)	3.64%	3.32%
Immediate trend rate	7.28%	7.52%
Ultimate trend rate	4.50%	4.50%
Year that the rate reaches ultimate trend rate	2035	2028

	December 31,		
	2015	2014	2013
Benefit cost:			
Discount rate (benefit cost)	3.32%	3.66%	2.79%
Immediate trend rate	7.52%	7.72%	7.87%
Ultimate trend rate	4.50%	4.50%	4.50%
Year that the rate reaches ultimate trend rate	2028	2028	2028

A 1% change in the assumed health care cost trend would have increased (decreased) the accumulated postretirement benefit obligation at December 31, 2015 and the periodic postretirement benefit cost for the year ended as follows:

	1% Increase	1% Decrease
Accumulated postretirement benefit obligation	262	(260)
Periodic postretirement benefit cost	9	(8)

The Company expects to contribute \$747 to the retiree health plans in 2016.

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The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

<u>Year</u>	<u>Amount</u>
2016	\$ 747
2017	719
2018	593
2019	528
2020	460
Years 2021-2025	1,188

There are no expected Medicare subsidy receipts expected in future periods.

Certain of the Company's foreign subsidiaries maintain other postretirement benefit plans that are consistent with statutory practices. These plans are not included in the disclosures above as they are not significant to the consolidated financial statements.

Defined Contribution Plans

The Company also has defined contribution plans covering domestic employees of the Company and certain subsidiaries. The Company recorded expenses of \$6,638, \$7,826, and \$8,713, related to these plans for the years ended December 31, 2015, 2014, and 2013, respectively.

18. Stock-Based Compensation:

The Company applies the fair value based method to account for stock options and awards.

On January 29, 2014, CPQ Holding Corporation changed its name to PQ Holdings Inc.

On September 28, 2007, the Company established the CPQ Holding Corporation Stock Incentive Plan, (the "Stock Incentive Plan"). On July 2, 2008, the Stock Incentive Plan was amended. The number of shares that may be issued under the amended Stock Incentive Plan or be subject to awards may not exceed 692,495 shares. In accordance with the Stock Incentive Plan, the Company has the authority to issue restricted stock, options, stock appreciation rights, deferred stock units, and dividends.

In 2007 and 2008, the Company issued 355,269 shares of restricted Class A common stock and 895 deferred stock units under the Stock Incentive Plan. In February 2010, the Company issued 340,981 additional shares of restricted Class A common stock under the Stock Incentive Plan, of which a portion of the shares were awarded to certain employees new to the Stock Incentive Plan and a portion of the shares were awarded to certain employees previously awarded shares in 2007 and 2008. The restricted stock includes three separate tranches for vesting purposes; (1) Service shares, (2) Tranche 1 Performance shares, and (3) Tranche 2 Performance shares. The Service shares' vesting is based on satisfying certain service conditions and the Tranche 1 and Tranche 2 shares' vesting is based on satisfying certain performance conditions. All of the Service shares vested on certain dates during 2007, 2008, 2009, 2010 and 2011, subject to the employees' continued service with the Company on such dates. In connection with the 2014 Stock Purchase, the vesting of Tranche 1 Performance shares was modified to provided that those shares will vest as follows: 100% of each grant fully vests on any Measurement Date, as defined in the amendment to the shareholder's restricted stock agreement, upon certain investment funds affiliated with CCMP having received Proceeds, as defined, resulting in an MOI, as defined, of at least 2.0,

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subject to the employee's continued service with the Company through the vesting date. "MOI" is defined, as of the Measurement Date, as the quotient obtained on or prior to such Measurement Date by dividing (i) the sum of Proceeds received on such Measurement Date and all prior Measurement Dates, by (ii) the Principal Investment. All of the Tranche 2 Performance shares vested when the Company met three specified annual EBITDA targets, subject to the employees' continued service with the Company on such dates when the EBITDA targets were met. The fair value of the awards was determined using multiples of EBITDA and the income approach, based on discounted free cash flow.

In 2015, the Company issued 57,923 shares of restricted Class D common stock and 34,628 shares of Class C options. Both share issuances have various vesting features, including satisfying certain service based and performance based conditions. The fair value of the Class D common stock awards was determined based on the equity valuation from recent transactions. The fair value of the Class C options was determined using a Black-Scholes option pricing model.

Activity of nonvested shares of restricted Class D common stock granted under the Company's Stock Incentive Plan is shown below. The weighted-average grant-date fair value of the restricted Class D common stock granted during 2015 was \$160.71.

	Number of shares		Weighted average grant date fair value (per share)	
	Class A	Class D	Class A	Class D
Nonvested awards, December 31, 2014	200,665	—	\$ 7.09	\$ —
Granted during year	—	57,923	\$ —	\$ 160.71
Vested during year	—	(2,225)	\$ —	\$ 160.71
Nonvested awards, December 31, 2015	200,665	55,698	\$ 7.09	\$ 160.71

Compensation expense for all stock-based awards was \$3,358, \$0, and \$1,011, for years ended December 31, 2015, 2014, and 2013, respectively, commensurate with the estimated vesting of the underlying awards.

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19. Common Stock:

As of December 31, 2015 and 2014, the Company has the following capital stock:

	December 31,	
	2015	2014
Class A common stock (Par value \$0.01):		
Authorized	150,000,000	150,000,000
Issued	680,678	680,678
Outstanding	582,280	582,593
Class B common stock (Par value \$0.01):		
Authorized	30,000,000	30,000,000
Issued	5,100,795	5,100,795
Outstanding	5,087,995	5,087,995
Class C common stock (Par value \$0.01):		
Authorized	10,000,000	10,000,000
Issued	48,820	48,820
Outstanding	48,820	48,820
Class D common stock (Par value \$0.01):		
Authorized	1,500,000	1,500,000
Issued	84,258	5,800
Outstanding	84,258	5,800
Preferred stock (Par value \$0.01):		
Authorized	1,500,000	1,500,000
Issued	—	—
Outstanding	—	—

In conjunction with the 2007 Merger, the Company received \$315,000 of capital. In connection with the 2008 INEOS Acquisition, the Company received an additional \$192,830 of capital. During 2009, the Company received an additional \$2,250 of capital.

The 2007 Merger was accounted for as a purchase in accordance with U.S. GAAP. As a result of a 6.6% continuing ownership interest in PQ Holdings Inc. by certain stockholders ("Continuing Stockholders"), 93.4% of the purchase price was allocated to the assets and liabilities acquired at their respective fair values with the remaining 6.6% recorded at the Continuing Stockholders' historical book values as of the date of the acquisition. As a result of the carryover of the Continuing Stockholders' historical basis, stockholders' equity (deficit) of PQ Holdings Inc. has been reduced by \$53,532.

In connection with the 2014 Stock Purchase, Class C and Class D shares were authorized and issued. Class C and Class D shares are identical to Class A and Class B shares, respectively, except they do not have voting rights.

20. Commitments and Contingent Liabilities:

There is a risk of environmental impact in chemical manufacturing operations. The Company's environmental policies and practices are designed to ensure compliance with existing laws and regulations and to minimize the possibility of significant environmental impact. The Company is also subject to various other lawsuits and claims with respect to matters such as governmental regulations, labor, and other actions arising out

PQ HOLDINGS INC. AND SUBSIDIARIES
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of the normal course of business. No accrual for these matters currently exists, with the exception of those listed below, because management believes that the liabilities resulting from such lawsuits and claims are not probable or reasonably estimable.

The Company triggered the requirement of New Jersey's Industrial Site Recovery Act ("ISRA") statute. As required under ISRA, a General Information Notice with respect to the Company's two New Jersey locations was filed with the New Jersey Department of Environmental Protection ("NJDEP") in December 2004 and again in July 2007. Based on an initial review of the facilities by the NJDEP in 2005, the Company estimated that \$500 will be required for contamination assessment and removal work at these facilities, and had recorded a reserve for such amount as of December 31, 2005. During subsequent years, it was determined that additional assessment, removal and remediation work would be required and the reserve was increased to cover the estimated cost of such work. In addition, during this period, work had been performed and the reserve was reduced for actual costs incurred for the assessment and remediation work. As of December 31, 2015 and 2014, the Company has recorded a reserve of \$1,625 and \$2,039 for costs required for contamination assessment and remediation work at these facilities. The amounts charged to pre-tax earnings for environmental remediation and related costs/(benefits) were \$0, \$(89), and \$1,500, for the years ended December 31, 2015, 2014, and 2013, respectively, and are recorded as other operation expense in the consolidated statements of operations. There may be additional costs related to soil and ground water remediation, but until further investigation takes place, the Company cannot reasonably estimate the amount of additional liability that may exist.

As part of a Delaware River Basin Commission ("DRBC") required Pollutant Minimization Plan ("PMP"), in July 2013 the Company's Chester facility conducted limited paint sampling for polychlorinated biphenyls ("PCBs"). Also, as part of demolition, repair and maintenance projects scheduled for the Company's Baltimore facility in 2014, the Company conducted limited paint sampling during the fall of 2013 for waste categorization purposes. Paint samples were analyzed for PCB Aroclor 1254, the specific PCB congener commonly used in the manufacture of paint until the late 1970s. The Company's analytical results indicated that PCB Aroclor 1254 is present in paint on some structures (e.g., piping, structural steel, tanks) in excess of the fifty (50) parts per million ("ppm") regulatory threshold. Under the Toxic Substances Control Act ("TSCA"), there is no requirement to test in use paint for PCB content. However, once PCB content is identified at concentrations at or above the regulatory threshold, absent specific approval from the U.S. Environmental Protection Agency ("EPA"), the PCB-containing paint is regulated as an unauthorized use of PCBs, and the paint must be addressed. The Company is preparing to abate painted surfaces that have tested positive for PCBs at levels exceeding 50 ppm in 2015. As of December 31, 2015 and 2014, the Company recorded a reserve of \$2,157 and \$2,644 for the anticipated remediation costs of known PCB painted structures at the Company's Baltimore and Chester facilities. The amounts charged to pre-tax earnings for remediation costs of known PCB painted structures were \$1,000 and \$2,935, for the years ended December 31, 2015 and 2014, respectively, and are recorded as other operation expense in the consolidated statements of operations.

In 2011, the Company installed a Continuous Emissions Monitor ("CEM") to measure CO, NOx and Opacity emissions from a furnace at our Chester facility in Pennsylvania. Since this time, the Company has conducted Relative Accuracy Test Audits ("RATA") as part of its efforts to certify the CEM. On May 5, 2014, Pennsylvania Department of Environmental Protection ("PADEP") officially notified the Company that it was certifying the CEM based on RATA test results dating back to November 2011 and to start entering data previously recorded by the CEM into the Agency's on-line database. During the third and fourth quarters of 2014, the Company officially entered data recorded from the CEM up until the second quarter of 2013. On January 8, 2015, the Environmental Program Manager for the Southeast Regional Office Air Quality Program of PADEP notified the Company that it would like to meet to discuss penalty calculations associated with CO and NOx emissions based on the CEM data. The penalty amount starting with fourth quarter 2011 through the second

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PQ HOLDINGS INC. AND SUBSIDIARIES
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(Dollars in thousands, except per share amounts)

quarter 2013 indicated in PADEP's communication to the Company totals to \$1,489. The Company is planning to meet with PADEP to propose significant reductions in the penalty amounts cited by the Agency. As of December 31, 2015 and 2014, the Company has recorded a reserve of \$1,700 and \$1,489, respectively, associated with the PADEP penalty and is recorded as other operation expense in the consolidated statements of operations.

As part of the 2008 INEOS Silicas Acquisition, the Company acquired a manufacturing facility at Warrington, United Kingdom. Asbestos-containing building material is present at the site, and asbestos removal and insulation replacement initiatives are underway. As of December 31, 2015 and 2014, the Company has recorded a reserve of \$639 and \$671, respectively, for costs related to this program.

In 2008, the Company sold the property of a manufacturing facility located in the United States to the local port authority. In 2009, the port authority commissioned an environmental investigation of portions of the property. In 2010, the port authority advised the Company of alleged soil and groundwater contamination on the property and alleged the Company liable for certain conditions. The Company received and reviewed the environmental investigation documentation and determined it may have liability with respect to some, but not all, of the alleged contamination. Respective legal counsel for the Company and the Port of Tacoma are currently engaged in efforts to negotiate the terms of a cost sharing agreement for the funding of additional study and subsequent abatement work to the extent necessary for the site. As of December 31, 2015 and 2014, the Company has recorded a reserve of \$707 and \$728, respectively, for costs related to this potential liability.

As part of the 2008 INEOS Silicas Acquisition, the Company is liable for potential multi-year UK tax benefits. The Company is contractually obligated to make a payment on an annual basis on its UK taxable results, which can fluctuate period to period, until there is a change in control, as defined in the purchase agreement. As of December 31, 2015 and 2014, the Company has accrued \$5,385 and \$6,457, respectively, for this matter representing the expected payment owed on the calculation of the liability for the tax year ended 2015 and 2014. The Company recorded these expenses as transaction related costs in other operating expense, net.

The Company has entered into various lease agreements for the rental of office and plant facilities and equipment, substantially all of which are classified as operating leases. Total rent expense under these agreements was \$14,551, \$13,476, and \$10,939, for the years ended December 31, 2015, 2014, and 2013, respectively.

Total rent due under non-cancelable operating lease commitments are:

<u>Year</u>	<u>Amount</u>
2016	\$10,659
2017	7,714
2018	4,398
2019	2,754
2020	1,905
Thereafter	3,964
	<u>\$31,394</u>

The Company rents its corporate office under a long-term operating lease agreement, which contains a provision for amid-term rent increase. The Company records monthly rent expense equal to the total of the payments due over the lease term, divided by the number of months of the lease term. The difference between rent expense recorded and the amount paid is credited or charged to deferred rent liability, which is reflected in the consolidated balance sheet.

PQ HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except per share amounts)

The Company has entered into short and long-term purchase commitments for various key raw materials and energy requirements. The purchase obligations include agreements to purchase goods that are enforceable and legally binding and that specify all significant terms. The purchase commitments covered by these agreements are with various suppliers and total approximately \$13,031.

Purchases under these agreements are expected to be:

<u>Year</u>	<u>Amount</u>
2016	\$ 6,108
2017	2,240
2018	1,130
2019	775
2020	775
Thereafter	<u>2,003</u>
	<u>\$13,031</u>

21. Related Party Transactions:

The Company maintains certain policies and procedures for the review, approval, and ratification of related party transactions to ensure that all transactions with selected parties are fair, reasonable and in the Company's best interest. All significant relationships and transactions are separately identified by management if they meet the definition of a related party or a related party transaction. Related party transactions include transactions that occurred during the year, or are currently proposed, in which the Company was or will be a participant and which any related person had or will have a direct or indirect material interest. All related party transactions are reviewed, approved and documented by the appropriate level of the Company's management in accordance with these policies and procedures.

PQ Holdings Inc., TC Group IV, L.L.C., an affiliate of The Carlyle Group, and PQ Corporation entered into a consulting agreement relating to the provision of certain financial and strategic advisory services and consulting services. The Company paid a one-time fee in the amount of \$12,000 on July 30, 2007 for structuring the 2007 Merger. In addition, the Company agreed to pay an annual monitoring fee equal to \$2,000. In conjunction with the 2008 INEOS Silicas Acquisition, the consulting agreement was amended whereby the Company agreed to increase the annual monitoring fee equal to \$3,000, which was recorded in other operating expense in the consolidated statements of operations for the years ended December 31, 2014 and 2013. TC Group IV, L.L.C. assigned the consulting agreement to Carlyle Investment Management L.L.C., another affiliate of The Carlyle Group on June 7, 2012.

PQ Holdings Inc., INEOS, and PQ Corporation entered into a consulting agreement relating to the provision of certain financial and strategic advisory services and consulting services. The Company paid a one-time fee in the amount of \$6,000 on July 2, 2008 for structuring the 2008 INEOS Silicas Acquisition. In addition, the Company agreed to pay an annual monitoring fee equal to \$2,000, which was recorded in other operating expense in the consolidated statements of operations for the years ended December 31, 2014 and 2013.

In conjunction with the 2014 Stock Purchase, PQ Holdings Inc., CCMP, and PQ Corporation entered into a consulting agreement relating to the provision of certain financial and strategic advisory services and consulting services. Similarly, the consulting agreement between PQ Holdings, INEOS, and PQ Corporation was amended and restated. Under the new consulting agreements, the Company agreed to pay an annual monitoring fee of

PQ HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except per share amounts)

\$5,000 distributed to CCMP and INEOS equal to the Pro Rata Percentage, as defined, between CCMP and INEOS, which was recorded in other operating expense in the consolidated statements of operations for the year ended December 31, 2015.

The Company entered into a Joint Venture Agreement (the “ZI Partnership Agreement”) in 1988 with CRI Zeolites Inc., a Royal Dutch Shell plc affiliate, to form Zeolyst International, our 50/50 joint venture partnership (the “Partnership”). Under the terms of the ZI Partnership Agreement, the Partnership leases certain land used in its Kansas City production facilities from PQ Corporation. This lease, which has been recorded as an operating lease, provided for rental payments of \$265, \$250, and \$235 for the years ended December 31, 2015, 2014 and 2013, respectively. The terms of this lease are evergreen as long as the Partnership agreement is in place. The Partnership purchases certain of its raw materials from the Company and is charged for various manufacturing costs incurred at the Company’s Kansas City production facility. The amount of these costs charged to the Partnership during the years ended December 31, 2015, 2014, and 2013, were \$14,551, \$14,284, and \$13,044, respectively. Certain administrative, marketing, engineering, management-related, and research and development services are provided to the Partnership by the Company. During the years ended December 31, 2015, 2014, and 2013, the Partnership was charged \$12,551, \$10,164, and \$9,769, respectively, for these services. In addition, the Partnership was charged certain product demonstration costs of \$1,598, \$1,832, and \$1,970, during the years ended December 31, 2015, 2014, and 2013, respectively.

From time to time, the Company makes sales to portfolio companies of funds that are affiliated with CCMP and companies that are affiliated with INEOS, but these sales are not material.

22. Customer Concentration:

There were no single customers with revenue transactions greater than 10% of total revenues for the years ended December 31, 2015, 2014, and 2013.

23. Subsequent Events:

The Company has evaluated subsequent events from the balance sheet date through March 5, 2016, the date at which the financial statements were available to be issued, and determined there are no additional items to disclose.

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PQ HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except share amounts)
(unaudited)

	<u>March 31,</u> <u>2016</u>	<u>December 31,</u> <u>2015</u>
ASSETS		
Cash and cash equivalents	\$ 44,195	\$ 53,507
Receivables, net	137,706	117,438
Inventories	205,488	197,093
Prepaid and other current assets	19,550	19,006
Total current assets	406,939	387,044
Investments in affiliated companies	225,647	224,480
Property, plant and equipment, net	576,534	569,168
Goodwill	720,321	717,460
Other intangible assets, net	316,946	324,032
Other long-term assets	47,525	45,900
Total assets	<u>\$ 2,293,912</u>	<u>\$ 2,268,084</u>
LIABILITIES		
Notes payable and current maturities of long-term debt	\$ 31,661	\$ 14,508
Accounts payable	91,570	104,645
Accrued liabilities	81,588	73,497
Total current liabilities	204,819	192,650
Long-term debt	1,788,351	1,789,255
Deferred income taxes	119,594	113,197
Other long-term liabilities	95,147	96,865
Total liabilities	<u>2,207,911</u>	<u>2,191,967</u>
Commitments and contingencies (Note 13)		
EQUITY		
Common stock, Class A (\$0.01 par); authorized shares 150,000,000; issued shares 680,678; outstanding shares 581,798 and 582,280 on March 31, 2016 and December 31, 2015, respectively.	6	6
Common stock, Class B (\$0.01 par); authorized shares 30,000,000; issued shares 5,100,795; outstanding shares 5,087,995 on March 31, 2016 and December 31, 2015.	51	51
Common stock, Class C (\$0.01 par); authorized shares 10,000,000; issued shares 48,820; outstanding shares 48,820 on March 31, 2016 and December 31, 2015.	—	—
Common stock, Class D (\$0.01 par); authorized shares 1,500,000; issued shares 86,903 and 84,258; outstanding shares 28,560 on March 31, 2016 and December 31, 2015.	1	1
Additional paid-in capital	467,670	466,476
Accumulated deficit	(262,911)	(264,013)
Treasury stock, at cost; shares 98,880 and 98,398 (Class A), 12,800 (Class B), 0 (Class C), 0 (Class D) on March 31, 2016 and December 31, 2015, respectively.	(916)	(916)
Accumulated other comprehensive loss	(124,799)	(131,973)
Total PQ Holdings Inc. equity	79,102	69,632
Noncontrolling interest	6,899	6,485
Total equity	<u>86,001</u>	<u>76,117</u>
Total liabilities and equity	<u>\$ 2,293,912</u>	<u>\$ 2,268,084</u>

See accompanying notes to condensed consolidated financial statements.

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PQ HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands)
(unaudited)

	Three months ended	
	March 31,	
	2016	2015
Sales	\$ 237,393	\$ 245,291
Cost of goods sold	173,613	180,528
Gross profit	63,780	64,763
Selling, general and administrative expenses	28,524	27,683
Other operating expense, net	11,461	15,193
Operating income	23,795	21,887
Equity in net income from affiliated companies	4,659	7,559
Interest expense	26,413	26,914
Other (income) expense, net	(3,422)	18,071
Income (loss) before income taxes and noncontrolling interest	5,463	(15,539)
Provision (benefit) for income taxes	3,904	(1,817)
Net income (loss)	1,559	(13,722)
Less: Net income attributable to the noncontrolling interest	457	505
Net income (loss) attributable to PQ Holdings Inc.	\$ 1,102	\$ (14,227)

See accompanying notes to condensed consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(in thousands)
(unaudited)

	Three months ended	
	March 31,	
	2016	2015
Net income (loss)	\$1,559	\$(13,722)
Other comprehensive income (loss), net of tax:		
Pension and postretirement benefits	363	397
Net gain (loss) from hedging activities	58	(191)
Foreign currency translation	6,710	(20,347)
Total other comprehensive income (loss)	7,131	(20,141)
Comprehensive income (loss)	8,690	(33,863)
Less: Comprehensive income attributable to noncontrolling interests	414	318
Comprehensive income (loss) attributable to PQ Holdings Inc.	<u>\$8,276</u>	<u>\$(34,181)</u>

See accompanying notes to condensed consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)
(unaudited)

	Common stock, Class A	Common stock, Class B	Common stock, Class C	Common stock, Class D	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Balance, December 31, 2015	\$ 6	\$ 51	\$ —	\$ 1	\$466,476	\$ (264,013)	\$ (916)	\$ (131,973)	\$ 6,485	\$76,117
Net income	—	—	—	—	—	1,102	—	—	457	1,559
Other comprehensive income (loss)	—	—	—	—	—	—	—	7,174	(43)	7,131
Stock compensation for restricted stock awards	—	—	—	—	1,194	—	—	—	—	1,194
Balance, March 31, 2016	<u>\$ 6</u>	<u>\$ 51</u>	<u>\$ —</u>	<u>\$ 1</u>	<u>\$467,670</u>	<u>\$ (262,911)</u>	<u>\$ (916)</u>	<u>\$ (124,799)</u>	<u>\$ 6,899</u>	<u>\$86,001</u>

	Common stock, Class A	Common stock, Class B	Common stock, Class C	Common stock, Class D	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Noncontrolling interest	Total
Balance, December 31, 2014	\$ 6	\$ 51	\$ —	\$ —	\$459,819	\$ (271,864)	\$ (916)	\$ (96,637)	\$ 7,089	\$ 97,548
Net income (loss)	—	—	—	—	—	(14,227)	—	—	505	(13,722)
Other comprehensive income (loss)	—	—	—	—	—	—	—	(19,954)	(187)	(20,141)
Dividend distribution	—	—	—	—	—	—	—	—	(153)	(153)
Balance, March 31, 2015	<u>\$ 6</u>	<u>\$ 51</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$459,819</u>	<u>\$ (286,091)</u>	<u>\$ (916)</u>	<u>\$ (116,591)</u>	<u>\$ 7,254</u>	<u>\$ 63,532</u>

See accompanying notes to condensed consolidated financial statements.

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PQ HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)
(unaudited)

	Three months ended March 31,	
	2016	2015
Cash flows from operating activities:		
Net income (loss)	\$ 1,559	\$ (13,722)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:		
Depreciation	16,077	14,877
Amortization	7,544	7,638
Amortization of deferred financing costs and original issue discount	2,183	2,184
Hedge premium amortization	66	99
Foreign currency exchange (gain) loss	(3,206)	18,204
Pension and postretirement healthcare benefit expense	1,157	923
Pension and postretirement healthcare benefit funding	(2,124)	(2,687)
Deferred income tax provision (benefit)	2,590	(3,327)
Net (gain) loss on asset disposals	301	(25)
Supplemental pension plan mark-to-market loss gain	(304)	(182)
Stock compensation	1,194	—
Equity in net income from affiliated companies	(4,659)	(7,559)
Dividends received from affiliated companies	5,000	—
Working capital changes that provided (used) cash:		
Receivables	(17,976)	(21,939)
Inventories	(6,225)	(13,326)
Prepays and other current assets	(541)	(1,371)
Accounts payable	(1,919)	3,838
Accrued liabilities	5,655	4,954
Other, net	(143)	(452)
Net cash provided by (used in) operating activities	6,229	(11,873)
Cash flows from investing activities:		
Purchases of property, plant and equipment	(29,503)	(21,723)
Other, net	(2)	(36)
Net cash used in investing activities	(29,505)	(21,759)
Cash flows from financing activities:		
Draw down of revolver	42,000	—
Repayments of revolver	(25,000)	—
Repayments of long-term debt	(3,088)	(3,087)
Distributions to noncontrolling interests	—	(153)
Net cash provided by (used in) financing activities	13,912	(3,240)
Effect of exchange rate changes on cash	52	(3,562)
Net change in cash and cash equivalents	(9,312)	(40,434)
Cash and cash equivalents at beginning of period	53,507	100,836
Cash and cash equivalents at end of period	\$ 44,195	\$ 60,402
Non-cash investing activity:		
Capital expenditures acquired on account but unpaid as of the period end	\$ 9,256	\$ 9,149

See accompanying notes to condensed consolidated financial statements.

PQ HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands)
(unaudited)

1. Background and Basis of Presentation:

PQ Holdings Inc. and subsidiaries (the “Company”) conducts operations through three principal businesses: Performance Chemicals: a fully integrated, global leader in silicate technology, producing sodium silicate, specialty silicas, zeolites, spray dry silicates, magnesium silicate, and other high performance chemical products used in a variety of end-uses such as adsorbents for surface coatings, clarifying agents for beverages, cleaning and personal care products; Catalysts: an integrated silica catalyst and specialty zeolite-based catalyst producer with leading global market positions, producing silica catalyst used in the production of high-density polyethylene (“HDPE”), and specialty zeolite-based catalysts sold to the emissions control industry, the petrochemical industry and other areas of the broader chemicals industry; and Specialty Glass Materials: a leading global producer of engineered glass products for use in highway safety, polymer additives, metal finishing and electronics end markets, which is comprised of Highway Safety and Engineered Glass Materials (“EGM”). Highway Safety manufactures glass beads used for airport, highway and road safety applications to improve visibility in wet and nighttime driving conditions, where EGM produces solid and hollow glass spheres for use as polymer additives and fillers in specialized plastics, as engineered peening beads in metal finishing and as conductives in consumer electronics and other applications.

The Company experiences some seasonality, primarily with respect to the Specialty Glass Materials business. As the road striping season occurs during warmer weather, sales and earnings are generated primarily during the second and third quarters. Working capital is built during the first and second quarters of the year, while cash generation occurs primarily in the second half of the fiscal year.

The condensed consolidated financial statements included herein are unaudited and have been prepared in accordance with accounting principles generally accepted in the United States (“GAAP”) for interim financial reporting. Certain information and footnote disclosures normally included in annual financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations for interim reporting. In the opinion of management, all adjustments of a normal and recurring nature necessary to state fairly the financial position and results of operations have been included. The year-end condensed consolidated balance sheet data was derived from audited financial statements, but does not include all disclosures required by GAAP. The results of operations are not necessarily indicative of the results to be expected for the full year. The accompanying unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto for the year ended December 31, 2015. The Company has continued to follow the accounting policies set forth in those consolidated statements.

2. Recently Issued Accounting Standards:

In March 2016, the Financial Accounting Standards Board (“FASB”) issued guidance that includes targeted improvements to the accounting for employee stock-based compensation. The updates in the guidance include changes in the income tax consequences, balance sheet classification and cash flow statement reporting of stock-based payment transactions. The guidance also includes certain modifications applicable only to nonpublic entities. The guidance is effective for public entities for annual periods beginning after December 15, 2016, and interim periods within those years, with early application permitted. The Company is evaluating the impact that the new guidance will have on its consolidated financial statements.

In February 2016, the FASB issued guidance that amends the accounting for leases. Under the new guidance, a lessee will recognize assets and liabilities for most leases but will recognize expenses similar to current lease accounting. The guidance is effective for public companies for fiscal years, and interim periods

PQ HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands)
(unaudited)

within those fiscal years, beginning after December 15, 2018. Early adoption is permitted. The new guidance must be adopted using a modified retrospective transition, and provides for certain practical expedients. The Company is currently evaluating the impact that the new guidance will have on its consolidated financial statements. The Company has operating lease agreements for which it expects to recognize right of use assets and corresponding liabilities on its balance sheet upon adoption of the new guidance.

In September 2015, the FASB issued guidance that will change the requirements for reporting measurement period adjustments to provisional amounts initially recognized in conjunction with a business combination. Under GAAP, an acquiring entity currently is required to retrospectively adjust, in prior period financial statements, the provisional amounts to reflect new information obtained during the measurement period (a period, which may not exceed one year from the date of the business combination, during which the acquiring entity may receive information about the facts and circumstances existing as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of the acquisition date). Under the new guidance, adjustments to the provisional amounts will be reflected in the financial statements for the reporting period in which the adjustments are determined, including by recognizing in current period earnings the full effect of changes in depreciation, amortization or other income effects. The guidance requires that the acquiring entity either present separately on the face of the current period income statement or disclose in the notes to the current period financial statement, by line item, the amount of the adjustments made during the current period. The Company adopted the new guidance effective January 1, 2016. The Company will apply the adjustments prescribed by the guidance prospectively to new acquisitions. The guidance had no impact upon adoption on the Company's consolidated financial statements.

In July 2015, the FASB issued new guidance that changes the measurement principle for inventory from the lower of cost or market to the lower of cost or net realizable value. The amendments in this guidance do not apply to inventory that is measured using last-in, first-out ("LIFO") or the retail inventory method; rather, the amendments apply to all other inventory, which includes inventory that is measured using first-in, first-out ("FIFO") or average cost. Within the scope of this new guidance, an entity should measure inventory at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling price in the ordinary course of business, less reasonably predictable costs of completion, disposal and transportation, which is consistent with existing GAAP. The new guidance will be effective for public entities for fiscal years beginning after December 15, 2016, including interim periods within those years. The Company does not expect this guidance to have a significant impact on its consolidated financial statements.

In August 2014, the FASB issued guidance regarding management's responsibility to evaluate whether there is substantial doubt about an entity's ability to continue as a going concern within one year of the issuance of the financial statements. If substantial doubt exists, additional disclosures would be required. This guidance will be effective starting with the annual period ending after December 15, 2016, with early adoption permitted. The Company does not expect this guidance to have a significant impact on its consolidated financial statements.

In May 2014, the FASB issued accounting guidance (with subsequent targeted amendments) that will significantly enhance comparability of revenue recognition practices across entities, industries, jurisdictions and capital markets. The core principle of the guidance is that revenue recognized from a transaction or event that arises from a contract with a customer should reflect the consideration to which an entity expects to be entitled in exchange for goods or services provided. To achieve that core principle the new guidance sets forth a five-step revenue recognition model that will need to be applied consistently to all contracts with customers, except those that are within the scope of other topics in the Accounting Standards Codification ("ASC"). Also required are enhanced disclosures to help users of financial statements better understand the nature, amount, timing and

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uncertainty of revenues and cash flows from contracts with customers. The enhanced disclosures include qualitative and quantitative information about contracts with customers, significant judgments made in applying the revenue guidance, and assets recognized related to the costs to obtain or fulfill a contract. These new requirements for public entities become effective for annual reporting periods beginning after December 15, 2017, including interim periods within those years. The Company is assessing the impact of these new requirements on its financial statements.

3. Fair Value Measurements:

Fair values are based on quoted market prices when available. When market prices are not available, fair value is generally estimated using discounted cash flow analyses, incorporating current market inputs for similar financial instruments with comparable terms and credit quality. In instances where there is little or no market activity for the same or similar instruments, the Company estimates fair value using methods, models and assumptions that management believes a hypothetical market participant would use to determine a current transaction price. These valuation techniques involve some level of management estimation and judgment which becomes significant with increasingly complex instruments or pricing models. Where appropriate, adjustments are included to reflect the risk inherent in a particular methodology, model or input used.

The Company's financial assets and liabilities carried at fair value have been classified based upon a fair value hierarchy. The hierarchy gives the highest ranking to fair values determined using unadjusted quoted prices in active markets for identical assets and liabilities (Level 1) and the lowest ranking to fair values determined using methodologies and models with unobservable inputs (Level 3). The classification of an asset or a liability is based on the lowest level input that is significant to its measurement. For example, a Level 3 fair value measurement may include inputs that are both observable (Levels 1 and 2) and unobservable (Level 3). The levels of the fair value hierarchy are as follows:

- Level 1 – Values are unadjusted quoted prices for identical assets and liabilities in active markets accessible at the measurement date. Active markets provide pricing data for trades occurring at least weekly and include exchanges and dealer markets.
- Level 2 – Inputs include quoted prices for similar assets or liabilities in active markets, quoted prices from those willing to trade in markets that are not active, or other inputs that are observable or can be corroborated by market data for the term of the instrument. Such inputs include market interest rates and volatilities, spreads and yield curves.
- Level 3 – Certain inputs are unobservable (supported by little or no market activity) and significant to the fair value measurement. Unobservable inputs reflect the Company's best estimate of what hypothetical market participants would use to determine a transaction price for the asset or liability at the reporting date.

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The following table presents information about the Company's assets and liabilities that are measured at fair value on a recurring basis as of March 31, 2016 and December 31, 2015, and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value. Financial assets and liabilities measured at fair value on a recurring basis are summarized as follows:

	As of March 31, 2016	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Restoration plan assets	\$ 5,987	\$ 5,987	\$ —	\$ —
Total	\$ 5,987	\$ 5,987	\$ —	\$ —
Liabilities:				
Derivative contracts	\$ 3,918	\$ —	\$ 3,918	\$ —
Total	\$ 3,918	\$ —	\$ 3,918	\$ —
	As of December 31, 2015	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Restoration plan assets	\$ 5,927	\$ 5,927	\$ —	\$ —
Total	\$ 5,927	\$ 5,927	\$ —	\$ —
Liabilities:				
Derivative contracts	\$ 3,946	\$ —	\$ 3,946	\$ —
Total	\$ 3,946	\$ —	\$ 3,946	\$ —

Restoration plan assets

The fair values of the Company's restoration plan assets are determined through quoted prices in active markets. Restoration plan assets are assets held in a Rabbi trust to fund the obligations of the Company's defined benefit supplementary retirement plans and include various stock and fixed income mutual funds. See Note 12 to these condensed consolidated financial statements regarding defined supplementary retirement plans.

Derivative contracts

Derivative assets and liabilities can be exchange-traded or traded over the counter ("OTC"). The Company generally values exchange-traded derivatives using models that calibrate to market transactions and eliminate timing differences between the closing price of the exchange-traded derivatives and their underlying instruments. OTC derivatives are valued using market transactions and other market evidence whenever possible, including market-based inputs to models, model calibration to market transactions, broker or dealer quotations or alternative pricing sources with reasonable levels of price transparency. When models are used, the selection of a particular model to value an OTC derivative depends on the contractual terms of, and specific risks inherent in, the instrument as well as the availability of pricing information in the market. The Company generally uses similar models to value similar instruments. Valuation models require a variety of inputs, including contractual terms, market prices and rates, forward curves, measures of volatility, and correlations of such inputs. For OTC

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derivatives that trade in liquid markets, such as forward contracts, swaps and options, model inputs can generally be corroborated by observable market data by correlation or other means, and model selection does not involve significant management judgment.

The Company has interest rate caps and natural gas caps and swaps that are fair valued using Level 2 inputs. In addition, the Company applies a credit valuation adjustment to reflect credit risk which is calculated based on credit default swaps. To the extent that the Company's net exposure under a specific master agreement is an asset, the Company utilizes the counterparty's default swap rate. If the net exposure under a specific master agreement is a liability, the Company utilizes a default swap rate comparable to PQ Holdings Inc. The credit valuation adjustment is added to the discounted fair value to reflect the exit price that a market participant would be willing to receive to assume the Company's liabilities or that a market participant would be willing to pay for the Company's assets. As of March 31, 2016 and December 31, 2015, the credit valuation adjustment resulted in a minimal change in the fair value of the derivatives.

4. Accumulated Other Comprehensive Loss:

The following table presents the tax effects of each component of other comprehensive income (loss) for the three months ended March 31, 2016 and 2015:

	Three months ended March 31,					
	2016			2015		
	Pre-tax amount	Tax benefit / (expense)	After-tax amount	Pre-tax amount	Tax benefit / (expense)	After-tax amount
Defined benefit and other postretirement plans						
Amortization and unrealized gains	\$ 591	\$ (200)	\$ 391	\$ 625	\$ (202)	\$ 423
Unrecognized prior service costs	(37)	9	(28)	(35)	9	(26)
Benefit plans, net	554	(191)	363	590	(193)	397
Net gain (loss) from hedging activities	84	(26)	58	(309)	118	(191)
Foreign currency translation	4,005	2,705	6,710	(17,959)	(2,388)	(20,347)
Other comprehensive income (loss)	<u>\$ 4,643</u>	<u>\$ 2,488</u>	<u>\$ 7,131</u>	<u>\$ (17,678)</u>	<u>\$ (2,463)</u>	<u>\$ (20,141)</u>

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The following table presents the change in accumulated other comprehensive loss, net of tax, by component for the three months ended March 31, 2016 and 2015:

	Defined benefit and other postretirement plans	Net gain (loss) from hedging activities	Foreign currency translation	Total
December 31, 2015	\$ (48,206)	\$ (2,624)	\$ (81,143)	\$(131,973)
Other comprehensive income (loss) before reclassifications	1,814	795	6,753	9,362
Amounts reclassified from accumulated other comprehensive income (loss) ^(a)	(1,451)	(737)	—	(2,188)
Net current period other comprehensive income (loss) attributable to PQ Holdings Inc.	363	58	6,753	7,174
March 31, 2016	<u>\$ (47,843)</u>	<u>\$ (2,566)</u>	<u>\$ (74,390)</u>	<u>\$(124,799)</u>
December 31, 2014	\$ (49,982)	\$ (2,881)	\$ (43,774)	\$ (96,637)
Other comprehensive income (loss) before reclassifications	1,983	423	(20,160)	(17,754)
Amounts reclassified from accumulated other comprehensive income (loss) ^(a)	(1,586)	(614)	—	(2,200)
Net current period other comprehensive income (loss) attributable to PQ Holdings Inc.	397	(191)	(20,160)	(19,954)
March 31, 2015	<u>\$ (49,585)</u>	<u>\$ (3,072)</u>	<u>\$ (63,934)</u>	<u>\$(116,591)</u>

(a) See the following table for details about these reclassifications.

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The following table presents the reclassifications out of accumulated other comprehensive loss for the three months ended March 31, 2016 and 2015. Amounts in parenthesis indicate debits to profit / loss.

<u>Details about Accumulated Other Comprehensive Income Components</u>	<u>Amount Reclassified from Accumulated Other Comprehensive Income</u>		<u>Affected Line Item in the Statement Where Net Income is Presented</u>
	<u>Three months ended</u>		
	<u>2016</u>	<u>2015</u>	
Defined benefit and other postretirement plans			
Amortization of prior service cost	\$ 149	\$ 138	(a)
Amortization of net loss	(2,365)	(2,494)	(a)
	(2,216)	(2,356)	Total before tax
	765	770	Tax benefit
	<u>\$ (1,451)</u>	<u>\$ (1,586)</u>	Net of tax
Net gain (loss) from hedging activities			
Interest rate caps	\$ (66)	\$ (100)	Interest expense
Natural gas swaps	(1,002)	(893)	Cost of goods sold
	(1,068)	(993)	Total before tax
	331	379	Tax benefit
	<u>\$ (737)</u>	<u>\$ (614)</u>	Net of tax
Total reclassifications for the period	<u>\$ (2,188)</u>	<u>\$ (2,200)</u>	Net of tax

(a) These accumulated other comprehensive income (loss) components are included in the computation of net periodic pension and other postretirement cost (see Note 12 for additional details).

5. Other Operating and Non-operating Expense, Net:

A summary of significant other operating expense, net is as follows:

	<u>Three months ended</u>	
	<u>2016</u>	<u>2015</u>
Amortization expense	\$ 7,544	\$ 7,638
Transaction related costs	288	6,039
Management advisory fee	1,250	1,250
Environmental related costs	385	42
Restructuring, plant closure and severance related costs	1,314	—
Net loss (gain) on asset disposals	301	(25)
Asset retirement obligation accretion	78	76
Other, net	301	173
	<u>\$ 11,461</u>	<u>\$ 15,193</u>

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The majority of the Company's other (income) expense, net consisted of a foreign exchange gain of (\$3,206) for the three months ended March 31, 2016 and a foreign exchange loss of \$18,204 for the three months ended March 31, 2015. These gains and losses are primarily driven by non-permanent intercompany debt arrangements denominated in local currencies which are translated to U.S. dollars.

6. Inventories:

Inventories were classified and valued as follows:

	<u>March 31,</u> <u>2016</u>	<u>December 31,</u> <u>2015</u>
Finished products and work in process	\$ 159,621	\$ 149,723
Raw materials	45,867	47,370
	<u>\$ 205,488</u>	<u>\$ 197,093</u>
Valued at lower of cost or market:		
LIFO basis	\$ 121,114	\$ 115,654
FIFO or average cost basis	84,374	81,439
	<u>\$ 205,488</u>	<u>\$ 197,093</u>

7. Investments in Affiliated Companies:

The Company accounts for investments in affiliated companies under the equity method. Affiliated companies accounted for on the equity basis as of March 31, 2016 are as follows:

<u>Company</u>	<u>Country</u>	<u>Percent</u> <u>Ownership</u>
PQ Silicates Ltd.	Taiwan	50%
Zeolyst International	USA	50%
Zeolyst C.V.	Netherlands	50%
Quaker Holdings	South Africa	49%

Following is summarized information of the combined investments:

	<u>Three months ended</u> <u>March 31,</u>	
	<u>2016</u>	<u>2015</u>
Net sales	\$60,621	\$ 71,338
Gross profit	19,120	25,662
Operating income	9,847	17,062
Net income (before taxes)	10,513	16,314

The Company's investment in affiliates balance as of March 31, 2016 and December 31, 2015 includes net purchase accounting fair value adjustments of \$65,610 and \$66,207, respectively, consisting primarily of intangible assets such as customer relationships, formulations and product technology, and tradenames. Consolidated equity in net income from affiliates is net of \$597 of amortization expense related to purchase accounting fair value adjustments for each of the three-month periods ended March 31, 2016 and 2015.

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8. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	March 31, 2016	December 31, 2015
Land	\$ 77,810	\$ 77,239
Buildings	181,500	177,723
Machinery and equipment	612,102	600,682
Construction in progress	126,644	115,336
	<u>998,056</u>	<u>970,980</u>
Less: accumulated depreciation	<u>(421,522)</u>	<u>(401,812)</u>
	<u>\$ 576,534</u>	<u>\$ 569,168</u>

Depreciation expense was \$16,077 and \$14,877 for the three months ended March 31, 2016 and 2015, respectively.

9. Long-term Debt:

The summary of long-term debt is as follows:

	March 31, 2016	December 31, 2015
Senior secured term loans with interest at 4.00% as of March 31, 2016 and as of December 31, 2015 (due August 2017)	\$ 1,194,863	\$ 1,197,950
Senior secured notes with interest at 8.75% as of March 31, 2016 and as of December 31, 2015 (due November 2018)	600,000	600,000
Revolving credit facility with interest at 4.93% as of March 31, 2016 (due May 2017)	17,000	—
Other	23,310	23,158
Total debt	<u>1,835,173</u>	<u>1,821,108</u>
Original issue discount	(11,411)	(13,117)
Deferred financing costs	<u>(3,750)</u>	<u>(4,228)</u>
Total debt, net of original issue discount	1,820,012	1,803,763
Less: current portion	<u>(31,661)</u>	<u>(14,508)</u>
	<u>\$ 1,788,351</u>	<u>\$ 1,789,255</u>

The fair value of a financial instrument is the amount at which the instrument could be exchanged in a current transaction. As of March 31, 2016 and December 31, 2015, the fair value of the senior secured term loans and senior secured notes was lower than book value by \$53,688 and \$30,760, respectively. The fair value of the senior secured term loans and notes was derived from published loan prices at March 31, 2016 and December 31, 2015, as applicable. The fair value is classified as Level 2 based upon the fair value hierarchy (see Note 3 to these condensed consolidated financial statements for further information on fair value measurements).

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10. Financial Instruments:

The Company uses interest rate related derivative instruments to manage its exposure related to changes in interest rates on its variable-rate debt instruments and uses commodity derivatives to manage its exposure to commodity price fluctuations. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates and commodity prices, the Company exposes itself to credit risk and market risk. Credit risk is the failure of the counterparty to perform under the terms of the derivative contract. When the fair value of a derivative contract is an asset, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is a liability, the Company owes the counterparty and, therefore, the Company is not exposed to the counterparty's credit risk in those circumstances. The Company minimizes counterparty credit risk in derivative instruments by entering into transactions with high quality counterparties. The derivative instruments entered into by the Company do not contain credit-risk-related contingent features.

Market risk is the adverse effect on the value of a derivative instrument that results from a change in interest rates, currency exchange rates, or commodity prices. The market risk associated with interest rate and commodity price contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

Use of Derivative Financial Instruments to Manage Commodity Price Risk. The Company is exposed to risks in energy costs due to fluctuations in energy prices, particularly natural gas. The Company has a hedging program in the United States which allows the Company to mitigate exposure to natural gas volatility with natural gas swap and cap agreements. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices of comparable contracts. The respective current and non-current derivative liabilities are recorded in accrued liabilities and other long-term liabilities, and the respective current and non-current derivative assets are recorded in prepaid and other current assets and other long-term assets, as applicable. As the derivatives are highly effective and are designated and qualify as cash flow hedges, the related unrealized gains or losses are recorded in stockholders' equity as a component of other comprehensive income (loss), net of tax. Realized gains and losses on natural gas hedges are included in production cost and subsequently charged to cost of goods sold in the consolidated statements of operations in the period in which inventory is sold.

Use of Derivative Financial Instruments to Manage Interest Rate Risk. The Company is exposed to fluctuations in interest rates on the long-term senior secured term loans and revolving credit facility. Changes in interest rates will not affect the market value of such debt but will affect the amount of our interest payments over the terms of the loans. Likewise, an increase in interest rates could have a material impact on the Company's cash flow. The Company hedges the interest rate fluctuations on these debt obligations through interest rate cap agreements. The Company records these agreements at fair value as assets or liabilities. Fair value is determined based on estimated amounts that would be received or paid to terminate the contracts at the reporting date based on quoted market prices. As the derivatives are highly effective and are designated and qualify as cash flow hedges, the related unrealized gains or losses are deferred in stockholders' equity as a component of other comprehensive income (loss), net of tax. Amounts accumulated in other comprehensive income related to interest rate cap agreements are reclassified to interest expense in the consolidated statements of operations when the related interest payments affect earnings. The Company had an \$800,000 notional amount of 2% interest rate caps on its variable-rate debt at December 31, 2015, with a fair value of zero. The agreements expired during March 2016, and the Company had no interest rate cap agreements outstanding at March 31, 2016.

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The fair values of derivative instruments held are shown below:

	Balance sheet location	March 31, 2016	December 31, 2015
Liability derivatives:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	\$ 3,113	\$ 3,004
Natural gas swaps	Other long-term liabilities	605	732
Derivatives not designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	200	210
Total liability derivatives		<u>\$ 3,918</u>	<u>\$ 3,946</u>

The following tables show the effect of the Company's derivative instruments designated as hedges on other comprehensive income (loss) (OCI) and the statement of income:

		Three months ended March 31,			
		2016		2015	
Derivatives designated as cash flow hedges:	Location in Earnings	Amount of gain (loss) recognized in OCI on derivatives (effective portion)	Amount of gain (loss) reclassified from accumulated OCI into income (effective portion)	Amount of gain (loss) recognized in OCI on derivatives (effective portion)	Amount of gain (loss) reclassified from accumulated OCI into income (effective portion)
Interest rate caps	Interest expense	\$ —	\$ 66	\$ (38)	\$ 100
Natural gas swaps	Cost of goods sold	(984)	1,002	(1,264)	893
		<u>\$ (984)</u>	<u>\$ 1,068</u>	<u>\$ (1,302)</u>	<u>\$ 993</u>

Amounts of unrealized losses in OCI that are expected to be reclassified to the consolidated statement of operations over the next twelve months are \$3,113 as of March 31, 2016.

11. Income Taxes:

The effective income tax rate for the three-month period ended March 31, 2016 was 71.5% compared to 11.7% for the three-month period ended March 31, 2015. The Company's effective income tax rate fluctuates based on, among other factors, changes in income mix. The difference between the U.S. federal statutory income tax rate and our effective income tax rate for the three months ended March 31, 2016 and 2015 was mainly due to the tax effect of repatriating foreign earnings back to the United States as dividends, differences between tax rates in foreign jurisdictions as compared to the U.S. tax rate, non-deductible transaction costs, withholdings taxes, changes to reserves for uncertain tax positions and changes in valuation allowances against deferred tax assets in certain jurisdictions.

12. Benefit Plans:

The following information is provided for the Company sponsored defined benefit pension plans covering (1) employees in the U.S. and Canada and (2) certain employees at its subsidiaries outside of North America ("Other Plans"), the Company sponsored unfunded plans to provide certain health care benefits to retired employees in the U.S. and Canada, and the Company's defined benefit supplementary retirement plans which provide benefits for certain U.S. employees in excess of qualified plan limitations.

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Components of net periodic expense are as follows:

	Three months ended March 31,	
	2016	2015
Pension Benefits - U.S. and Canada		
Interest cost	\$ 2,026	\$ 1,949
Expected return on assets	(2,473)	(2,683)
Amortization of net loss	482	444
Net periodic expense (benefit)	<u>\$ 35</u>	<u>\$ (290)</u>
	Three months ended March 31,	
	2016	2015
Pension Benefits - Other Plans		
Service cost	\$ 779	\$ 841
Interest cost	716	654
Expected return on assets	(639)	(601)
Amortization of prior service cost	(38)	(32)
Amortization of net loss	78	126
Net periodic expense	<u>\$ 896</u>	<u>\$ 988</u>
	Three months ended March 31,	
	2016	2015
Supplemental Retirement Plans		
Interest cost	\$ 135	\$ 130
Amortization of net loss	54	56
Net periodic expense	<u>\$ 189</u>	<u>\$ 186</u>
	Three months ended March 31,	
	2016	2015
Other Postretirement Benefit Plans		
Interest cost	\$ 42	\$ 42
Amortization of net gain	(13)	(16)
Net periodic expense	<u>\$ 29</u>	<u>\$ 26</u>
	Three months ended March 31,	
	2016	2015
Contributions		
Pension Benefits - U.S. and Canada	\$ 105	\$ 47
Pension Benefits - Other Plans	1,904	2,328
Supplemental Retirement Plans	51	56
Other Postretirement Benefit Plans	64	256

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Certain of the Company's foreign subsidiaries maintain other defined benefit pension and postretirement plans that are consistent with statutory practices. These plans are not included in the disclosures above as they are not significant to the Company's condensed consolidated financial statements.

13. Commitments and Contingent Liabilities:

There is a risk of environmental impact in chemical manufacturing operations. The Company's environmental policies and practices are designed to ensure compliance with existing laws and regulations and to minimize the possibility of significant environmental impact. The Company is also subject to various other lawsuits and claims with respect to matters such as governmental regulations, labor, and other actions arising out of the normal course of business. No accrual for these matters currently exists, with the exception of those listed below, because management believes that the liabilities resulting from such lawsuits and claims are not probable or reasonably estimable.

The Company triggered the requirement of New Jersey's Industrial Site Recovery Act ("ISRA") statute. As required under ISRA, a General Information Notice with respect to the Company's two New Jersey locations was filed with the New Jersey Department of Environmental Protection ("NJDEP") in December 2004 and again in July 2007. Based on an initial review of the facilities by the NJDEP in 2005, the Company estimated that \$500 will be required for contamination assessment and removal work at these facilities, and had recorded a reserve for such amount as of December 31, 2005. During subsequent years, it was determined that additional assessment, removal and remediation work would be required and the reserve was increased to cover the estimated cost of such work. In addition, during this period, work had been performed and the reserve was reduced for actual costs incurred for the assessment and remediation work. As of March 31, 2016, the Company has recorded a reserve of \$1,250 for costs required for contamination assessment and removal work at these facilities. There may be additional costs related to the remediation of these two facilities, but until further investigation takes place, the Company cannot reasonably estimate the amount of additional liability that may exist.

As part of a Delaware River Basin Commission required Pollutant Minimization Plan, in July 2013 the Company's Chester facility conducted limited paint sampling for polychlorinated biphenyls ("PCBs"). Also, as part of demolition, repair and maintenance projects scheduled for the Company's Baltimore facility in 2014, the Company conducted limited paint sampling during the fall of 2013 for waste categorization purposes. Paint samples were analyzed for PCB Aroclor 1254, the specific PCB congener commonly used in the manufacture of paint until the late 1970s. The Company's analytical results indicated that PCB Aroclor 1254 is present in paint on some structures (e.g., piping, structural steel, tanks) in excess of the fifty (50) parts per million (ppm) regulatory threshold. Under the Toxic Substances Control Act, there is no requirement to test in use paint for PCB content. However, once PCB content is identified at concentrations at or above the regulatory threshold, absent specific approval from the U.S. Environmental Protection Agency, the PCB-containing paint is regulated as an unauthorized use of PCBs, and the paint must be addressed. The Company abated painted surfaces that have tested positive for PCBs at levels exceeding 50 ppm at Baltimore in 2015 and early 2016. As of March 31, 2016, the Company has recorded a reserve of \$2,130 for the anticipated remediation costs of known PCB painted structures at the Company's Baltimore and Chester facilities.

In 2011, the Company installed a Continuous Emissions Monitor ("CEM") to measure CO, NO_x and Opacity emissions from a furnace at our Chester facility in Pennsylvania, and the Company conducted Relative Accuracy Test Audits ("RATA") as part of its efforts to certify the CEM. On May 5, 2014, the Pennsylvania Department of Environmental Protection ("PADEP") officially notified the Company that it was certifying the

PQ HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands)
(unaudited)

CEM based on RATA test results dating back to November 2011 and instructed the Company to start entering data previously recorded by the CEM into the PADEP's on-line database. During the third and fourth quarters of 2014, the Company officially entered data recorded from the CEM up until the second quarter of 2013. In November 2015, the PADEP issued an Assessment of Civil Penalty in the amount of \$1,739 for alleged violations under the Pennsylvania Air Pollution Control Act during the period from August 11, 2011 through June 30, 2013. The Company is planning to meet with the PADEP to propose significant reductions in the penalty amounts cited by the Agency. As of March 31, 2016, the Company has recorded a reserve of \$1,700 associated with the PADEP penalty.

As part of the INEOS Silicas acquisition in July 2008, the Company acquired a manufacturing facility at Warrington, United Kingdom ("UK"). Asbestos-containing building material is present at the site, and asbestos removal and insulation replacement initiatives are underway. As of March 31, 2016, the Company has recorded a reserve of \$619 for costs related to this program.

In 2008, the Company sold the property of a manufacturing facility located in the United States to the local port authority. In 2009, the port authority commissioned an environmental investigation of portions of the property. In 2010, the port authority advised the Company of alleged soil and groundwater contamination on the property and alleged the Company liable for certain conditions. The Company received and reviewed the environmental investigation documentation and determined it may have liability with respect to some, but not all, of the alleged contamination. As of March 31, 2016, the Company has recorded a reserve of \$707 for costs related to this potential liability.

As part of the INEOS Silicas acquisition in July 2008, the Company is liable for potential multi-year UK tax benefits. The Company is contractually obligated to make a payment on an annual basis on its UK taxable results, which can fluctuate period to period, until there is a change in control, as defined in the purchase agreement. The Company made its most recent annual payment for the tax year ended 2014 during the three months ended March 31, 2016. As of March 31, 2016, the Company has accrued \$3,000 for this matter representing the expected payment owed on the calculation of the liability for the tax years ended 2016 and 2015. The Company records these expenses as transaction related costs in other operating expense, net.

14. Subsequent Events:

On May 4, 2016, the Company announced the closing of the merger of Eco Services Holdings LLC ("*Eco Services*"), the Company and certain of their respective affiliates pursuant to which the Company and Eco Services will reorganize under a newly formed holding company (the "*Combined Company*") in an equity-for-equity transaction. The Combined Company will retain the PQ Corporation name, and the merger creates a leading global producer of inorganic specialty materials and catalysts positioned to deliver exceptional service and sustainable and innovative products to its customers.

Concurrently with the closing of the merger between the Company and Eco Services, the Company has also refinanced its existing credit facilities by entering into a \$1,200,000 senior secured term loan (consisting of a \$900,000 senior secured term loan and a \$300,000 Euro equivalent senior secured term loan), \$625,000 in new senior secured notes, \$525,000 in senior unsecured notes, and a \$200,000 asset-based secured revolving credit facility. The existing \$200,000 of Eco Services notes will remain outstanding.

The Company has evaluated subsequent events from the balance sheet date through May 11, 2016, the date at which the financial statements were available to be issued, and determined there are no additional items to disclose.

Report of Independent Auditors

To the Management Committee of Zeolyst International:

We have audited the accompanying financial statements of Zeolyst International (the "Partnership), which comprise the balance sheets as of December 31, 2016 and 2015, and the related statements of operations and accumulated earnings, changes in partners' capital, and cash flows for the three years in the period ended December 31, 2016.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on the financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the Partnership's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Partnership's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Zeolyst International at December 31, 2016 and 2015, and the results of its operations and its cash flows for the three years in the period ended December 31, 2016 in accordance with accounting principles generally accepted in the United States of America.

Emphasis of Matter

As discussed in Note 13 to the financial statements, the Partnership has significant related party transactions. Our opinion is not modified with respect to this matter.

/s/ PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
March 21, 2017

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ZEOLYST INTERNATIONAL
BALANCE SHEETS
(in thousands)

	December 31, 2016	December 31, 2015
ASSETS		
Cash	\$ 3,580	\$ 3,507
Trade receivables, net:		
Receivables from third parties	31,836	32,682
Receivables from affiliates	46,891	34,932
Non-trade receivables from affiliates	7,250	1,329
Inventories	98,186	83,460
Other current assets	1,328	1,547
Total current assets	189,071	157,457
Property, plant and equipment, net	132,645	120,748
Other long-term assets	4,108	4,323
Total assets	<u>\$ 325,824</u>	<u>\$ 282,528</u>
LIABILITIES		
Line of credit	\$ —	\$ 15,000
Trade accounts payable	8,585	8,903
Accounts payable to affiliates	14,005	8,855
Other current liabilities	8,668	12,337
Total current liabilities	31,258	45,095
Other long-term liabilities	1,400	2,129
Total liabilities	32,658	47,224
Commitments and contingencies (note 12)		
PARTNERS' CAPITAL		
Contributed capital	54,930	54,930
Accumulated earnings	238,236	180,374
Net partners' capital	293,166	235,304
Total liabilities and partners' capital	<u>\$ 325,824</u>	<u>\$ 282,528</u>

See accompanying notes to financial statements.

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ZEOLYST INTERNATIONAL
STATEMENTS OF OPERATIONS AND ACCUMULATED EARNINGS
(in thousands)

	Year ended December 31,		
	2016	2015	2014
Net sales	\$ 168,875	\$ 170,649	\$ 147,318
Related party sales	93,655	148,986	66,150
Total net sales	262,530	319,635	213,468
Cost of goods sold	63,591	97,995	47,068
Related party cost of goods sold	78,316	89,389	72,375
Total cost of goods sold	141,907	187,384	119,443
Gross profit	120,623	132,251	94,025
Selling, general and administrative expenses	3,069	4,510	2,781
Related party SG&A	34,018	31,475	29,142
Operating income	83,536	96,266	62,102
Interest expense, net	169	281	360
Other expense, net	505	2,553	526
Net income	82,862	93,432	61,216
Accumulated earnings at beginning of year	180,374	146,942	151,726
Dividends paid	(25,000)	(60,000)	(66,000)
Accumulated earnings at end of year	<u>\$ 238,236</u>	<u>\$ 180,374</u>	<u>\$ 146,942</u>

See accompanying notes to financial statements.

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ZEOLYST INTERNATIONAL
STATEMENTS OF CHANGES IN PARTNERS' CAPITAL
(in thousands)

	Contributed capital	Accumulated earnings	Net partners' capital
PQ Corporation:			
Balance, December 31, 2013	\$ 27,465	\$ 75,863	\$ 103,328
Dividends paid		(33,000)	(33,000)
Net income		30,608	30,608
Balance, December 31, 2014	\$ 27,465	\$ 73,471	\$ 100,936
Dividends paid		(30,000)	(30,000)
Net income		46,716	46,716
Balance, December 31, 2015	\$ 27,465	\$ 90,187	\$ 117,652
Dividends paid		(12,500)	(12,500)
Net income		41,431	41,431
Balance, December 31, 2016	\$ 27,465	\$ 119,118	\$ 146,583
CRI Zeolites, Inc.:			
Balance, December 31, 2013	\$ 27,465	\$ 75,863	\$ 103,328
Dividends paid		(33,000)	(33,000)
Net income		30,608	30,608
Balance, December 31, 2014	\$ 27,465	\$ 73,471	\$ 100,936
Dividends paid		(30,000)	(30,000)
Net income		46,716	46,716
Balance, December 31, 2015	\$ 27,465	\$ 90,187	\$ 117,652
Dividends paid		(12,500)	(12,500)
Net income		41,431	41,431
Balance, December 31, 2016	\$ 27,465	\$ 119,118	\$ 146,583
Total partners' capital at December 31, 2013	\$ 54,930	\$ 151,726	\$ 206,656
Total partners' capital at December 31, 2014	\$ 54,930	\$ 146,942	\$ 201,872
Total partners' capital at December 31, 2015	\$ 54,930	\$ 180,374	\$ 235,304
Total partners' capital at December 31, 2016	\$ 54,930	\$ 238,236	\$ 293,166

See accompanying notes to financial statements.

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ZEOLYST INTERNATIONAL
STATEMENTS OF CASH FLOWS
(in thousands)

	Year ended December 31,		
	2016	2015	2014
Cash flows from operating activities:			
Net income	\$ 82,862	\$ 93,432	\$ 61,216
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and Amortization	13,066	10,294	9,626
Loss on Sale or Disposal of Capital Assets	26	—	21
Net change in returns allowance	(445)	17	(977)
Net change in inventory reserve	—	9	(341)
Working capital changes that provided (used) cash:			
Receivables, including affiliates	(16,589)	(26,372)	36,659
Inventories	(14,726)	16,384	(21,403)
Other current assets	219	(243)	49
Accounts payable, including affiliates	4,263	(4,095)	569
Other current liabilities	(3,669)	4,025	(12)
Other long-term liabilities	(952)	522	210
Other long-term assets	—	—	—
Net cash provided by operating activities	<u>\$ 64,055</u>	<u>\$ 93,973</u>	<u>\$ 85,617</u>
Cash flows from investing activities:			
Purchases of property, plant and equipment	(23,982)	(18,619)	(28,450)
Investment, at cost	—	(3,000)	—
Net cash used for investing activities	<u>(23,982)</u>	<u>(21,619)</u>	<u>(28,450)</u>
Cash flows from financing activities:			
Proceeds from line of credit	31,142	78,000	73,000
Payments on line of credit	(46,142)	(87,000)	(64,195)
Payments of cash dividends	(25,000)	(60,000)	(66,000)
Net cash used for financing activities	<u>(40,000)</u>	<u>(69,000)</u>	<u>(57,195)</u>
Net change in cash	73	3,354	(28)
Cash at beginning of period	3,507	153	181
Cash at end of period	<u>\$ 3,580</u>	<u>\$ 3,507</u>	<u>\$ 153</u>
Non-cash investing activity:			
Capital expenditures acquired on account but unpaid	3,173	2,604	1,717

See accompanying notes to financial statements.

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

1. Organization:

Zeolyst International, a General Partnership (“Partnership”) was formed in 1988 pursuant to a Joint Venture Agreement (“the Agreement”) between PQ Corporation (“PQ”) and CRI Zeolites (“CRI”), a Royal Dutch Shell affiliate (collectively, the “Partners”). The percentage interests as of December 31, 2016 and 2015 are as follows:

PQ	50%
CRI	50%

The Partnership was formed pursuant to the Kansas Uniform Partnership Act. The Agreement specifies that the partners share equally in capital contributions. The Agreement states that the profits and losses of the Partnership will be allocated in accordance with the partners’ interests in the Partnership. The intent of the Partnership is to develop, manufacture, and sell zeolites and zeolite-containing catalysts.

The Partnership has significant transactions with its partners and related affiliates. Refer to the Related Party Transactions footnote for further disclosure.

2. Partnership Business:

The Partnership manufactures zeolites and zeolytic catalysts that are used by refiners to capture impurities in the processing of petroleum and other chemicals. The filtration ability of zeolites placed into a customer’s chemical process generally extends two to three years. As a result, a significant portion of the Partnership’s customer base tends to change on an annual basis. A significant percentage of the base materials purchased for the Partnership’s manufacturing process is acquired from related parties. In addition, a significant portion of the Partnership’s sales is transacted through Criterion Catalyst Company (“Criterion”) which is a subsidiary of CRI. The Partnership compensates Criterion with a 2% sales commission on specific sales transactions.

3. Summary of Significant Accounting Policies:

These financial statements have been prepared in accordance with generally accepted accounting principles. These financial statements are accounted for on a historical cost basis and do not reflect the results of any purchase accounting adjustments recorded in the Partner’s consolidated financial statements.

Cash and Cash Equivalents. Cash and cash equivalents include investments with original terms to maturity of 90 days or less from the time of purchase.

Trade Accounts Receivables and Allowance for Doubtful Accounts: Trade accounts receivables are recorded at the invoiced amount and do not bear interest. The Partnership maintains allowances for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. Allowances for doubtful accounts are based on historical experience and known factors regarding specific customers. If the financial condition of the Partnership’s customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances would be required. Account balances are charged off against the allowance when it is probable the receivable will not be recovered.

Inventories: Inventories are stated at the lower of cost or market, valued on the first-in, first-out (“FIFO”) method. The Partnership establishes reserves for slow-moving and obsolete inventory.

Property, Plant and Equipment: Property, plant, and equipment are carried at cost and include expenditures for new facilities and major renewals and betterments. Interest is capitalized on capital projects as applicable.

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

Maintenance, repairs and minor renewals are charged to expense as incurred. When assets are sold or otherwise disposed of, the related cost and accumulated depreciation are removed from the accounts, and any resulting gain or loss is included in the results of operations.

Depreciation is generally provided on the straight-line method based on estimated useful lives of the assets, ranging up to 33 years for buildings and improvements, 10 years for machinery and equipment.

We perform an impairment review of Property Plant and Equipment and other long-lived assets when events and circumstances indicate that those assets may be impaired by comparing the carrying amount of the assets to their fair value. Fair value is determined using quoted market prices where available, or other techniques including discounted cash flows. The Partnership's estimates of future cash flows involve assumptions concerning future operating performance, economic conditions, and technological changes that may affect the future useful lives of the assets.

Other Long-term Assets: Other long-term assets primarily include investments, at cost and spare parts. On October 30, 2015, the Partnership made a \$3,000 strategic investment in a technology developer and licensor of materials-based solutions for catalytic and separations processes. The investment is accounted for under the cost method of accounting.

Revenue Recognition: The Partnership recognizes revenue when both title and risk of loss of the product have been transferred to the customer (generally upon shipment), the seller's price to the buyer is fixed or determinable, collectability is reasonably assured, and persuasive evidence of an arrangement exists. Customers take title and assume all the risks of ownership upon shipment (if terms are "FOB shipping point") or upon delivery (if terms are "FOB destination"). Any deviation from the standard terms and arrangements are reviewed for the proper accounting treatment, and revenue recognition is revised accordingly.

Prior to shipment, product specifications are verified with the customer through product samples. Specific performance reserves based on customer contracts are recorded in the other long-term liabilities account at the time of shipment. Estimates are calculated based on the performance of the catalyst over a specified run length.

We defer revenue recognition on certain of our product lines until all essential elements of the sales order have shipped and both title and risk of loss has passed to the customer. Hydrocracking and specialty catalyst orders are typically filled by a number of individual shipments, and those shipments may span the end of a fiscal quarter or year. If a portion of the order has not shipped and it is essential to the functionality of the customer's end use, all revenue associated with that order will be deferred until the order is completed. A shipment is considered essential if each individual shipment has no value to the customer on a stand-alone basis and if the remaining shipment is not considered inconsequential and perfunctory.

The Partnership reserves 2% of the Hydrocracking sales due to a clause in the contract that allows customers to return up to 5% of the unused products they purchase within 90 days, and based on historical experience. The total sales returns reserve as of December 31, 2016 and 2015 amounted to \$650 and \$1,095 respectively.

Shipping and Handling Costs: The Partnership classifies costs related to shipping and handling of products shipped to customers as cost of goods sold.

Research and Development: Research and development costs of \$16,033, \$13,994 and \$12,895 for the years ended December 31, 2016, 2015 and 2014, respectively, were expensed as incurred and reported in selling, general and administrative expenses in the accompanying statement of operations.

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

Foreign Exchange Transactions: The functional currency of the Partnership is the U.S. Dollar. The Partnership enters into transactions that are denominated in other currencies. Gains and losses on foreign currency transactions are included in other (income) / expense, net on the statement of operations. Foreign exchange loss of \$264 and \$2,353 and gains of \$326 were recognized for the years ended December 31, 2016, 2015 and 2014, respectively.

Fair Value Measurements: The Partnership's financial assets and liabilities are reflected in the financial statements at fair value. Fair value is defined as the price at which an asset could be exchanged in a current transaction between willing market participants. A liability's fair value is defined as the amount that would be paid to transfer the liability to a market participant, not the amount that would be paid to settle the liability with a creditor. The Partnership's cash balances approximate fair value due to their short-term maturity.

Use of Estimates: The preparation of the Partnership's financial statements in conformity with generally accepted accounting principles requires management to make estimates that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates.

4. Recently Issued Accounting Standards:

In August 2016, the FASB issued guidance which clarifies the classification of certain cash receipts and cash payments in the statement of cash flows, including debt prepayment or extinguishment costs and distributions from certain equity method investees. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The new guidance is effective for nonpublic entities for fiscal years beginning after December 15, 2018 and interim periods within fiscal years beginning after December 15, 2019. Early adoption is permitted, and the new guidance should be applied retrospectively to each period presented. The Partnership is evaluating the impact that the new guidance will have on its consolidated financial statements.

In February 2016, the FASB issued guidance that amends the accounting for leases. Under the new guidance, a lessee will recognize assets and liabilities for most leases (including those classified under existing GAAP as operating leases, which based on current standards are not reflected on the balance sheet), but will recognize expenses similar to current lease accounting. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those years. The guidance is effective for nonpublic entities for fiscal years beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020. Early adoption is permitted. The new guidance must be adopted using a modified retrospective transition, and provides for certain practical expedients. The Partnership is currently evaluating the impact that the new guidance will have on its consolidated financial statements.

In July 2015, the FASB issued new guidance that changes the measurement principle for inventory from the lower of cost or market to the lower of cost or net realizable value. The amendments in this guidance do not apply to inventory that is measured using LIFO or the retail inventory method; rather, the amendments apply to all other inventory, which includes inventory that is measured using FIFO or average cost. Within the scope of this new guidance, an entity should measure inventory at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal and transportation, which is consistent with existing GAAP. The new guidance is effective for the Partnership as of January 1, 2017 for the year ending December 31, 2017, and for interim periods within the fiscal year beginning January 1, 2018. The Partnership does not expect this guidance to have a significant impact on its consolidated financial statements.

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

In August 2014, the FASB issued guidance regarding management's responsibility to evaluate whether there is substantial doubt about an entity's ability to continue as a going concern within one year of the issuance of the financial statements. If substantial doubt exists, additional disclosures are required. This guidance was effective for the Partnership starting with the year ended December 31, 2016, and is effective for annual and interim periods thereafter. The adoption of the guidance did not have an impact on the Partnership's disclosures in the notes to its consolidated financial statements.

In May 2014, the FASB issued accounting guidance (with subsequent targeted amendments) that will significantly enhance comparability of revenue recognition practices across entities, industries, jurisdictions and capital markets. The core principle of the guidance is that revenue recognized from a transaction or event that arises from a contract with a customer should reflect the consideration to which an entity expects to be entitled in exchange for goods or services provided. To achieve that core principle, the new guidance sets forth a five-step revenue recognition model that will need to be applied consistently to all contracts with customers, except those that are within the scope of other topics in the Accounting Standards Codification ("ASC"). Also required are enhanced disclosures to help users of financial statements better understand the nature, amount, timing and uncertainty of revenues and cash flows from contracts with customers. The enhanced disclosures include qualitative and quantitative information about contracts with customers, significant judgments made in applying the revenue guidance, and assets recognized related to the costs to obtain or fulfill a contract. For public companies, the new requirements are effective for annual reporting periods beginning after December 15, 2017, including interim periods within those years. These new requirements for nonpublic entities become effective for annual reporting periods beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. A nonpublic entity may elect early application, but no earlier than the annual reporting period beginning after December 15, 2016, the early application date for public entities. The Partnership is assessing the impact of these new requirements on its consolidated financial statements.

5. Accounts Receivable and Allowance for Doubtful Accounts:

The components of accounts receivable are as follows:

	December 31, 2016	December 31, 2015
Trade accounts receivable	\$ 79,377	\$ 68,709
Allowance	(650)	(1,095)
	<u>\$ 78,727</u>	<u>\$ 67,614</u>

6. Inventories:

Inventories were classified and valued as follows:

	December 31, 2016	December 31, 2015
Finished products and work in process	\$ 91,608	\$ 78,565
Raw materials and containers	6,578	4,895
	<u>\$ 98,186</u>	<u>\$ 83,460</u>

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

7. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	December 31, 2016	December 31, 2015
Land and buildings	\$ 35,298	\$ 27,211
Machinery and equipment	161,185	132,386
Construction in progress	33,356	46,005
	229,839	205,602
Less: accumulated depreciation	(97,194)	(84,854)
	<u>\$ 132,645</u>	<u>\$ 120,748</u>

Depreciation expense was \$12,628, \$9,406 and \$9,113 for the years ended December 31, 2016, 2015, and 2014, respectively. Disposal of assets reduced PP&E and Accumulated Depreciation by \$314, \$749, and \$85, respectively with a \$26, \$0, and \$21 reduction to earnings for the years ended December 31, 2016, 2015, and 2014, respectively.

8. Other Current Liabilities:

A summary of other current liabilities is as follows:

	December 31, 2016	December 31, 2015
Accrued royalties and license fees	\$ 5,305	\$ 2,283
Accrued commissions	863	4,024
Accrued rebates	950	4,036
Accrued other	1,550	1,994
	<u>8,668</u>	<u>12,337</u>

9. Revolver:

On March 30, 2011, the Partnership entered into a five-year revolving line of credit facility of \$60,000, which carries an initial interest rate of LIBOR + 25 basis points. The agreement expires on March 30, 2016. The interest rate on the facility is LIBOR as adjusted per the agreement plus an interest margin ranging from .25% to .75% per annum based on the Partnership's debt to EBITDA ratio. A commitment fee is paid to the bank for this agreement. For the years ended December 31, 2015 availability under this agreement was \$45,000.

The revolving credit agreement contains certain restrictions and covenants that require the Partnership to maintain a minimum partners' equity, as defined, of \$60,000 plus 10% of net income, an interest coverage ratio, as defined, at or above 3.00, and a total leverage ratio, as defined, at a maximum of 3.00, on a quarterly basis. The Partnership was in compliance with all covenants during 2015.

On March 2, 2016, the Partnership entered into a five-year revolving line of credit facility of \$60,000, which carries an initial interest rate of LIBOR. The agreement expires on March 1, 2021. The interest rate on the facility is LIBOR plus an interest margin ranging from .75% to 1.00% per annum based on the Partnership's debt to EBITDA ratio. A commitment fee is paid to the bank for this agreement. For the year ended December 31, 2016 availability under this agreement was \$60,000.

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

The revolving credit agreement contains certain restrictions and covenants that require the Partnership to maintain a minimum partners' equity, as defined, of \$100,000 plus 10% of net income, and a minimum EBITDA of \$40,000 on a last twelve month basis measured quarterly. The Partnership was in compliance with all covenants during 2016.

Cash payments for interest were approximately \$180, \$275 and \$338 for the years ended December 31, 2016, 2015 and 2014, respectively.

The fair value of a financial instrument is the amount at which the instrument could be exchanged in a current transaction. The carrying amount of the revolving line of credit approximates fair value because it is a short-term liquidity tool to fund operations, which is drawn down and paid back with cash generated from operations.

10. Partners' Contributions:

In accordance with the Agreement, in the event that cash flow from operations is insufficient to meet the Partnership's requirements, following a majority vote by the Management Committee of the Partnership to request capital from the partners, the partners will provide additional capital to enable the Partnership to meet its obligations. No such contributions were made during the years ended December 31, 2016, 2015, or 2014 as the Partnership had the ability to finance operations through cash flow from operations and borrowings under the Partnership's revolving line of credit facility.

11. Income Taxes:

As a partnership, Zeolyst International is not liable for the payment of taxes on income in the U.S. Net income and losses are allocated to the respective partners on an annual basis, and it is the partners' responsibility to pay income taxes, if any, thereon according to their respective tax positions.

12. Commitments and Contingent Liabilities:

In 1998, the Partnership entered into a ten year tolling agreement ("the Tolling Agreement") with CRI Belgium, a related party, for the manufacture of specialty extruded products. Effective January 2004, the 1998 Tolling Agreement was replaced by a new evergreen ten-year tolling agreement with CRI Belgium. Both parties can terminate this agreement without cause with twenty-four months' notice. The Partnership pays CRI Belgium a daily charge rate based on the actual days of production. This charge is included in cost of goods sold and totaled \$18,330, \$29,877 and \$19,103 for the years ended December 31, 2016, 2015 and 2014, respectively. In addition, for certain capital expenditures, that are beneficial to the Partnership, the parties will mutually agree on future adjustments to the daily charge rates or propose an alternative method of the Partnership's contribution to those costs.

During 2007, the Partnership entered into a License Agreement with a third party to obtain exclusive licensing rights to use the technology in the manufacturing, using and selling of Powder catalyst and Shaped catalyst. The consideration for the licensing rights includes (1) a down payment of \$3,200 payable in six annual installments to acquire the product license, and (2) royalty payments at a rate of 10% of the Powder and Shaped Net Sale price during the royalty period. The \$3,200 is payable as follows: \$500 was paid at the date of the agreement, \$500 at first, second, and third anniversaries of the agreement, and \$600 at the fourth and fifth anniversary of the agreement. The product license intangible is being amortized over the life of the agreement on a straight-line basis, which is estimated to be 15 years. Amortization expense of \$213 was recognized in 2016,

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

2015 and 2014. The royalty period of 10 years began in 2013, immediately after the date on which the Partnership had cumulatively produced the first 250 metric tons of Powder and Shaped catalyst. If at the end of the Royalty Period, the cumulative of running royalties actually paid by the Partnership is less than \$3,000, the Partnership will be obligated to pay the difference between the \$3,000 and the actual cumulative running royalty amount. As of December 31, 2016 and 2015 there were \$1,982 and \$1,681 respectively, liabilities recorded related to this agreement.

During 2013 the Partnership entered into a Sublicense Agreement with a third party to obtain patent and know-how licensing rights to make, use, import, and sell the Licensed Process and Products in the Licensed field. The consideration for the licensing rights includes a payment of \$1,500 payable in three installments. The \$1,500 is payable as follows: \$500 will be paid at the date of the first successful sale of commercialized product, or 36 months from execution of the license agreement, \$500 after sale of 0.5 million pounds of product, or 48 months from execution of the license agreement, and \$500 after sale of 1.0 million pounds of product, or 60 months from execution of the license agreement. In October 2016, the agreement was amended to extend payment terms. The payment of \$1,500 is payable as follows: \$500 will be paid at the date of the first successful sale of commercialized product, or 69 months from execution of the license agreement, \$500 after sale of 0.5 million pounds of product, or 81 months from execution of the license agreement, and \$500 after sale of 1.0 million pounds of product, or 93 months from execution of the license agreement. The product license intangible will be amortized prospectively with this change in estimated life. Amortization expense of \$225, and \$675 was recognized in the years ending December 31, 2016, and 2015 respectively.

13. Related Party Transactions:

Policies and Procedures

The Partnership maintains certain policies and procedures for the review, approval, and ratification of related party transactions to ensure that all transactions with selected parties are fair and reasonable. All significant relationships and transactions are separately identified by management if they meet the definition of a related party or a related party transaction. Related party transactions include transactions that occurred during the year, in which the Partnership was or will be a participant and which any related person had or will have a direct or indirect material interest. Due to the nature of the Partnership, material related party transactions are identified on a transaction-based approach. The types of transactions identified and reviewed include, but are not limited to, sales of products, purchases of inventory, tolling costs, sales and marketing costs, research and development, and management-related fees. All related party transactions are reviewed, approved and documented by the appropriate level of the Partnership's management in accordance with these policies and procedures.

PQ

Under the terms of the Agreement, the Partnership leases certain land used in its Kansas City production facilities from PQ. This lease, which has been recorded as an operating lease, provided for rental payments of \$280, \$265, and \$250 for the years ended December 31, 2016, 2015 and 2014, respectively. The rent expense is included in the cost of goods sold line item in the accompanying statement of operations. The terms of this lease are evergreen as long as the Partnership agreement is in place. The Partnership recognized sales to PQ of \$1,191, \$0, and \$0 in the years ended December 31, 2016, 2015, and 2014 respectively. The Partnership purchases certain of its raw materials from PQ and is charged for various manufacturing costs incurred at the PQ Kansas City production facility. The amount of these costs charged to the Partnership during the years ended December 31, 2016, 2015 and 2014 were \$15,514, \$14,021 and \$14,284, respectively. These costs are a component of production costs and are included in the cost of goods sold line item in the accompanying

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

statement of operations when the inventory is sold. Certain administrative, marketing, engineering, management-related, and research and development services are provided to the Partnership by PQ. During the years ended December 31, 2016, 2015 and 2014, the Partnership was charged \$12,325, \$12,551 and \$10,164, respectively, for these services. These amounts are included in the selling, general and administrative line item in the accompanying statement of operations. In addition, certain product demonstration costs of \$2,169, \$1,598 and \$1,832 during the years ended December 31, 2016, 2015 and 2014, respectively, were recorded in the COGS line of the accompanying statement of operations.

At December 31, 2016 and 2015, the accounts payable to affiliates consisted of \$2,472 and \$2,462 due to PQ. Included in trade accounts receivable at December 31, 2016 and 2015 was \$840 and \$0, respectively due from PQ.

On December 18, 2013, PQ and ZI, entered into a real estate tax abatement agreement with the Unified Government of Wyandotte County and Kansas City, Kansas that will utilize an Industrial Revenue Bond financing structure to achieve a 75% real estate tax abatement on the value of the improvements that will be constructed during the expansion of PQ's and ZI's facilities at the jointly-operated Kansas City, Kansas plant. In accordance with ASC 210-20-45, the financing obligation and the industrial bond receivable have been presented on a net basis.

CRI and Royal Dutch Shell Affiliates

Royal Dutch Shell affiliates include CRI Zeolites, Criterion, Shell Development Company, Shell Research and Technology Center—Amsterdam, CRI Center Marketing Asia Pacific, Shell International Oil Products, CRI Belgium and CRI Technology Services. As described in footnote 2, a significant portion of the Partnership's sales are transacted through Criterion. During the years ended December 31, 2016, 2015 and 2014 the Partnership recognized sales transacted through Criterion of \$92,463, \$148,986 and \$66,150, respectively. The Partnership purchases certain of its raw materials and is charged for tolling, customer distribution and packaging costs incurred by Criterion. The amount of these costs charged to the Partnership during the years ended December 31, 2016, 2015 and 2014 were \$22,364, \$44,793 and \$25,482, respectively. These costs are a component of production costs and are included in the cost of goods sold line item in the accompanying statement of operations when the inventory is sold. Certain engineering, management-related, broker-related, and research and development services are provided to the Partnership by CRI and Royal Dutch Shell affiliates. During the years ended December 31, 2016, 2015 and 2014, the Partnership was charged \$21,694, \$18,923 and \$18,978, respectively, for these services. These amounts are included in the selling, general and administrative line item in the accompanying statement of operations.

At December 31, 2016 and 2015, the accounts payable to affiliates balance consisted of \$11,533 and \$6,593, respectively, due to CRI and Shell affiliates. Included in trade accounts receivable at December 31, 2016 and 2015 was \$46,051 and \$34,932, respectively, of receivables related to sales transacted through Criterion, as described above.

Zeolyst C.V.

Zeolyst C.V. is a limited partnership formed in 1993 pursuant to a joint venture agreement between PQ Zeolites B.V. and CRI Zeolites for the purpose of the production of Zeolite powders. The Partnership entered into an agreement with Zeolyst C.V. to purchase Zeolite powders manufactured by Zeolyst C.V. Under the terms of the agreement, products manufactured by Zeolyst C.V. are supplied solely to the Partnership. The Partnership has performed a qualitative and quantitative analysis and concluded that for Zeolyst C.V. for which it holds a

ZEOLYST INTERNATIONAL
NOTES TO FINANCIAL STATEMENTS
(in thousands)

variable interest but will not absorb a majority of the expected losses or residual returns, the Partnership is not the primary beneficiary and therefore, this VIE was not consolidated in the Partnership's Consolidated Financial Statements. The Partnership has no unfunded commitments or guarantees as a result of its involvement with Zeolyst C.V. The total carrying value of assets and liabilities for Zeolyst C.V was \$89,924 and \$12,323, as of December 31, 2016 and was \$85,705 and \$6,828 as of December 31, 2015, respectively. The Partnership currently does not have any exposure to any losses by Zeolyst C.V. The Partnership has purchased \$37,989, \$28,711 and \$30,527 through the sales agreement during the years ended December 31, 2016, 2015 and 2014, respectively. These costs are a component of production costs and are included in the cost of goods sold line item in the accompanying statement of operations when the inventory is sold.

At December 31, 2016 and 2015, the accounts receivable from affiliates balance consisted of \$7,250 and \$1,329, respectively, due from Zeolyst C.V.

14. Subsequent Events:

The Partnership has evaluated subsequent events from the balance sheet date through March 21, 2017 and determined there are no further items to disclose.

Shares

PQ GROUP HOLDINGS INC.

Common Stock



*Morgan Stanley
J.P. Morgan*

*Jefferies
Evercore ISI*

*Goldman Sachs & Co. LLC
Deutsche Bank Securities*

*Citigroup
Nomura*

*Credit Suisse
KeyBanc Capital Markets*

Through and including _____, 2017 (the 25th day after the date of this prospectus), all dealers effecting transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to a dealer's obligation to deliver a prospectus when acting as an underwriter and with respect to an unsold allotment or subscription.

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PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth the estimated expenses payable by us in connection with the sale and distribution of the securities registered hereby, other than underwriting discounts or commissions. All amounts are estimates except for the SEC registration fee and the Financial Industry Regulatory Authority filing fee.

SEC Registration fee	\$11,590
FINRA filing fee	\$15,500
Stock exchange listing fee	*
Printing and engraving expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Transfer agent and registrar fees	*
Miscellaneous fees and expenses	*
Total	*

* To be completed by amendment.

Item 14. Indemnification of Directors and Officers.

Section 145 of the General Corporation Law of the State of Delaware provides as follows:

A corporation shall have the power to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of the corporation) by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with such action, suit or proceeding if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe the person's conduct was unlawful. The termination of any action, suit or proceeding by judgment, order, settlement, conviction or upon a plea of nolo contendere or its equivalent, shall not, of itself, create a presumption that the person did not act in good faith and in a manner which the person reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had reasonable cause to believe that the person's conduct was unlawful.

A corporation shall have the power to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action or suit by or in the right of the corporation to procure a judgment in its favor by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against expenses (including attorneys' fees) actually and reasonably incurred by the person in connection with the defense or settlement of such action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation and except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or the court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper.

As permitted by the Delaware General Corporation Law, we have included in our certificate of incorporation a provision to eliminate the personal liability of our directors for monetary damages for breach of

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their fiduciary duties as directors, subject to certain exceptions. In addition, our certificate of incorporation and bylaws provide that we are required to indemnify our officers and directors under certain circumstances, including those circumstances in which indemnification would otherwise be discretionary, and we are required to advance expenses to our officers and directors as incurred in connection with proceedings against them for which they may be indemnified.

We intend to enter into indemnification agreements with our directors and officers. These agreements will provide broader indemnity rights than those provided under the Delaware General Corporation Law and our certificate of incorporation. The indemnification agreements are not intended to deny or otherwise limit third-party or derivative suits against us or our directors or officers, but to the extent a director or officer were entitled to indemnity or contribution under the indemnification agreement, the financial burden of a third-party suit would be borne by us, and we would not benefit from derivative recoveries against the director or officer. Such recoveries would accrue to our benefit but would be offset by our obligations to the director or officer under the indemnification agreement.

The underwriting agreement provides that the underwriters are obligated, under certain circumstances, to indemnify our directors, officers and controlling persons against certain liabilities, including liabilities under the Securities Act. Reference is made to the form of underwriting agreement filed as Exhibit 1.1 hereto.

We maintain directors' and officers' liability insurance for the benefit of our directors and officers.

Item 15. Recent Sales of Unregistered Securities

Equity Securities

In connection with the Business Combination, on May 4, 2016 we issued (i) an aggregate of 430,107 shares of our Class A common stock in exchange for equity securities of PQ Holdings, (ii) an aggregate of 5,128,585 shares of our Class B common stock in exchange for equity securities of PQ Holdings, (iii) an aggregate of 1,513,683 shares of our Class B common stock in exchange for equity units of Eco Services Group Holdings LLC, (iv) an aggregate of 197,144 shares of our restricted Class A common stock subject to vesting conditions in exchange for restricted equity securities of PQ Holdings, (v) an aggregate of 46,936 shares of our restricted Class B common stock subject to vesting conditions in exchange for restricted equity securities of PQ Holdings, (vi) options to purchase an aggregate of 40,806 shares of our Class A common stock at a weighted average exercise price of \$70.94 per share in exchange for outstanding options to purchase equity securities of PQ Holdings, and (vii) options to purchase an aggregate of 156,139 shares of our Class A common stock at a weighted average exercise price of \$70.94 per share in exchange for Class A units of Eco Services Group Holdings LLC.

From May 4, 2016 through December 31, 2016, we issued (i) an aggregate of 34,431 shares of our Class B common stock for aggregate consideration of \$5,012,849, (ii) options to purchase an aggregate of 61,049 shares of our Class A common stock at a weighted average exercise price of \$71.01 per share under the PQ Group Holdings Inc. Stock Incentive Plan, (iii) an aggregate of 15,862 shares of our restricted Class B common stock subject to vesting conditions under the PQ Group Holdings Inc. Stock Incentive Plan and (iv) an aggregate of 1,935 shares of our Class B common stock under the PQ Group Holdings Inc. Stock Incentive Plan.

During the six months ended June 30, 2017, we issued (i) an aggregate of 406 shares of our restricted Class B common stock subject to vesting conditions under the PQ Group Holdings Inc. Stock Incentive Plan and (ii) options to purchase an aggregate of 49,435 shares of our Class A common stock at a weighted average exercise price of \$79.25 per share under the PQ Group Holdings Inc. Stock Incentive Plan.

The issuances of the securities in the transactions described above were issued without registration in reliance on the exemptions afforded by Section 4(a)(2) of the Securities Act and Rules 506 and 701 promulgated thereunder.

The foregoing share numbers do not reflect the Reclassification.

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Debt Securities

In connection with the Business Combination, on May 4, 2016, PQ Corporation issued \$625.0 million aggregate principal amount of 6.75% Senior Secured Notes at a price of 99% of their face value resulting in approximately \$618.8 million of aggregate gross proceeds. The initial purchasers for the 6.75% Senior Secured Notes were Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC, Morgan Stanley & Co. LLC, J.P. Morgan Securities LLC, Jefferies LLC, Goldman Sachs & Co. LLC, Deutsche Bank Securities Inc. and KeyBanc Capital Markets Inc. The aggregate amount of the initial purchasers' discount on the 6.75% Senior Secured Notes was approximately \$6.3 million. The 6.75% Senior Secured Notes were offered and sold to the initial purchasers in reliance on the exemption afforded by Section 4(a)(2) of the Securities Act and Rule 506 promulgated thereunder and were offered and resold by the initial purchasers to qualified institutional buyers pursuant to Rule 144A under the Securities Act and to non-U.S. investors outside the United States in compliance with Regulation S of the Securities Act.

Also in connection with the Business Combination, on May 4, 2016, PQ Corporation issued \$525.0 million aggregate principal amount of Floating Rate Senior Unsecured Notes at a price of 98% of their face value resulting in approximately \$514.5 million of aggregate gross proceeds. The Floating Rate Senior Unsecured Notes were issued in a private placement to accredited investors in reliance on the exemption afforded by Section 4(a)(2) of the Securities Act and Rule 506 promulgated thereunder.

The proceeds from the sale of the 6.75% Senior Secured Notes and the Floating Rate Senior Unsecured Notes were used, together with borrowings under PQ Corporation's senior secured credit facilities and cash on hand, to repay outstanding indebtedness and redeem outstanding notes.

Item 16. Exhibits and Financial Statement Schedules

(a) Exhibits

<u>Exhibit No.</u>	<u>Description</u>
1.1+	Form of Underwriting Agreement
3.1+	Form of Second Restated Certificate of Incorporation of PQ Group Holdings Inc.
3.2+	Form of Amended and Restated Bylaws of PQ Group Holdings Inc.
4.1+	Form of Specimen Stock Certificate of PQ Group Holdings Inc.
4.2*	Indenture, dated May 4, 2016, among PQ Corporation, the Guarantors from time to time party thereto and Wells Fargo Bank, National Association, as Trustee and Collateral Agent, including the form of Global Note attached as Exhibit A thereto
4.3*	Note Purchase Agreement, dated May 4, 2016, by and among PQ Corporation, Wilmington Trust, National Association, as Noteholder Agent and each of the Purchasers listed on Schedule A thereto, including the form of Senior Note attached as Exhibit 1.1 thereto
4.4*	Indenture, dated as of October 24, 2014, among Eco Services Operations LLC, Eco Finance Corp. and Wilmington Trust, National Association, as Trustee, including the form of Global Note attached as Exhibit A thereto
4.5*	First Supplemental Indenture, dated as of May 4, 2016, among PQ Corporation, the Guarantors named on the signature pages thereto and Wilmington Trust, National Association, as Trustee
5.1+	Opinion of Ropes & Gray LLP
10.1*	Term Loan Credit Agreement, dated as of May 4, 2016, by and among PQ Corporation, CPQ Midco I Corporation, the Lenders from time to time party thereto, and Credit Suisse AG, Cayman Islands Branch, as Administrative Agent and Collateral Agent, with Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC, JPMorgan Chase Bank, N.A., Morgan Stanley Senior Funding, Inc., Deutsche Bank Securities Inc., Goldman Sachs Lending Partners LLC, Jefferies Finance LLC and KeyBanc Capital Markets Inc., as Joint Lead Arrangers and Joint Bookrunners

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10.2*	First Amendment Agreement, dated as of November 14, 2016, to the Term Loan Credit Agreement dated as of May 4, 2016, among PQ Corporation, CPQ Midco I Corporation, the Guarantors named on the signature pages thereto, JPMorgan Chase Bank, N.A., as an Additional Term Lender, and Credit Suisse AG, Cayman Islands Branch, as Administrative Agent and Collateral Agent
10.3*	ABL Credit Agreement, dated as of May 4, 2016, by and among PQ Corporation, CPQ Midco I Corporation, the Canadian Borrowers from time to time party thereto, the European Borrowers from time to time party thereto, the Lenders from time to time party thereto and Citibank, N.A., as Administrative Agent and Collateral Agent, with Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC, JPMorgan Chase Bank, N.A., Morgan Stanley Senior Funding, Inc., Deutsche Bank Securities Inc., Goldman Sachs Lending Partners LLC, Jefferies Finance LLC and KeyBanc Capital Markets Inc., as Joint Lead Arrangers and Joint Bookrunners
10.4*	Lease Agreement, dated January 1, 2017, by and between The Realty Associates Fund X, L.P. and PQ Corporation
10.5+	Form of Amended and Restated Stockholders Agreement between PQ Group Holdings Inc. and certain stockholders of PQ Group Holdings Inc.
10.6*	PQ Group Holdings Inc. Stock Incentive Plan
10.7*	Form of Nonqualified Stock Option Award Agreement under the PQ Group Holdings Inc. Stock Incentive Plan
10.8*	Form of Restricted Stock Agreement under the PQ Group Holdings Inc. Stock Incentive Plan
10.9+	Form of Director and Officer Indemnification Agreement
10.10	Partnership Agreement, dated as of February 1, 1988, by and between PQ Corporation and Shell Polymers and Catalysts Enterprises Inc.
10.11	First Amendment to Partnership Agreement, dated January 1, 1993, by and among PQ Corporation, Shell Catalyst Ventures Inc. and CRI Zeolites Inc.
10.12	Second Amendment to Partnership Agreement, dated October 18, 2002, by and between PQ Corporation and Shell Catalyst Ventures Inc.
10.13	Third Amendment to Partnership Agreement, dated January 1, 2005, by and between PQ Corporation and CRI Zeolites Inc.
10.14+	PQ Group Holdings Inc. 2017 Omnibus Incentive Plan
10.15+	Severance Agreement with James Gentilcore
10.16+	Severance Agreement with Michael Crews
10.17+	Severance Agreement with Scott Randolph
10.18+	Severance Agreement with Paul Ferrall
10.19	Second Amendment Agreement, dated August 7, 2017, to the Term Loan Credit Agreement dated as of May 4, 2016 (as amended by the First Amendment Agreement dated as of November 14, 2016), among PQ Corporation, CPQ Medco I Corporation, the Guarantors named on the signature pages thereto, Citibank, N.A., as an Additional Term Lender, and Credit Suisse AG, Cayman Islands Branch, as Administrative Agent and Collateral Agent
16.1	Letter from Deloitte & Touche LLP dated August 14, 2017
21.1*	Subsidiaries of PQ Group Holdings Inc.
23.1	Consent of PricewaterhouseCoopers LLP related to the financial statements of PQ Group Holdings Inc. as of December 31, 2016 and 2015 and for the years then ended.

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23.2	Consent of Deloitte & Touche LLP related to the financial statements of Eco Services Operations LLC (accounting predecessor to PQ Group Holdings Inc.) for the period from inception (July 30, 2014) to December 31, 2014 (Successor Period), and of Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 through November 30, 2014 (Predecessor Period)
23.3	Consent of PricewaterhouseCoopers LLP related to the financial statements of PQ Holdings Inc. as of December 31, 2015 and 2014 and for each of the three years in the period ended December 31, 2015
23.4	Consent of PricewaterhouseCoopers LLP related to the financial statements of Zeolyst International as of December 31, 2016 and 2015 and for each of the three years in the period ended December 31, 2016
23.5+	Consent of Ropes & Gray LLP (included in Exhibit 5.1)
24.1*	Powers of Attorney
24.2*	Powers of Attorney for Martin S. Craighead and Kimberly Ross

+ To be filed by amendment.

* Previously filed.

(b) Financial Statement Schedules

All schedules are omitted because they are not applicable or the required information is included in the financial statements or notes thereto.

Item 17. Undertakings

The undersigned registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

The undersigned Registrant hereby undertakes: (1) That for purposes of determining any liability under the Securities Act of 1933, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the Registrant pursuant to Rule 424(b) (1) or (4) or 497(h) under the Securities Act of 1933 shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) That for the purpose of determining any liability under the Securities Act of 1933, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

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SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Malvern, Commonwealth of Pennsylvania, on the 14th day of August, 2017.

PQ GROUP HOLDINGS INC.

By: /s/ James F. Gentilcore
Name: James F. Gentilcore
Title: Chief Executive Officer, President and Director

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities and on the dates indicated:

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ James F. Gentilcore</u> James F. Gentilcore	Chief Executive Officer, President and Director (Principal Executive Officer)	August 14, 2017
<u>*</u> Michael Crews	Executive Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	August 14, 2017
<u>*</u> Michael Boyce	Chairman of the Board of Directors	August 14, 2017
<u>*</u> Greg Brenneman	Director	August 14, 2017
<u>*</u> Timothy Walsh	Director	August 14, 2017
<u>*</u> Chris Behrens	Director	August 14, 2017
<u>*</u> Mark McFadden	Director	August 14, 2017
<u>*</u> Robert Toth	Director	August 14, 2017
<u>*</u> Robert Coxon	Director	August 14, 2017
<u>*</u> Andrew Currie	Director	August 14, 2017

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<u>Signature</u>	<u>Title</u>	<u>Date</u>
* _____ Jonny Ginns	Director	August 14, 2017
* _____ Kyle Vann	Director	August 14, 2017
* _____ Martin S. Craighead	Director	August 14, 2017
* _____ Kimberly Ross	Director	August 14, 2017

*By: /s/ James F. Gentilcore
James F. Gentilcore
Attorney-in-fact

EXHIBIT INDEX

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4.3*	Note Purchase Agreement, dated May 4, 2016, by and among PQ Corporation, Wilmington Trust, National Association, as Noteholder Agent and each of the Purchasers listed on Schedule A thereto, including the form of Senior Note attached as Exhibit 1.1 thereto
4.4*	Indenture, dated as of October 24, 2014, among Eco Services Operations LLC, Eco Finance Corp. and Wilmington Trust, National Association, as Trustee, including the form of Global Note attached as Exhibit A thereto
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10.2*	First Amendment Agreement, dated as of November 14, 2016, to the Term Loan Credit Agreement dated as of May 4, 2016, among PQ Corporation, CPQ Midco I Corporation, the Guarantors named on the signature pages thereto, JPMorgan Chase Bank, N.A., as an Additional Term Lender, and Credit Suisse AG, Cayman Islands Branch, as Administrative Agent and Collateral Agent
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10.6*	PQ Group Holdings Inc. Stock Incentive Plan
10.7*	Form of Nonqualified Stock Option Award Agreement under the PQ Group Holdings Inc. Stock Incentive Plan
10.8*	Form of Restricted Stock Agreement under the PQ Group Holdings Inc. Stock Incentive Plan
10.9+	Form of Director and Officer Indemnification Agreement

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10.10	Partnership Agreement, dated as of February 1, 1988, by and between PQ Corporation and Shell Polymers and Catalysts Enterprises Inc.
10.11	First Amendment to Partnership Agreement, dated January 1, 1993, by and among PQ Corporation, Shell Catalyst Ventures Inc. and CRI Zeolites Inc.
10.12	Second Amendment to Partnership Agreement, dated October 18, 2002, by and between PQ Corporation and Shell Catalyst Ventures Inc.
10.13	Third Amendment to Partnership Agreement, dated January 1, 2005, by and between PQ Corporation and CRI Zeolites Inc.
10.14+	PQ Group Holdings Inc. 2017 Omnibus Incentive Plan
10.15+	Severance Agreement with James Gentilcore
10.16+	Severance Agreement with Michael Crews
10.17+	Severance Agreement with Scott Randolph
10.18+	Severance Agreement with Paul Ferrall
10.19	Second Amendment Agreement, dated August 7, 2017, to the Term Loan Credit Agreement dated as of May 4, 2016 (as amended by the First Amendment Agreement dated as of November 14, 2016), among PQ Corporation, CPQ Medco I Corporation, the Guarantors named on the signature pages thereto, Citibank, N.A., as an Additional Term Lender, and Credit Suisse AG, Cayman Islands Branch, as Administrative Agent and Collateral Agent
16.1	Letter from Deloitte & Touche LLP dated August 14, 2017
21.1*	Subsidiaries of PQ Group Holdings Inc.
23.1	Consent of PricewaterhouseCoopers LLP related to the financial statements of PQ Group Holdings Inc. as of December 31, 2016 and 2015 and for the years then ended.
23.2	Consent of Deloitte & Touche LLP related to the financial statements of Eco Services Operations LLC (accounting predecessor to PQ Group Holdings Inc.) for the period from inception (July 30, 2014) to December 31, 2014 (Successor Period), and of Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 through November 30, 2014 (Predecessor Period)
23.3	Consent of PricewaterhouseCoopers LLP related to the financial statements of PQ Holdings Inc. as of December 31, 2015 and 2014 and for each of the three years in the period ended December 31, 2015
23.4	Consent of PricewaterhouseCoopers LLP related to the financial statements of Zeolyst International as of December 31, 2016 and 2015 and for each of the three years in the period ended December 31, 2016
23.5+	Consent of Ropes & Gray LLP (included in Exhibit 5.1)
24.1*	Powers of Attorney
24.2*	Powers of Attorney for Martin S. Craighead and Kimberly Ross

+ To be filed by amendment.

* Previously filed.

PARTNERSHIP AGREEMENT

By and Between

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.

and

PQ CORPORATION

LIST OF EXHIBITS

<u>Designation</u>	<u>Title</u>
Exhibit 1	Plant Purchase Agreement
Exhibit 2	Land Lease
Exhibit 3	Bill of Sale
Exhibit 4	PQ Services Agreement
Exhibit 5	PQ Produced Materials Supply Agreement
Exhibit 6	Partnership Manufacturing Agreement
Exhibit 7	Shell Sales Agreement
Exhibit 8	PQ Sales Agreement
Exhibit 9	SPACE Services Agreement
Exhibit 10	PQ Technology License Agreement
Exhibit 11	SPACE Technology License Agreement
Exhibit 12	Research and Development Agreement
Exhibit 13	Confidential Disclosure Agreement
Exhibit 14	Shell Oil Company Services Agreement

PARTNERSHIP AGREEMENT

THIS AGREEMENT is entered into as of February 1, 1988, by and between Shell Polymers and Catalysts Enterprises Inc., a Delaware corporation ("SPACE"), and PQ Corporation, a Pennsylvania corporation ("PQ"). Each of SPACE and PQ is sometimes referred to herein as "Partner", and collectively they are sometimes referred to as "Partners."

WITNESSETH:

WHEREAS, PQ and SPACE have entered into a Letter of Intent dated July 22, 1987, for the development of a partnership for Zeolite and Zeolite-containing Catalyst development, production and marketing in certain areas; and

WHEREAS, PQ and SPACE desire to enter into an equally-owned partnership for the purpose of accomplishing the desired development, production and marketing of Zeolite and Zeolite-containing Catalyst in certain areas and for any other lawful purpose related thereto; and

WHEREAS, PQ and SPACE desire to enter into this Partnership Agreement for the conduct of the business of such partnership;

NOW THEREFORE, for and in consideration of the mutual covenants, and subject to the terms and conditions contained herein, between the parties to this Agreement, the Partners hereby form and create a general partnership (the "Partnership") under and pursuant to the Kansas Uniform Partnership Act, as amended or its successor, (K.S.A. 56-301 et seq.), for the purposes and upon the terms, provisions and conditions as hereinafter set forth:

Article I

Definitions

Unless indicated otherwise, the following terms used herein shall have the meanings set out below. References to Exhibits are to the Exhibits attached to and forming a part of this Agreement.

1.1 "SPACE" shall mean SHELL POLYMERS AND CATALYSTS ENTERPRISES INC., a Delaware Corporation, a wholly owned subsidiary of Shell Oil Company.

1.1.1 "Affiliate", with respect to SPACE shall mean Shell Oil Company or any company (including a corporation, partnership, joint venture or other association) other than SPACE, PARTNERSHIP and PARTNERSHIP Affiliates, which is now or subsequently becomes directly or indirectly affiliated with Shell.

For the purpose of this definition, a particular company is:

(a) directly affiliated with Shell if Shell holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and

(b) indirectly affiliated with Shell if a series of companies can be specified beginning with Shell and ending with the particular company, so related that each company of the series, except Shell, is directly affiliated with one or more companies in the series.

1.2 "PQ" shall mean PQ CORPORATION, Pennsylvania corporation.

1.2.1 “Affiliate”, with respect to PQ, shall mean any company (including a corporation, partnership, joint venture or other association) other than PQ, PARTNERSHIP and PARTNERSHIP Affiliates, which is now or subsequently becomes directly or indirectly affiliated with PQ.

For the purpose of this definition, a particular company is:

(a) directly affiliated with PQ if PQ holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and

(b) indirectly affiliated with PQ if a series of companies can be specified beginning with PQ and ending with the particular company, so related that each company of the series, except PQ, is directly affiliated with one or more companies in the series.

1.3 “Shell Oil Company” or “Shell” shall mean Shell Oil Company, a Delaware Corporation whose principal office is at 900 Louisiana Street, Houston, Texas 77002, including its divisions, Shell Chemical Company and Shell Development Company.

1.4 "Profited Cost" shall mean, for a product produced in a plant:

(a) all direct costs for raw materials, additives, utilities, packaging materials and other materials physically utilized for manufacture of that product;

(b) all direct costs for operations, laboratory, and maintenance labor and materials necessary to the manufacture of the product, quality assurance for the process and product, and the maintenance of the plant at levels consistent with long-term manufacture of the product at the quality level which meets customer requirements. These costs shall include, but not exceed, the cost of operating and maintaining the plant in a safe manner, and meeting all state and federal regulation for worker health and safety and environmental protection, and the cost of any additional processing of the Zeolite and/or the Zeolite-containing Catalyst by any third party;

(c) indirect costs of management, supervision, engineering and R&D support to manufacturing, and on-site management at levels which are agreed to annually by the Management Committee in accordance with the Services Agreement; and

(d) return on investment (ROI) for the fixed assets employed at the plant to produce a product. The method of calculation of the ROI is contained in Appendix A.

Costs which cannot be reasonably attributed to the production of the product in that plant will not be included in Profited Costs.

1.5 "Zeolite" shall mean zeolite(s) including precursors thereto but shall not include zeolite-containing catalysts or zeolites purposefully mixed with other material such as, for example, but not limited to alumina, silica and mullite, or zeolites having catalytically active metals or metal ions incorporated therein or thereon.

1.6 Zeolite-containing Catalysts shall mean catalysts which incorporate Zeolites as a component of their structure.

1.7 "Agreement Date" shall mean the date of execution of this Agreement, if signed by both parties on the same day, or the later of the dates of execution if signed by the parties on different dates.

1.8 "Capital Account" shall mean an account kept on the books of the Partnership. There shall be credited to the Capital Account of each Partner the cash contribution or the fair market value amount of contribution in kind (determined as hereinafter provided) of its capital contributions, and its share of profits of the partnership, and there shall be charged against each Partner's Capital Account the amount of all distributions made by the Partnership to such Partner and its share of any losses of the Partnership. The Capital Accounts of the Partners will be determined and maintained through the full term of the Partnership in accordance with the capital accounting rules of Treas. Reg. §1.704-1(b)(2)(iv), or any successor regulation. The Partner's Capital Account will further be adjusted in accordance with Treas. Reg. §1.704-1(b)(2)-(4)(g), or any successor regulation, for allocation to them of depreciation, depletion, amortization, and gain or loss as computed for book purposes, with respect to such property.

1.9 "Force Majeure" shall mean acts of God, wars, strikes, lockouts, or other industrial disturbances, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, civil disturbances, explosions, breakage or accident to machinery, pipelines or processing plant, government regulations, curtailment of or other inability to obtain equipment, supplies or materials, temporary failure of gas supply, and any other cause whether of the kind herein enumerated or otherwise not within the control of the party claiming suspension, all of which by the exercise of due diligence such party is unable to prevent; but provided, however, that the above requirement that any Force Majeure shall be remedied with the exercise of due diligence shall not require the settlement of strikes or lockouts by acceding to the demands of the opposing party when such course is inadvisable in the discretion of the party having the difficulty.

1.10 "Management Representative(s)" shall mean those individuals appointed by each Partner to make certain decisions as more fully described in Article IX hereof.

1.11 "Operator" shall mean PQ as an independent contractor, or such other independent contractor as may be appointed by the Partnership, in respect to its employment by the Partnership as overseer of the Zeolite/Catalyst Plant and supervisor of its production.

1.12 “Operator’s Personnel” shall mean the personnel who are employees of the Operator, and not employees of the Partnership.

1.13 “Ownership Percentage” shall mean with respect to each Partner, a fifty percent (50%) interest held in the Partnership.

1.14 “Management Committee” shall mean the committee provided for in Article IX.

1.15 “Partnership Interest” shall mean the complete interest, rights, privileges of a Partner, subject however to all duties, obligations, covenants, representations and liabilities provided for in this Agreement.

1.16 “Principal Office” of the Partnership shall be Valley Forge, Pennsylvania or as otherwise agreed to in writing by the Partners.

1.17 “Agreement” or “Partnership Agreement” shall mean this agreement including all exhibits and appendices attached hereto and all other agreements between the parties referenced herein and pertaining to the subject matter herein.

1.18 "Plant Purchase Agreement" shall mean that agreement between PQ and the Partnership whereby the Partnership purchases the Speciality Zeolite/Catalyst Plant located at PQ's Kansas City Plant location from PQ.

1.19 "Land Lease" shall mean that real estate lease under which PQ leases to the Partnership the land on which the Zeolite/Catalyst Plant sits.

1.20 "PQ Services Agreement" shall mean that agreement between PQ and the Partnership under which PQ operates and manages the day to day operations of the Zeolite/Catalyst Plant and provides services for a fee.

1.21 "PQ Produced Materials Supply Agreement" shall mean that agreement between PQ and the Partnership under which PQ sells to the Partnership products produced by PQ.

1.22 "Partnership Manufacturing Agreement" shall mean that agreement between PQ and the Partnership under which the Partnership agrees to produce specified products for PQ for a Profited Cost utilizing production capacity not being currently used for Partnership purposes. Raw materials will be supplied by PQ.

1.23 “Shell Sales Agreement” or “Shell Marketing Agreement” shall mean that agreement between Shell and the Partnership under which Shell agrees, for a fee, to market, or to have marketed, Zeolite-containing Catalysts produced by the Partnership.

1.24 “PQ Sales Agreement” or “PQ Marketing Agreement” shall mean that agreement between PQ and the Partnership under which PQ agrees, for a fee, to market Zeolites produced by the Partnership.

1.25 “SPACE Services Agreement” shall mean that agreement between SPACE and the Partnership under which SPACE, or an affiliate of SPACE, for a fee, will supply services to the Partnership.

1.26 “PQ Technology License Agreement” shall mean that agreement between PQ and the Partnership under which certain PQ technology and know-how is non-exclusively licensed to the Partnership for use by the Partnership.

1.27 “SPACE Technology License Agreement” shall mean that agreement between SPACE and the Partnership under which certain SPACE technology and know-how is non-exclusively licensed to the Partnership for use by the Partnership.

1.28 “Research and Development Agreement” or “Development Agreement” shall mean that agreement between PQ and Shell Oil Company under which the parties agree to cooperate in Zeolite and Zeolite-containing Catalyst research and development efforts in Designated Use Areas.

1.29 “Confidential Disclosure Agreement” shall mean that agreement between Shell Oil Company and PQ covering the terms and conditions under which the parties will exchange technical and commercial information in areas which are not Designated Use Areas.

1.30 “Shell Oil Company Services Agreement” shall mean that agreement between Shell Oil Company and the Partnership under which Shell Oil Company or an affiliate of Shell Oil Company, will provide, for a fee, services to the Partnership.

1.31 “Kansas City Plant” shall mean that series of manufacturing facilities owned and operated by PQ at Kansas City, Kansas, designed for the production of Zeolite, Zeolite-containing Catalysts, and other silica based products.

1.32 “Specialty Zeolite/Catalyst Plant” or “Zeolite/Catalyst Plant” shall mean that part of the Kansas City Plant which is to be sold to the Partnership by PQ in accordance with the Plant Purchase Agreement.

1.33 “Designated Use Area” or “DUA” shall mean an application area for any Zeolite or Zeolite-containing Catalyst which has been designated herein by the parties hereto, or is later designated by the Partners pursuant to Section 5.1 of this Agreement. DUA does not mean a specific zeolite or zeolite-containing catalyst, but encompasses the process which uses any zeolite or zeolite-containing catalyst in an application area.

1.34 “C5/C6 Isomerization DUA” shall mean a process in which the primary intent is the isomerization of normal C5 and C6 paraffins to branched C5 and C6 paraffins.

1.35 “Hydrocracking DUA” shall mean a process in which the primary intent is the hydroconversion of distillate feedstocks from crude oil (atmospheric or vacuum fractionation), or distillate feedstocks produced from crude oil fractions in other conversion processes, to liquid products with a significantly lower average molecular weight.

1.36 "Catalytic Dewaxing DUA" shall mean a process in which the primary intent is the improvement of low temperature flow properties of distillate fuels and lubricating oil stocks by the hydroconversion of high melting point hydrocarbons contained therein through means of molecularly shape-selective catalytic hydrocracking; a process which results in reduction of the molecular weight of the high melting point hydrocarbons and permits their separation from the stock by distillation.

1.37 "Distillate Deep Hydrogenation DUA" shall mean a process in which the primary intent is the reduction of the contents of aromatic hydrocarbons and/or functionalized aromatic compounds in a hydrocarbon stock to levels that permit its use in higher value applications, for which its original contents of these species would have made it unsuitable or less suitable. It is intended that the aromatics content reduction be achieved with minimal molecular weight reduction of the hydrocarbon stock.

1.38 "Scope of Business" as used herein shall consist of:

(a) the development, manufacture and marketing of Zeolites and/or Zeolite-containing Catalysts for use within the DUAs or within the areas of Accepted Business Opportunities, all within the United States, its possessions and Territories, except as otherwise agreed;

(b) the operation of the Zeolite/Catalyst Plant; and

(c) toll manufacturing.

1.39 “SPACE Zeolite-containing Catalyst Business” as used herein shall mean the current SPACE hydrocracking, C5/C6 isomerization, distillate deep hydrogenation and catalytic dewaxing zeolite catalyst business, with the exclusion of the current supply contract for catalytic dewaxing catalyst between Shell Oil Company and Engelhard.

1.40 “PQ Zeolite Business” as used herein shall mean all current PQ zeolite business which utilizes the Speciality Zeolite/Catalyst Plant for manufacture, excluding Proprietary Zeolites or Proprietary Zeolite-containing Catalysts.

1.41 “Accepted Business Opportunity” or “ABO” shall mean a business opportunity related to zeolites and/or zeolite-containing catalysts which has been agreed to by the Partners.

1.42 "Powder Plant" shall mean that portion of the PQ Kansas City Plant in which PQ currently produces Zeolite A and Zeolite NaY and converts NaY to Ammonia Y Zeolite. The Powder Plant will continue to be owned by PQ. It is anticipated that at times PQ may utilize the Powder Plant for the benefit of the Partnership to process Zeolites at a market price or, in the event that a market price cannot be readily established, at a Profited Cost.

1.43 "Proprietary Zeolites" or "Proprietary Zeolite-containing Catalysts" shall mean zeolites or zeolite-containing catalysts produced by PQ for a third party based on technical information received from the third party under confidentiality.

1.44 "Plant Investment" shall be defined as the total plant and equipment investment of the Partnership. At the date of formation of the Partnership this investment is nine million, nine hundred thousand dollars (\$9,900,000). This number will be increased by Partnership investments in additional plant and equipment including associated engineering and installation costs, and decreased as plant and equipment is retired, written-off, or otherwise removed from the assets of the Partnership. However, Plant Investment will not be reduced for depreciation taken on such assets or increased for interest costs of the Partnership after investments are deemed ready for service.

1.45 "Bill of Sale" shall mean the agreement between PQ and the Partnership which identifies the various assets being sold to the Partnership.

Article II

Organization

2.1 Name. The activities and business of the Partnership shall be conducted under the name "Zeolyst Enterprises" in Kansas City, Kansas, and subject to all applicable laws. The business of the Partnership may be conducted in any other state or any foreign jurisdiction under any other name or names deemed appropriate or necessary by the Partnership Committee.

2.2 Purpose. The purpose of the Partnership shall be to develop Zeolites and Zeolite-containing Catalysts for use in DUAs and ABOs; to cause the Zeolite/Catalyst Plant to be operated for manufacture of Zeolites and Zeolite-containing Catalysts; to sell Zeolites and Zeolite-containing Catalysts produced therein and elsewhere for use in DUAs and ABOs within the United States, its possessions and Territories; to execute, enter into and perform the agreements and documents referenced herein; and to engage in any lawful act necessary or incidental to and in furtherance of these purposes.

2.3 Effectiveness. This Agreement shall not become effective or binding upon the Partners until such time as the Exhibits, Agreements and undertakings described in Articles III, IV and VI shall be prepared and executed and/or consummated as the case may be.

2.4 Powers. In furtherance of the purpose set out in Article 2.2 hereof, the Partnership, shall:

- (a) Exercise all the powers and privileges granted by this Agreement and by any law, together with any powers incidental thereto;
- (b) Receive by contribution, purchase, lease or otherwise acquire, employ, use and otherwise deal in and with real or personal property, or any interest therein, wherever situated; and to sell, convey, lease, exchange, transfer or otherwise dispose of, or mortgage or pledge, all or any of its property and assets, or any interest therein, wherever situated;

(c) Retain an Operator for the Zeolite/Catalyst Plant and appoint or retain such managers, representatives and agents as deemed appropriate and pay or otherwise provide for them suitable compensation;

(d) Participate with others, to the extent permitted by law, (i) in any corporation, partnership, limited partnership, joint venture, or other organization of any kind, or (ii) in any transaction, undertaking or arrangement which the Partnership by itself would have the power to conduct, whether or not such participation involves sharing or delegation of control of such activity with or to others;

(e) Enter into all of the agreements referred to herein and attached as exhibits hereto and any other agreements, contracts or documents referenced herein or as may be added by amendment from time to time and to make other contracts, including contracts of guaranty and suretyship, incur liabilities, borrow money, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or other encumbrance of all or part of its property, franchises and income;

(f) Lend money for Partnership purposes, invest and reinvest its funds, open and maintain accounts with banks and other financial institutions and conduct financial business therewith and take, hold and deal with real and personal property as security for the payment of funds so loaned or invested;

(g) Sue and be sued in all courts and judicial, administrative, arbitral or other proceedings, in its Partnership name; and

(h) Establish and maintain a risk management program for (i) all assets and properties of the Partnership, (ii) all potential legal liabilities arising out of Partnership activities, and (iii) any other possible exposures of the Partnership.

2.5 Partners' Meetings. Unless waived by the mutual written consent of both Partners, the Partners shall meet as provided in this Section.

(a) Meetings shall be held annually in the first calendar quarter and on such other dates that may be deemed by either Partner to be necessary or appropriate.

(b) Either Partner may request a meeting by giving notice to the other Partner specifying a date, time, and place at least seven (7) days in advance of the date of the meeting, provided that if the Partner receiving notice objects to the date, time or place, the Partners shall agree within fourteen (14) days of the notice of objection to meet within thirty (30) days of the date of the originally scheduled meeting. Notice may be waived in writing or by attendance at any meeting. An agenda need not be provided with the notice.

(c) Meetings may be held by conference telephone and action may be taken by written consent signed by a duly authorized representative of each Partner.

(d) At their meetings the Partners shall, among other things, review the activities of the Partnership and the Management Committee, review the annual business plan described in Article 9.1(e) hereof, consider other matters referred to them by the Management Committee and perform any other acts and exercise any rights afforded by law.

2.6 Partnership Property. All real or personal property (tangible or intangible) of whatever type or description (including all improvements placed or located thereon) acquired by the Partnership shall be owned by the Partnership, such ownership being subject to the other terms and provisions of this Agreement.

2.7 Term. The Partnership shall be formed as of the latter of the Agreement Date or the effective date determined by Article 2.3 hereof, and shall continue until terminated pursuant to the terms and conditions of this Agreement or by law. A notice shall be provided to all parties of the date of the Partnership formation. Any reference herein or in any Exhibit hereto to the formation of the Partnership or the date of formation of the Partnership shall be deemed a reference to the latter of the Agreement Date or the effective date determined by Article 2.3 hereof. For accounting purposes the books of the Partnership shall be opened February 1, 1988, and all costs incurred thereafter which are for the benefit of the Partnership will be charged to the Partnership if consistent with this Agreement.

Article III

Partners' Contributions

3.1 Cash Contributions. Each Partner shall contribute cash to the Partnership in the following amounts:

(a) Each Partner shall make an initial cash contribution of \$3,000,000 within five business days of the formation of the Partnership. This initial cash contribution shall be paid in immediately available funds into a bank account of the Partnership designated by the Management Committee for such purpose. The Partnership intends to borrow \$4MM as a non-recourse loan, otherwise the Partners will provide the additional funding. The initial contributions by the Partners and the \$4MM loan are intended to be sufficient to purchase the Zeolite Catalyst Plant, and pay Partnership start-up expenses. In addition a line of credit up to \$2MM will be established to provide initial working capital.

(b) Upon notification from the Management Committee, each Partner shall make cash contributions in an amount equal to its Ownership Percentage multiplied by any amount required to enable the Partnership to meet any obligation(s) imposed by law which the Partnership is otherwise unable to meet from its own or borrowed funds.

(c) Upon notification from the Management Committee, each Partner shall make cash contributions in an amount equal to its Ownership Percentage multiplied by an amount required to enable the Partnership to meet any cash requirements other than those set forth in Article 3.1(a) and (b) hereof which the Partnership is otherwise unable to meet from its own or borrowed funds.

3.2 Cash Calls. It is intended and anticipated that after the initial start-up of the Partnership, the Partnership will generate sufficient funds to meet its obligations. However, notification from the Management Committee to the Partners of cash contributions under Article 3.1 (b) and (c) above shall set forth (a) the total amount of cash required from both Partners; (b) the amount of cash required from the Partner to whom the cash call is addressed, which amount shall be proportional to its Ownership Percentage or as otherwise provided herein; and (c) the due date of the cash call and the method and place of payments which shall be as specified by the terms of this Agreement or as specified by the Management Committee.

3.3 Failure to Make Contributions. If either Partner fails to make when due any of its contributions under Article 3.1, the noncontributing Partner and the other Partner shall be immediately given written notice of such fact by the Management Committee or any officer of the Partnership. Such other Partner shall have the right, but not the obligation,

to make such contribution on behalf of such noncontributing Partner. If such contribution is made by the other Partner, then its Capital Account shall be accordingly increased by the amount of the contribution. If such contribution is made from the funds of the Partnership or borrowed by the Partnership, then the noncontributing Partner's Capital Account shall be reduced by the amount of such contribution as appropriate. The noncontributing Partner shall pay interest in the amount of such contribution it fails to make from the original due date of the contribution until the date of payment to the Partnership or reimbursement to the other Partner, as the case may be. Such interest shall be paid (i) to the other Partner at a rate equal to the rate being charged by Chase Manhattan Bank, New York, New York, as announced publicly at the opening of business on such date for ninety (90) day loans to the best commercial credit risks plus five percent (5%) per annum (not to exceed the maximum rate permitted by law); and/or (ii) to the Partnership at a rate equal to the higher of the rate specified in clause (i) above or the rate actually charged to the Partnership if the Partnership borrowed the funds for such contribution from a commercial bank or lender. When such repayment or reimbursement is made, as the case may be, the Capital Accounts shall be adjusted accordingly as if the noncontributing partner had made the contribution when due. Until such

repayment or reimbursement is made in full, all distributions hereunder (including distributions upon dissolution) which the noncontributing Partner would otherwise be entitled to receive, shall be retained by the Partnership or paid directly to the other Partner, as the case may be, and credited against the amount of such repayment or reimbursement obligation until paid in full.

3.4 Services Not Contributions. Services, if any, rendered to the Partnership by either of the Partners, shall not constitute contributions to either of their Capital Accounts and, unless otherwise agreed in writing, shall not be reimbursable by the Partnership in any manner, provided, however, this provision shall not in any way affect the rights and obligations of the Partners or the Partnership under any other agreements to which any one or more of them is a party including the Services Agreement.

3.5 Noncash Contributions. Nothing in this Agreement shall preclude the Partnership from accepting from a Partner, in lieu of cash, any rights or other real, personal or intangible property at a value established by the Management Committee.

Article IV

Plant Facilities

4.1 Plant Purchase. The Partnership shall purchase from PQ the Zeolite/Catalyst Plant at Kansas City, Kansas for the sum of nine million, nine hundred thousand dollars (\$9,900,000) in substantial accordance with the terms and conditions contained in the Plant Purchase Agreement attached hereto as Exhibit 1. Such purchase shall include the assets set forth in the Bill of Sale attached hereto as Exhibit 3.

4.2 Land Lease. The Partnership shall lease from PQ all the land necessary upon which is situated the Specialty Zeolite/Catalyst Plant. Such land is situated at PQ's Kansas City Plant. The precise description of such leased land and the duration, terms and conditions of such lease are more particularly set forth in the Land Lease attached hereto as Exhibit 2 and incorporated by reference.

Article V

Partnership Zeolite Business

5.0 Partnership Business and Definitions. The business of the Partnership shall be the management and operation of the marketing and manufacturing activities necessary to exploit the potential of the DUAs and ABOs making up the Scope of Business. As provided in this Article V the Scope of Business may change with time but will initially include specifically the SPACE Zeolite-containing Catalyst Business and the PQ Zeolite Business. The Partnership may pursue all activities directly or indirectly, through joint ventures, partnerships or other associations, that the Management Committee deems are in the best interests of the Partnership and necessary to accomplish their established business objectives.

For the purposes of this Article V the following definitions shall apply:

(a) "Other SPACE Business Opportunities" shall include all opportunities for the manufacture and sale of zeolite-containing catalysts outside of "SPACE Zeolite-containing Catalyst Business", with the exclusion of the current supply contract for catalytic dewaxing catalyst between Shell Oil Company and Engelhard.

(b) "Other PQ Business Opportunities" shall include all opportunities for the manufacture and sale of zeolites with the exclusion of:

(1) PQ Zeolite Business

(2) zeolites for detergents unless hydrothermal stabilization is required for their manufacture

(3) zeolites which require atmospheric synthesis and which have anticipated annual sales by PQ in excess of 200,000 lb/yr, and for which hydrothermal stabilization would not be used in their manufacture by PQ or the Partnership.

(c) "zeolite" shall mean any synthetic molecular sieve, consisting of an infinitely extending, three-dimensional network of AlO_4 and SiO_4 tetrahedra linked by the sharing of oxygen atoms, including synthetic molecular sieves in which the Al and Si have been replaced with other atoms, including but not limited to Fe or Ga.

5.1 Designated Use Areas

(a) Initial Designation

The initial DUAs are to be C5/C6 Isomerization, Hydrocracking, Catalytic Dewaxing and Distillate Deep Hydrogenation (as defined in Paragraphs 1.34 through 1.37).

(b) Addition Designation Procedure

(i) Shell and PQ are expected to exchange Confidential Know-how under the Confidential Disclosure Agreement (Exhibit 13) for the purposes of developing and evaluating additional DUAs.

(ii) Addition of a DUA may be proposed by either General Manager or by any member of the Management Committee. In the event implementation of the DUA would fall within the authority level of the General Managers, they may approve the incorporation of the DUA, subject only to veto by the Management Committee. Approval of a DUA by either General Manager or the Management Committee shall not be unreasonably withheld.

(iii) In the event implementation of a DUA falls outside the authority level of the General Managers, the Management Committee approval will be requested at their next quarterly meeting, or any other properly called meeting.

(iv) Should the DUA be rejected by the Management Committee, either Partner will be free to proceed separately in the proposed area, provided however this does not authorize either Partner to violate the Confidential Disclosure Agreement (Exhibit 13).

(c) DUA Termination

In the event a DUA is no longer considered to be desirable by the Partners, that DUA may be terminated by a unanimous vote of the Management Committee. Continuing supply/purchase obligations and licensing requirements will be negotiated as part of the termination.

(d) DUA Notification

Upon approval or termination of a DUA, Partnership shall provide SPACE and PQ with written notification of such approval or termination which reference the technology licensing agreements and

the research agreement as appropriate. Upon receipt of such notification from Partnership, SPACE shall notify Shell of the approval of an additional DUA or the termination of an existing DUA and request that Shell amend the Research and Development Agreement (Exhibit 12) accordingly. The additional or terminated DUA will be automatically incorporated into or removed from, respectively, the Technology Licensing Agreements (Exhibits 10 and 11).

(e) DUA Uses

DUAs are used to define the Scope of Business. In addition, DUAs will be used by SPACE and PQ for business planning (allocation of resources, etc.), technology licensing purposes, and Zeolite/Catalyst Plant access priority determination.

5.2. “Accepted Business Opportunities”

(a) Offering to Partnership

(i) SPACE will offer to Partnership all “Other SPACE Business Opportunities.”

(ii) PQ shall offer to Partnership all “Other PQ Business Opportunities”.

(b) Procedures

(i) Shell and PQ will exchange Confidential Know-how under the Confidential Disclosure Agreement (Exhibit 13) for the purposes of developing and evaluating additional ABOs.

(ii) Other SPACE and/or PQ Business Opportunities offered to the Partnership shall be proposed or terminated, approved, and/or vetoed using the same procedures as for DUAs in Paragraph 5.1(b) and 5.1(c).

(c) ABO Notification

Upon approval or termination of an ABO, Partnership shall provide SPACE and PQ with written notification of such approval or termination which references the technology licensing agreements and

the research agreement as appropriate. The additional or terminated ABO will be automatically incorporated into or removed from, respectively, the Technology Licensing Agreements (Exhibit 10 and 11). If the Partners agree that an ABO should be incorporated into the Research and Development Agreement, SPACE shall, upon receipt of such notification from Partnership, notify Shell of the approval of an ABO and request that Shell amend the Research and Development Agreement (Exhibit 12).

(d) ABO Uses

ABOs are used to define the Scope of Business. In addition, ABOs will be used by SPACE and PQ for business planning (allocation of resources, etc.), technology licensing purposes, and Zeolite/Catalyst Plant access priority determination.

5.3 Zeolite/Catalyst Plant Access Priority. The parties envision four types of commercial transactions might be carried out by the Partnership. The access to the Zeolite/Catalyst Plant's capacity will be in the following priority order subject to the notice requirements contained in the PQ Services Agreement, the PQ Manufacturing Agreement and Management Committee directives.

(a) Zeolite-containing Catalyst for use in a DUA will have first priority for use of the Zeolite/Catalyst Plant. In the event that additional processing outside the Zeolite/Catalyst Plant is required to produce a Zeolite-containing Catalyst, the processor will be selected by mutual agreement of the General Managers subject only to veto by the Management Committee.

(b) In the event the Partnership can produce Zeolites and other Zeolite-containing products in excess of Partnership requirements for Zeolite-containing Catalyst within all the DUA's, the Partnership will produce and sell such Zeolite-containing products to third parties for use in the DUA's. If the Management Committee elects to produce and sell such products, their production will receive second priority.

(c) Proprietary Zeolite and Proprietary Zeolite-containing Catalyst production for PQ will have the next priority.

PQ will pay the Partnership a Profited Cost when producing these products in accordance with all the terms and conditions contained in the Partnership Manufacturing Agreement (Exhibit 6).

(d) In the event the Partnership can produce Zeolites and Zeolite-containing products for use in ABOs in excess of Partnership requirements under (a) and (b), and PQ requirements under (c), the Partnership will manufacture these products as the next priority for utilizing the Plant.

(e) In the event plant capacity exists in excess of that required for (a) through (d), the Management Committee may approve utilization of the plant for other purposes.

5.4 Partnership Product Marketing

(a) Zeolite-containing Catalysts will be marketed for the Partnership by Shell Oil Company or a Shell Oil Company Associate as defined in the Shell Sales Agreement (Exhibit 7).

(b) Zeolites and other Zeolite-containing products will be marketed for the Partnership by PQ under the PQ Sales Agreement (Exhibit 8).

(c) Zeolites and Zeolite-containing products produced by the Partnership for sale outside the DUA's or ABO's shall be marketed by the Partner or other party designated by the Management Committee, with preference given to the Partners.

5.5 Special Allocation of Income and Losses Between Partners.

(a) Both Partners will contribute equally to the Partnership Capital Account. However the end use and production technology contributions of the Partners through the technology licenses for Partnership products, discussed in 5.1 and 5.2, will have different proportional values. In recognition of these different values, SPACE and PQ will share in the Partnership annual cash income before tax (CIBT), as referenced by Article 8 of the PQ and SPACE Technology License Agreements, on the following basis:

(1) CIBT between 0 and 20% of Plant Investment will be divided on a 50/50 basis to each Partner.

(2) The first \$4,000,000 of CIBT above 20% of Plant Investment will be divided 70% to SPACE, 30% to PQ.

(3) All CIBT above the sum of (1) and (2) will be divided 65% to SPACE, 35% to PQ.

(4) Credit for depreciation of Partnership Assets shall be shared equally by the Partners, unless otherwise agreed.

(5) If the Partnership generates a net loss before taxes, such losses shall be charged equally to the Partners.

(b) Monthly Estimates of Profit/Loss. At the end of each calendar month, the Partnership shall calculate an estimate of the current year-to-date profit allocation and report such to each Partner by the end of the seventh (7th) working day of the following month.

5.6 PQ Produced Materials. The Partnership will purchase from PQ its zeolites and other materials produced by PQ. Such materials purchased from PQ by the Partnership shall be priced at market value, wherever such a value can be determined or reasonably inferred, with a Profited Cost adjustment (ROI component of Profited Cost = 20% of Plant Investment) when Market Value cannot be established. For example, NH₄Y value could be based on NaY market value adjusted for ion exchange in the Power Plant at a Profited Cost. All terms and conditions for such purchases shall be set out in the PQ Produced Material Supply Agreement (Exhibit 5). Such materials will include, but are not limited to sodium and ammonium Y zeolite. If the market price for similar quantity and quality is lower than the calculated Profited Cost, PQ may elect to sell produced materials at the market price, or if PQ does not so elect, the Partnership may purchase these materials from a third party at the market price.

5.7 The parties understand that SPACE Affiliates are not required to purchase for their own use any Partnership product from the Partnership unless they so contract otherwise.

5.8 Neither SPACE nor PQ will compete directly or indirectly with the Partnership without the express written approval of the Management Committee.

5.9 PQ and Shell Oil Company are expected to share technology in the DUA's and, when specified, ABO's under the Development Agreement (Exhibit 12), and potential DUA's and other business opportunities under the Confidential Disclosure Agreement (Exhibit 13).

A. Present Technology

(a) PQ is expected to disclose to Shell Oil Company and SPACE those aspects of its current Zeolite production and modification technology which could be utilized by the Partnership to produce and market improved Zeolites and Zeolite-containing Catalysts for the current Partnership businesses.

(b) Shell Oil Company is expected to disclose to PQ those aspects of current Zeolite and Zeolite-containing Catalyst manufacture and performance which could be utilized by the Partnership to enable the Partnership to produce and market improved Zeolites and Zeolite-containing Catalysts for the current Partnership businesses.

B. Future Technology and Development

(a) Technology developed by SPACE, or its Affiliates and available to SPACE, or PQ, independent of Partnership activity which has applicability to improve performance of the Partnership will be offered exclusively to the Partnership under a first right of refusal for use in the current Partnership businesses pursuant to the terms of confidentiality *in* the Confidential Disclosure Agreement (Exhibit 13) and this Agreement.

(b) Technology developed or funded by Partnership shall be offered to both parties hereto for use outside the current Partnership business opportunities in accordance with the Technology Licensing Agreements (Exhibits 10 and 11).

5.10 It is anticipated by the Partners that Shell Oil Company and PQ in response to DUA and, when specified, ABO market needs will use the information described in 5.9 above to attempt to develop improved Zeolites and Zeolite-containing Catalysts offering superior performance in accordance with the Development Agreement (Exhibit 12).

Article VI

Operation and Management

6.1 Operating License Agreements. The Partners shall license to the Partnership, upon Partnership formation, certain technology as follows:

(a) PQ will provide the Partnership with rights to all PQ technology sufficient for the Partnership to operate the Zeolite/Catalyst Plant and to produce Zeolites and Zeolite-containing Catalysts for the Partnership businesses and to market them in accordance with the terms and conditions of the PQ Technology License Agreement attached hereto as Exhibit 10.

(b) SPACE will provide the Partnership with rights to all SPACE technology sufficient for the Partnership to operate the Zeolite/Catalyst Plant and to produce and market Zeolites and Zeolite-containing Catalysts for the Partnership businesses in accordance with the terms and conditions of the SPACE Technology License Agreement attached hereto as Exhibit 11.

6.2 Operating Agreement. The Partnership shall retain and designate PQ in the capacity of an independent contractor, to operate and maintain the Zeolite/Catalyst Plant and where appropriate to carry out the operational purposes as stated in Article II above in accordance with the terms more particularly described in the PQ Services Agreement attached hereto as Exhibit 3.

6.3 Service and Utility Agreements.

(a) The Partnership shall enter into a SPACE Services Agreement with SPACE, in its capacity other than as a Partner, in the form attached hereto as Exhibit 9.

(b) The Partnership shall enter into the PQ Services Agreement with PQ, in its capacity other than as a Partner, in the form attached hereto as Exhibit 4.

(c) The Partnership shall enter into the Shell Services Agreement with Shell, in the form attached hereto as Exhibit 14.

(d) The Partnership may also enter into such other material processing, utility, supply, waste disposal, service or other agreements with its Partners or third parties as are necessary or desirable for the operation and/or management of the Zeolite/Catalyst Plant and the other purposes of the Partnership. The Management Committee may designate any of such agreements which it

believes would be more efficiently or economically entered into by the Operator for the benefit of the Partnership and so delegate to the Operator the right to enter into such agreements. All such agreements entered into by the Operator in behalf of the Partnership under the above described delegation shall be approved as to form and substance, by the Management Committee prior to execution.

6.4 PQ Produced Material Supply. The Partnership shall enter into the PQ Produced Materials Supply Agreement with PQ, a copy of which is attached hereto as Exhibit 5 for the supply of zeolites and other materials produced by PQ necessary to produce Zeolite-containing Catalysts.

6.5 Marketing Agreements.

(a) Shell Zeolite Catalyst Marketing Agreement. The Partnership shall contract with Shell, for Shell or a third party agreeable to the Management Committee, to market Zeolite-containing Catalysts produced by the Partnership, in accordance with the terms of the Shell Sales Agreement (Exhibit 7).

(b) The Partnership shall contract with PQ and PQ shall market, or contract with a third party agreed to by the Management Committee to market Zeolites produced by the Partnership in accordance with the terms of the PQ Sales Agreement attached hereto as Exhibit 8.

6.6 Partnership Manufacturing Agreement. The Partnership shall permit PQ to use the Zeolite/Catalyst Plant to manufacture Proprietary Zeolites and Proprietary Zeolite-containing Catalysts, and any other such zeolites or zeolite-containing products as shall be agreed by the management committee in accordance with the Partnership Manufacturing Agreement attached hereto as Exhibit 6. The Zeolite/Catalyst Plant is to be used for the production of Zeolites for PQ only at such times as the Management Committee shall agree, which consent shall not be unreasonably withheld.

6.7 Fees Paid to a Partner. If a Partner (or its Affiliate) is retained or contracts with the Partnership to perform a service or other function for the Partnership at a fee or charge related to such Partner's cost in performing such service or function, the compensation and benefits to such Partner's personnel participating in performing such service or function shall not be greater than the compensation and benefits normally paid by such Partner for such services or functions performed by employees with the same or similar experience of those performing such service or function for the Partnership.

6.8 Miscellaneous. Unless there is an agreement otherwise the Parties intend that services to the Partnership by the Partners or their Affiliates, if any, will be provided at cost. The Partnership may contract for services from third parties when such can be justified by lower costs or when the Partners or their Affiliates are unwilling or unable to provide such services. The use of any service is a decision of the Partnership.

Article VII

Representations and Warranties

7.1 General Representations and Warranties. Each of SPACE and PQ represents and warrants to the other that:

- (a) It has the necessary authority, to make and perform this Agreement and has duly approved and authorized the delivering and performing of this Agreement.
- (b) It shall execute and deliver, or cause to be executed and delivered, all instruments and documents necessary or desirable to effectuate the purposes and intent of this Agreement.

(c) It assures the other that, by this Agreement and performance hereunder, all of the ownership interests to be conveyed by the terms of this Agreement shall be effectively conveyed.

(d) It assures the other that there are no known material encumbrances, burdens, debts, liabilities, claims, damages, causes of action or contingencies of any type or nature appurtenant to or associated with the technology or the ownership interests in the technology to be conveyed by the terms of this Agreement or arising in connection with any action or activity prior to the Agreement Date, that could cause material liability for the other party hereto, except as disclosed in Exhibit 7.1.

7.2 Limitation of Warranties. Except as otherwise provided herein, or otherwise agreed, SPACE and PQ, respectively, make no warranties to the other of any kind covering likelihood of successful completion, accuracy of cost estimates or schedules, ability of their respective technology to perform satisfactorily in its intended use or the fitness thereof for any intended purpose.

7.3 General Partnership Intended. SPACE and PQ each acknowledge that the partnership interests in the Partnership are meant and intended to be general partnership interests with the rights of management and control thereof under applicable law, and SPACE and PQ are each acquiring such partnership interests to evidence ownership and management of the Partnership. SPACE and PQ shall not take any action with respect to ownership or disposition of such partnership interests except in accordance with all applicable statutes, rules and regulations.

Article VIII

Confidentiality Obligations

8.1 Technical Information. Notwithstanding any provision hereof to the contrary, neither the existence of this Agreement nor the provisions hereof shall be construed or abrogate either Partner from its obligations of confidentiality and nonuse with respect to Confidential Technical Information as provided in the various license agreements and the Confidentiality Agreements between the Partners and the Partnership. Further, all rights to technical information, inventions and patents under or with respect to this Partnership shall be considered for all purposes as being developed under the various research agreements between the Partners and their Affiliates and the Partnership and shall be subject to the provisions thereof.

8.2 Business Information. Except for such data and information as the Management Committee may designate in writing as being non-confidential, all information relating to the business activities contemplated herein received by any Partner or its Affiliate from another Partner or its Affiliate shall be treated in a confidential manner which shall require the recipient of such information to treat it with the same degree of confidentiality it affords its own information of a similar type. Subject to the preceding sentence, should such information become public information or otherwise generally available to the public through no act or fault of the recipient, the recipient shall neither confirm nor deny the source or authenticity of such information. The obligations of this Article 8.2 shall be binding upon the recipient of such business information for a period of ten years after receipt of such information and this obligation shall survive any termination or assignment of this Agreement.

Article IX

Management Committee

9.1 Responsibilities and Authority. Each Partner shall have an equal voice in the management of the Partnership and shall act (except where provided herein to the contrary) through the Management Committee. The Management Committee shall establish general policies and procedures for the Partnership and shall direct and make provision for the implementation of those policies and procedures in the conduct of the day-to-day operations of the Partnership's business. In furtherance and not by way of limitation with respect to the foregoing, except as provided in Article 9.2 (a), the Management Committee shall perform the following specific duties.

- (a) Subject to the provisions of Article 9.7, appoint and discharge officers of the Partnership.
- (b) Adopt, and may revise from time to time in whole or in part, appropriate delegations of authority for officers, agents, and any other representatives.
- (c) Review the performance of the officers of the Partnership.

(d) Adopt, and may revise from time to time in whole or in part, and shall monitor compliance with (i) guidelines under which funds of the Partnership may be committed, (ii) resolutions dealing with banking matters and (iii) any other necessary financial business of the Partnership.

(e) Adopt and review and revise, from time to time, but at least annually, a business plan, which may include objectives, strategies, programs, operating and capital budgets and shall provide the framework for the management of the business and affairs of the Partnership and the implementation of this Agreement and make provision for the implementation of said business plan. For annual planning purposes, such plan shall also include forecasts of technical support activities and technical manpower requirements to be provided by each Partner as well as services to be provided by each Partner.

(f) Make distributions, subject to the provisions of Article XIII hereof.

(g) Exercise all rights, privileges, and options, if and to the extent provided, under insurance policies purchased and maintained by the Partnership pursuant to Article 21.1; and have the authority to settle or compromise any claim against the Partnership not covered by insurance.

(h) Except as provided herein to the contrary, the Management Committee shall have the authority to bind the Partnership in the conduct of the Partnership's business and affairs.

(i) Review all legal actions against the Partnership, retain counsel and otherwise arrange for the defense thereof and approve settlement of any such actions by payment not in excess of \$25,000 by the Partnership.

(j) Establish one or more committees, for such purposes and with such duties as the Management Committee shall designate and appoint the members of each such committee from among the members of the Management Committee and/or the officers of the Partnership and/or such other persons whose services on such committee shall be considered to be beneficial to the Partnership; provided that if any members of the Management Committee shall be appointed to such a committee they shall be appointed in equal numbers from the members of the Management appointed by each Partner.

(k) File for all necessary governmental permits and approvals and commence and arrange for participation in any administrative proceeding, hearing or action appropriate to conduct of the usual business of the Partnership.

(l) Do, or cause to be done, any and all things and acts and execute, or cause to be executed, any and all documents, contracts, evidences of indebtedness, security agreements, financing statement or other instruments, or purchase performance bonds, necessary or appropriate to the conduct of the usual business of the Partnership in the ordinary course and to effectuate fully the purpose of the Partnership as expressed in this Agreement.

(m) Resolve any disputes which may arise under any agreement executed between the Partnership and a Partner not acting in its capacity as a Partner.

9.2 Restrictions on Authority of Officers and Management Committee.

(a) Except as otherwise mutually agreed or as set forth in Article 9.1 and 9.11 hereof, neither the Management Committee nor any of the individual members of the Management Committee or officers of the Partnership, unless otherwise authorized in writing by the Partners, shall have authority in the name and on behalf of the Partnership to:

- (i) Do any act in contravention of this Agreement or execute any agreement between the Partnership and a Partner;
- (ii) Possess or use Partnership property or assign any right of the Partnership property for other than a Partnership purpose
- (iii) Make, execute, or deliver any general assignment for the benefit of creditors, or any bond, guaranty, indemnity bond or surety bond;
- (iv) Assign, transfer, pledge, compromise, or release any claim of the Partnership for amounts equal to or exceeding \$25,000, except for full payment, or arbitrate or consent to the arbitration of any of its disputes or controversies;

(v) Make, execute, or deliver any deed, long-term ground lease or contract to sell all or substantially all of the Partnership property or to sell or dispose of any assets of the Partnership which have an original book value in excess of \$250,000 other than as provided in Articles IV, V and VI hereof;

(vi) Confess a judgment;

(vii) Make, execute, or deliver on behalf of the Partnership any mortgage, deed of trust, or accommodation paper or accommodation endorsement other than as provided in Article V hereof;

(viii) Delete, waive or otherwise amend or change this Agreement;

(ix) Approve or authorize any capital project or expenditure in excess of \$300,000 in the case of the Management Committee or \$75,000 in the case of the officers;

(x) Commence any legal action or lawsuit for damages or equitable relief; or

(xi) Create any personal liability for any Partner other than that personal liability to which any Partner may have previously agreed to in writing.

(b) Neither Partner shall represent or act for or purport to represent or act for or otherwise bind the Partnership, its affairs, business or assets, without the prior written approval of the other Partner except to the extent authorized by the provisions of this Agreement, any agreement between the Partners or any agreements between the Partnership and any one of the Partners.

9.3 Standard of Care. Each member of the Management Committee shall act in the same manner as would a reasonable business person in similar circumstances using sound business judgment.

9.4 Membership. The Management Committee shall initially be composed of six (6) members with three (3) members being designated by each Partner. The composition of the Management Committee may be increased at any time by the mutual agreement of the Partners. Each Partner shall designate one of its members on the Management Committee as its Management Representative. The Partners shall notify each other of their designees, which may be changed at any time. The initial members of the Management Committee shall be designated on the Agreement Date.

9.5 Voting Procedures. Each Partner shall have one vote which shall be cast by its designated Management Representative or in his absence by his designee. The Management Committee shall act only on the basis of unanimous vote of both Partner's Management Representative and/or designees. In the event that the Management Committee, after a meeting duly called and convened, is unable to reach a consensus on a matter (including, but not limited to, matters arising under Article 9.1 (m) hereof) within thirty (30) days, the Secretary of the Management Committee shall notify the Partners, and the Partners shall meet and resolve the matter within fourteen (14) days of the date notice is given.

9.6 Quorum. The quorum for Management Committee meetings shall be two (2) members, with each Partner being represented by not less than (1) member appointed by it. In the event there is no quorum for two (2) consecutive meetings, the Partners shall meet within thirty (30) days.

9.7 Officers. Except as otherwise mutually agreed by the Partners:

(a) The Management Committee shall appoint two General Managers of the Partnership, one from each Partner. For the duration of the first full calendar year of the Partnership, PQ shall designate the Chairman of the Management Committee who will preside at all meetings of the Management Committee. This responsibility shall alternate between SPACE and PQ each succeeding calendar year.

The Partner not designating the Chairman shall designate the Vice Chairman of the Management Committee who in the absence of the Chairman shall act as Chairman of the Management Committee.

(b) Upon the formation of the Partnership the areas of primary responsibility for the two General Managers shall be as set out below. The Management Committee may expand or change such responsibilities as it deems necessary. In all other respects, the two General Managers shall be deemed to have equal and coextensive authority. They shall confer on all items of major importance and business planning.

(1) The General Manager designated by PQ shall have the primary responsibility for all plant operations and Zeolite technology and marketing of Zeolites.

(2) The General Manager designated by SPACE shall have the primary responsibility for all Zeolite-containing Catalyst technology and marketing.

(c) The Secretary of the Partnership who shall also be Secretary to the Management Committee shall be appointed by the Management Committee from such persons recommended by SPACE. The Secretary shall attend to the giving of notice of all meetings of the Management Committee, shall keep minutes of all proceedings at meetings of the Management Committee and all meetings of committees thereof. In the absence of the Secretary, such person as shall be designated by the Chairman shall perform his duties.

(d) The Treasurer/Comptroller shall be appointed by the Management Committee from such persons recommended by PQ. The Treasurer/Comptroller shall be the principal accounting officer of the Partnership, be in charge of the accounting books and records of the Partnership, have the care and custody of all the funds of the Partnership and be Chairman of the accounting committee created under Article 9.1(j) hereof. However, at any time either Partner may undertake an audit in accordance with Section 11.7 hereof.

(e) The Management Committee may appoint such other officers as it may from time to time deem advisable. All officers of the Partnership must be employees of a Partner or a wholly owned subsidiary of a Partner. Subject to the restrictions set forth in this Article 9.7, a person may hold more than one office except no one person may hold the office of Secretary if he also holds the office of Chairman or Vice Chairman acting as Chairman of the Management Committee.

(f) Except as provided herein to the contrary all officers appointed by the Management Committee shall hold office at the pleasure of the Management Committee and may be removed at any time either with or without cause, by the Management Committee.

9.8 Meetings.

(a) The Management Committee shall have an initial meeting on the formation date of the Partnership and shall meet thereafter at least once each calendar quarter. The quarterly meetings shall be called by the Chairman or by at least two members and may be at the Kansas City Plant, the respective offices of the Partners or any other mutually acceptable location. Other meetings may be called by the Chairman or by all of the members appointed by one of the Partners and may be held at the Kansas City Plant, the respective offices of the Partners or any other mutually acceptable location. The Secretary shall give written notice of any meetings by letter, telex, cable or telegram to each member at least seven (7) days in advance of the date of the meeting.

(b) Any member may waive notice of any meeting of the Management Committee by written waiver filed with the Secretary either before or after the meeting, and attendance at any meeting shall constitute waiver of notice.

(c) Any member may participate in Management Committee meeting by means of conference telephone, television transmitted image with audio or other similar communications equipment by means of which all persons participating in the meeting can hear each other, and any member so participating shall be deemed to be present at the meeting in person.

(d) The minutes of all Management Committee meetings shall be approved by the Chairman and Vice-Chairman and placed in an official minute book.

9.9 Action Without Meeting. Any action to be taken by the Management Committee may, subject to the restrictions on the Management Committee's powers contained in Section 9.2, be taken without a meeting if a consent in writing (or separate counterparts thereof), setting forth the action so taken, and the date it shall be effective, shall be signed by both Management Representatives and such consent shall have the same force and effect as an action duly taken by the Management Committee at a meeting. Any such signed consent(s) shall be placed in the official minute book.

9.10 Expenses. Members of the Management Committee and officers of the Partnership shall receive no remuneration from the Partnership in connection with their duties on the Management Committee or as officers of the Partnership, as the case may be, nor shall the Partnership reimburse any expenses of members of the Management Committee or officers of the Partnership incurred in connection with their respective duties on the Partnership Committee or as officers of the Partnership.

9.11 Execution of Partnership Agreements. Notwithstanding any provision hereof to the contrary, all agreements entered into by the Partnership shall be upon prior authorization of the Management Committee and shall be executed on behalf of the Partnership by a General Manager, or other duly authorized representative, except,

(a) Any agreement to be entered into between the Partnership and a Partner or a Partner's Affiliate shall be executed on behalf of the Partnership by the General Manager or other duly authorized representative of the Partner not a party to the Agreement;

(b) Any agreement between the Partnership and a public utility is authorized and may be executed by a General Manager of the Partnership or such other officers or representative so designated by the Management Committee; and

(c) Any agreement between the Partnership and any third party other than a public utility is authorized and may be executed by a General Manager of the Partnership or such other officer or representative designated by the Management Committee provided such agreement is for a duration of one year or less and involves payments of one party to the other of \$50,000 or less.

9.12 Audits under Agreements with a Partner. Notwithstanding any provision hereof to the contrary, with respect to all agreements between the Partnership and a Partner, the General Manager of the Partner not a party to such an agreement shall have the authority acting alone to cause the Partnership to exercise any and all rights the Partnership might have with respect to audits or financial review under such an agreement and to act on behalf of the Partnership with respect thereto.

9.13 Administration of Agreements with a Partner. Notwithstanding any provision hereof to the contrary, with respect to all agreements between the Partnership and a Partner, the Partner not a party to such an agreement shall select the person responsible for the administration of such agreement by the Partnership provided such person shall be reasonably acceptable to the other Partner.

Article X

Ownership Percentage

10.1 Ownership Percentage. The Partners shall each have fifty percent (50%) ownership in the Partnership.

Article XI

Fiscal Matters

11.1 Fiscal Year. The fiscal year of the Partnership shall be the calendar year. The Partnership's first fiscal year shall end December 31, 1988.

11.2 Location of Books of Account. The books of account for the Partnership shall be kept and maintained by the Partnership in Valley Forge, Pennsylvania. PQ will be responsible for the maintenance of the Partnership accounting. PQ shall be responsible for maintaining the accounting records associated with the operating and maintenance of the Zeolite/Catalyst Plant.

11.3 Books and Records. The books of account shall be maintained on an accrual basis in accordance with generally accepted accounting principles consistently applied. The books and records shall include the designation and identification of any property in which the Partnership owns a beneficial interest; such records shall also include, but shall not be limited to, the ownership of property (real, personal, and mixed), as well as any property in which the Partnership owns an interest and the title to which has been recorded or is maintained in the name of one of the Partners without designation of the Partnership. Book depreciation with respect to the investment in the Plant facilities shall be based on a useful life of said investment based on good business practice and determined by the Management Committee.

11.4 Summary Billings. Within fifteen (15) business days after the end of each calendar month, each Partner shall issue summary billings to the Partnership at the location set forth in Article 11.2 hereof, covering billable items originating on the books of that Partner during said month. A copy of such summary billing will be directed to the other

Partner's designee at the discretion of the Management Committee. Summary billings shall be in addition to and include any individual billings sent to the Partnership consistent with the normal billing procedures of the Partners, and shall follow the numerations, terms and reporting requirements set out in the various agreements between the Partnership and the Partners including but not limited to the Agreement identified in the List of Exhibits attached hereto.

11.5 Determination of Net Income or Loss. Within twenty-five (25) days after the end of each calendar month, the Partnership shall determine the Partnership's net income or loss (revenue less expenses, including book depreciation) and before the last day of such calendar month the Partnership shall cause to be prepared and delivered to each Partner an unaudited profit and loss statement, a balance sheet and a statement of each Partner's Capital Account as of the end of each calendar month.

11.6 Annual Financial Statements. No later than 90 days following the end of each fiscal year of the Partnership, the Management Committee shall cause to be prepared and delivered to each Partner a profit and loss statement and a statement of changes in financial position for such fiscal year, a balance sheet and a statement of each Partner's Capital Account as of the end of such fiscal year and such financial statements will be audited and certified.

11.7 Inspection of Facilities and Records: Audits.

(a) Unless otherwise agreed by the Partnership Committee, the Partnership shall retain a mutually acceptable national accounting firm as independent auditors of the Partnership to conduct an examination of the financial statements of the Partnership as of the close of business of each fiscal year of the Partnership and to furnish its opinion on the balance sheet of the Partnership as of such date and the related statement of income and Partners' Capital Accounts for the fiscal period then ended. If such opinion is qualified, the Management Committee shall promptly meet to take whatever action is necessary or appropriate. A copy of the audited annual financial statements shall be furnished to each Partner within 95 days after the end of each fiscal year.

(b) Additionally each Partner shall have the right at all reasonable times during usual business hours to inspect the facilities of the Partnership except as restricted in Exhibit 6 and to examine the books of account and records of the Partnership. Such right may be exercised through any agent, employee or representative of such Partner designated by it, or by an independent public accountant. The Partner conducting such examination or inspection shall bear all costs and expenses incurred in connection therewith. No exceptions to the books and records of the Partnership shall be taken for any fiscal year unless taken in writing within twenty-four (24) months following the end of such fiscal year. Such audits shall be conducted in such a manner so as to cause minimum inconvenience to the Partnership.

11.8 Banking Matters. Funds of the Partnership shall be deposited in such banks or other depositories as shall be designated by the Management Committee. The Management Committee shall notify the Partners of the particular accounts into which all contributions or payments of the Partners are to be made on or prior to the due date of such contributions or payments. Checks or other orders of withdrawal shall be drawn upon the Partnership and shall be signed by such officers or authorized representatives as are designated by, and pursuant to the procedures and requirements set by, the Management Committee. Prior to the Agreement Date, SPACE or PQ shall have caused to be opened a bank account in the name of the Partnership for the purpose of receiving the initial cash contributions of the Partners.

11.9 Tax Matters.

(a) The Partnership shall file all appropriate federal, state, and local tax returns and make all appropriate elections for such returns. Pursuant to the terms of the services agreement between PQ and the Partnership, PQ shall prepare or have prepared all such necessary tax returns and defend them upon audit and handle other tax matters, except as provided in the Lease Agreement, whether or not such other matters may require preparation of formal tax returns. Federal and state income tax returns and any other tax returns (except ad valorem returns, sales and use tax returns and other related excise tax returns) designated by the Management Committee and so prepared by PQ shall be mailed by PQ to the members of the Management Committee in sufficient time so that each member of the Management Committee will receive a copy of such tax return at least fifteen (15) days prior to the date on which it is due. No later than seven (7) days prior to the date on which the return is due, SPACE shall notify PQ of any objections or questions to the proposed tax return.

Such notification may be oral or written. Thereupon, PQ shall attempt to resolve the differences. If the differences are not resolved by five (5) days prior to the date upon which the return is due, the Management Committee shall meet to resolve the matter. If SPACE fails to notify PQ of any objections by seven (7) days prior to the date on which the return is due, the return may be filed in the form submitted to members of the Management Committee. The Management Committee must approve all proposed Partnership income and franchise tax ruling requests before their submission to the proper authorities.

(b) PQ is designated the tax matters partner ("TMP") as defined in Section 6231(a) (7) of the Internal Revenue Code. The designation as TMP shall be effective only for operations conducted by the Partners pursuant to this Partnership Agreement. The TMP shall not bind SPACE to any agreement, extend the Statute of Limitations, settle any outstanding audit, litigate any unsettled audit issues, choose a forum for litigation, appeal an adverse lower court decision, file a Request for Administrative Adjustment, make any election with respect to federal, state or local income tax law, or take any other actions affecting tax matters without

obtaining the prior written concurrence of SPACE. The TMP shall inform SPACE, on a timely basis, of any tax matters, including, but not limited to, progress of any Internal Revenue Service audit, receipt of a Revenue Agent's Report, and notice of an Appeals Conference.

(c) The Management Committee is granted authority and shall make elections under the Internal Revenue Code of 1986 ("Code"), as amended, and the Treasury Regulations thereunder in the first and subsequent years' federal (and, if applicable, state and local) partnership tax returns with respect to the Partnership's activities as follows:

(i) The accrual method of accounting shall be adopted and such accounting shall be maintained on a calendar year basis.

(ii) A system of internal accounting controls shall be devised and maintained in conformity with good management practice including the provisions of the Foreign Corrupt Practices Act.

(iii) Operating supplies and parts shall be stated at average cost which represents invoice for production cost for new items.

(iv) Fixed assets, if any, shall be carried at cost.

(v) The Partnership shall, in accounting for tax depreciation or amortization of depreciable or amortizable property, use the depreciation or amortization methods and the depreciable lives which will maximize tax benefits available hereunder while taking maximum advantage of any available tax credits or the Investment Tax incentive programs.

(vi) All other elections shall be determined by the Management Committee.

(d) In the event that the Internal Revenue Service upon audit imputes income to either Partner as a result of the Partner's or the Partnership's furnishing facilities or services under the PQ Services Agreement, Shell Zeolite Catalysts Marketing Agreement, License agreements, Partnership Manufacturing Agreement, PQ Produced Materials Supply Agreement, Land Lease, or any other agreement between the Partnership and one of its Partners, the expenses of the Partnership resulting from such imputation shall be specially allocated to the Partner to which the income is imputed.

Article XII

Profit, Loss and Tax Allocation

12.1 Allocation of Income, Gain, Loss, Deduction, and Credit Except as otherwise provided in this Agreement, all allocation items of income, gain, loss, deduction and credit shall be allocated to the Partners in the same percentage as their respective Ownership Percentages. All tax credit recapture related to gain or loss on the sale of assets that were formerly owned by PQ and subsequently contributed to the Partnership will be specially allocated to PQ in accordance with Section 704(c) of the Code.

All allocation methods described herein for income, gain, loss, or deduction shall be utilized for allocation of income, gain, loss, or deduction for financial accounting purposes, including financial Capital Accounts, as well as for tax purposes. The same method of allocation shall be used for tax and financial purposes for any tax credits that must be recorded on the Partnership's financial books.

Appropriate adjustments will be made to each Partner's Capital Accounts to effectuate any audit adjustment imposed by tax authorities of any item of income, gain, loss, deduction or credit.

12.2 Adjustments to Capital Accounts. Except for the allocation of income or loss from the operation of the Partnership described in Article 12.1 above, no additions or withdrawals from or reduction in the Capital Account of either Partner, other than those required under Articles III, V, XI, XIII and XVI, respectively, shall be made except with the prior written consent of both Partners.

12.3 Special Allocation

(a) Notwithstanding Section 12.1, if the Internal Revenue Service makes an adjustment of an item of income or expense with respect to the taxable income of a partner or the Partnership and such an adjustment results in an increase in federal income tax liability of one of the partners, that partner shall be allocated the corresponding amount of partnership income as an addition to that partner's share of partnership income in a special allocation as described in §704(b) of the Internal Revenue Code.

Article XIII

Distributions

13.1 Distribution. Distributions shall be made simultaneously to the Partners when approved by the Management Committee. Any distribution made as of the close of the Partnership's fiscal year shall be in amounts according to the Partners allocation percentages under section 5.5 with proper accounting for any interim distributions. Interim distribution shall be made in equal amounts as approved by the Management Committee. This Article does not apply to liquidating distributions or distributions that are part of a plan of liquidation.

Article XIV

Assignment

14.1 Sale or Assignment. This Agreement shall inure to the benefit of and be binding upon each of the Partners hereto and shall be assignable to the successors of substantially the entire business of either Partner relating to the subject matter of this Agreement. This Agreement shall not

be otherwise assignable by either Partner without the written consent of the other Partner, except, however, either Partner may assign this Agreement to a wholly owned subsidiary without the consent of, but with prompt written notice to the other Partner. The Partner assigning this Agreement to a wholly owned subsidiary shall remain primarily liable for the performance of the duties and obligations owed the non-assigning Partner. Except as herein provided no assignment of this Agreement shall be valid without assignment to and assumption by such successors and assigns of all the rights and obligations under this Agreement.

14.2 SPACE shall have the right to request in writing, the consent of PQ to assign all its rights and obligations and Partnership interest to Criterion Catalyst Company. PQ's consent shall not be unreasonably withheld. If PQ shall fail to respond in writing to the written request of SPACE within sixty (60) days of such request, PQ's consent shall be deemed as given.

14.3 Additional Instructions. Except as otherwise provided herein and in addition to the restrictions set forth in Article 14.1 and 14.2 above, neither Partner shall encumber or make any assignment, pledge or other disposition of its Partnership interest or any of the obligations, rights or interests conferred by this Agreement without the prior written consent of the other Partner.

Article XV

Default

15.1 Default. If (i) either Partner shall fail to make a contribution pursuant to Article 3.1 hereof which failure shall not be remedied within sixty (60) days from the due date of such contribution, or (ii) under Article 3.3 hereof a non-contributing Partner fails to reimburse the other Partner for any contribution such other Partner made on behalf of the non-contributing Partner within sixty (60) days from the original due date of such contribution, or (iii) either Partner hereto shall fail to perform or fulfill in the time and manner herein provided, any other obligation or condition herein required to be performed or fulfilled by such Partner, and if such failure shall continue for sixty (60) days after written notice thereof from the non-defaulting Partner, then upon the occurrence of any such event the non-defaulting Partner shall have the right to terminate this Agreement and dissolve this Partnership by giving notice to the defaulting Partner given at any time within ninety (90) days after the expiration of the applicable aforementioned sixty (60) day period, and the defaulting Partner shall be deemed to have

terminated this Agreement. Any termination of this Agreement pursuant to this Article XV shall be in addition to, and shall not be exclusive of or prejudicial to, any other rights or remedies, at law or in equity, which the non-defaulting Partner may have on account of the default of the other Partner both under this Agreement and any other agreement between the Partners. Waiver by any Partner of a single default or a succession of defaults shall not deprive such Partner of any right to terminate this Agreement, arising by reason of any subsequent default.

Article XVI

Dissolution

16.1 Causes of Dissolution. The Partnership shall be dissolved for any of the following reasons:

- (a) Upon any termination of this Agreement pursuant to Article XV above;
- (b) An election by SPACE or PQ to liquidate pursuant to any right to liquidate provided in this Agreement.

(c) The Issuance by any court or governmental authority or agency of a decree or order, or the initiation by any such authority of proceedings or an investigation which seem likely to (i) adversely affect the ability of either Partner, (ii) materially adversely affect the interest of either Partner in the Partnership, (iii) direct the Partnership to dissolve, (iv) require either Partner to withdraw from the Partnership or otherwise divest itself of its interest in the Partnership or (v) declare that the Partnership has been dissolved.

(d) The mutual written consent of the Partners.

(e) Written notice to the Partnership by either Partner of the desire to terminate the Partnership following the institution of any bankruptcy or insolvency proceedings against the Partnership or the other Partner (whether voluntary or involuntary, and whether under federal or state law), the dissolution, liquidation or winding up of either Partner, or the assignment by either Partner of any significant portion of its property or assets for the benefit of creditors or claimants.

(f) A written determination by a member of the American Arbitration Association (selected for such purpose by mutual written agreement of the Partners within ten (10) days following a written request by either Partner for such a determination) to the effect that the Partner that did not request such determination committed a material breach of this Agreement or otherwise so conducted itself in matters resulting to the Partnership's business that it is not reasonably practicable to carry on the business of the Partnership in partnership with it. The cost of such an arbitrator shall be borne by the Partnership in the event such a determination is made and by the requesting Partner if the arbitrator refuses to make such a determination.

(g) If the Partnership Interest of either Partner is zero percent (0%).

16.2 Dissolution Procedure. In the event of dissolution, then, to the extent lawful, the following procedures shall be followed unless otherwise provided herein to the contrary:

(a) If the dissolution is under or pursuant or subject to the consequences of Article 15.1, of this Agreement.

(i) The Winding-up party shall proceed with reasonable promptness to wind up and liquidate the business of the Partnership;

(ii) All debts and liabilities of the Partnership shall be discharged. Any partner with a negative capital account balance shall be required to restore such account to zero. After these adjustments, the remaining assets shall be distributed in cash or partly in kind to the Partners or their representatives in accordance with their positive capital account balances, as set forth in Treas. Reg. §1.704-1 (b) (2) (ii) (b) (2), or any successor regulation;

(iii) If such assets and/or the proceeds of the sale of such assets are insufficient to pay any debt or liability of the Partnership each Partner shall contribute a proportionate share of the cash necessary to satisfy such debt or liability according to its Ownership Interest; and

(iv) If the dissolution is under or pursuant or subject to the consequences of Article 15.1 of this Agreement, and if the non-defaulting Party is SPACE, then SPACE shall have the first option to take ownership of the Zeolite/Catalyst Plant. Otherwise PQ shall have the first right to take ownership of the Zeolite/Catalyst Plant.

16.3 Winding-up Party. For the purposes of Article 16.2 hereof, unless the Partnership is terminated and dissolved by mutual agreement, the Winding-up Party shall be the Partner other than

- (i) The party terminating this Agreement,
- (ii) The party committing an event of default hereunder resulting in the termination of this Agreement by the non-defaulting party, or
- (iii) The party giving notice of its intention to discontinue participation in the Partnership.

If the Partnership is terminated and dissolved by mutual agreement, both Partners shall act jointly together as the Winding-up Party. In any event the Partners shall cooperate with each other to assure a prompt and orderly dissolution, winding-up and liquidation of the Partnership.

16.4 Buy Out of Partnership Interests

(a) After the Partnership has been functioning for three years, should SPACE or PQ have cause to wish to terminate the Partnership, the party wishing to terminate (A) will offer a buy out price to the other party (B).

(b) B will then have the right to buy out A at the price offered by A, or allow A to buy at the price offered. The purchasing party will be obligated to:

(i) in the case of PQ, continue for up to three (3) years supplying Shell, or the assigned marketing agent, their internal and marketing needs for Zeolites and Zeolite-containing catalysts in quantities then being provided by the Partnership, if requested by SPACE,

(ii) in the case of SPACE, continue purchasing PQ produced materials, for which it has a requirement in DUA's, and PQ must continue to supply such materials from PQ for up to three (3) years. In addition, at SPACE's option, PQ will be obligated to continue the Land Lease and Services Agreement for up to three (3) years. Further, at PQ's option, SPACE will continue to make available the manufacturing facilities to toll manufacture products for PQ for up to three (3) years in accordance with Section 5.3 of this Agreement.

(In either case, product quality and commercial terms and conditions must remain competitive.)

(c) Prior to the Partnership's third anniversary, dissolution other than as set out in Section 16.1 can be effected only by mutual agreement with each Partner retaining commercial obligations to the other for agreements entered into as part of the Partnership for a period of at least three (3) years from such dissolution.

16.5 Except as specifically provided in this Article XVI, nothing in this Article XVI shall otherwise affect any of the rights or obligations of the parties under any other agreement either to each other or to third parties.

Article XVII

Liability and Indemnification

17.1 Liability of Partner. Except as provided herein to the contrary, neither Partner shall be liable to third persons for Partnership losses, deficits, liabilities or obligations, except as required by law, unless the assets of the Partnership shall first be exhausted. The Partnership will be primarily liable, as between the Partnership and either one or both Partners, for all claims, damage, injury and liability related to the manufacture and sale of Partnership products except to the extent that such claims damage, injury or liability is the result of the gross negligence of one or more Partners.

17.2 Indemnification.

(a) Except to the extent of each Partner's interest in the Partnership, and for activities where the Partners are in the capacity of Partner, each Partner (in each case the "Indemnifying Partner") does hereby agree to defend, indemnify and save the other Partner harmless from and against any and all costs, expenses, suits, damages, claims, losses, judgments and liabilities (including attorney's fees) of any kind or nature whatsoever (unless caused by criminal conduct attributable to the other Partner):

(i) incurred as a result of any injuries, sickness, disease, or death sustained by the Indemnifying Partner's employees, arising out of, or in any way connected directly or indirectly with this Agreement, or with the performance hereunder; and whether or not such injury, sickness, disease or death is due, solely, or in part, to the negligence of such employees or, to the extent permitted by law, to the negligent act or omission to act of the indemnified Partner;

(ii) incurred as a result of any injuries, sickness, disease or death of third parties to the extent that the same are due to any act or omission to act amounting to gross negligence on the part of the Indemnifying Partner or its officers, agents, representatives, independent contractors, subcontractors or employees, and to the extent that such act or omission to act arises out of or is in any way connected, directly or indirectly, with this Agreement or with the performance hereunder; and

(iii) incurred as a result of claims or lawsuits by third parties for damages to or destruction of their property, to the extent that such claims or lawsuits arise out of any act, or omission to act amounting to gross negligence, on the part of the Indemnifying Partner or its officers, agents, representatives, independent contractors, subcontractors or employees, and to the extent that such act or omission to act is in any way connected, directly or indirectly, with this Agreement or the performance whereunder, except that the indemnity of this Article 17.2(a)(iii) shall not apply to the extent that such damage or destruction of property is due to any negligent act or negligent omission on the part of such third parties or the gross negligence of

the indemnified Partner or their respective officers, agents, representatives, independent contractors, subcontractors or employees; provided that, if any aspect of the indemnity set forth in this Article 17.2(a) be void or invalid as indemnifying against negligence, the voiding or invalidity shall apply only to the extent absolutely necessary as indemnifying a solely actively negligent party and the remainder of this indemnity shall remain valid and enforceable.

(b) Except as otherwise provided in this Article 17.2, each Partner hereto shall indemnify and save the other harmless from and against any and all costs, expenses, suits, damages, claims, losses, judgments and liabilities (including attorneys' fees) of any kind or nature whatsoever on account of or arising from any act or omission of such Indemnifying Partner or its employees in breach of this Agreement.

(c) Except as otherwise provided in this Article 17.2, each Partner hereto shall indemnify and save the other harmless from and against any and all costs, expenses, suits, damages, claims, losses, judgments and liabilities (including attorneys' fees) of any kind or nature whatsoever on account of or arising from any activities or operations by the indemnifying Partner prior to the Agreement Date respecting the technology, or rights, title or ownership interests in and to any assets, real, personal, tangible or intangible, conveyed by the Indemnifying Partner under or pursuant to this Agreement.

(d) Except as otherwise provided in this Article 17.2 each Partner does hereby agree to defend, indemnify and save the other Partner harmless from and against any and all costs, expenses, suits, damages, claims, losses, judgments and liabilities (including attorneys' fees) of any kind or nature whatsoever arising in connection with the partnership interests in the Partnership of the parties hereto, or any transactions concerning or involving such partnership interest, directly or indirectly caused by, arising from or attributable to the actions of the Indemnifying Partner.

(e) Each Partner hereto shall promptly give written notification to the other of any claim, notices or lawsuits where these indemnity provisions may apply. The Indemnifying Partner shall have the sole right to defend and settle claims or lawsuits and the indemnified Partner shall cooperate, at its own expense, in defending and settling, provided however that the indemnified Partner may, at its option and at its own expense, be represented by advisory counsel.

(f) Each Partner shall bear a share of any judgment obtained in connection with or after dissolution of the Partnership, against the Partnership or either or both of the Partners arising solely because of the liability of the Partner for Partnership matters under law, which share shall be equal to the Partners' Ownership Percentage at the time any judgment is rendered or at the time of dissolution of the Partnership, as the case may be. Each Partner hereby indemnifies and saves the other Partner harmless from and against any such judgment in excess of the other Partner's share thereof as determined by Ownership Percentage.

17.3 PQ and SPACE agree to notify the other within thirty (30) days of the date that the total stockholder equity of the respective corporation becomes less than twenty-five million dollars (\$25,000,000). At the request of the notified Partner, the notifying Partner shall have sixty (60) days in which to reasonably demonstrate

sufficient financial responsibility for the difference between the corporation's stockholder equity and \$25 million. The notifying Partner may elect to undertake, as necessary, any of, but not limited to, the following steps: receipt of additional capital contribution, purchase of general liability insurance, or surety bonds.

If at the end of the sixty (60) day period, the notified Partner still has reasonable objections to the financial position of the notifying Partner, then that Partner may initiate immediate dissolution of the Partnership in accordance with the terms of this Agreement.

Article XVIII

Force Majeure

18.1 Occurrence. In the event that further lawful performance of this Agreement or any part hereof by either Partner shall be rendered impossible by or as a consequence of Force Majeure, such Partner shall not be considered in default hereunder by reason of such failure to perform occasioned thereby and neither Partner may claim penalties, interests or any other compensation or participation in damages caused by the Force Majeure.

18.2 Notice of Occurrence. The Partner claiming Force Majeure shall notify the other Partner, in writing, within one (1) month after the occurrence of the Force Majeure stating the date of the beginning of same. In the event that the Partner claiming Force Majeure under this Article XVIII fails to notify the other Partner, in writing, within the prescribed one (1) month period, the claiming Partner will forfeit any rights it may have by virtue of Force Majeure under this Agreement and said Partner will be deemed to have taken on its charge all of the risks and consequences of said Force Majeure.

18.3 Prolonged Force Majeure. In the event, however, that the Partner claiming Force Majeure complies with the provisions of Article 18.2 hereof, then the Force Majeure shall automatically extend the times called for in this Agreement for the Partner to perform for a period of the delay due to and justified by the Force Majeure.

In the event that the Force Majeure continues for a period of more than twelve (12) months, the Partner against whom the Force Majeure has been invoked may cause this Partnership to be dissolved upon notifying the other Partner in writing. Such dissolution shall be subject to the consequences set forth in Article 16 hereof.

Article XIX

Notice

19.1 Manner. Whenever notice is required to be given pursuant to this Agreement, it shall be by letter, telex, telegram or cable sent to the Partners or the Partnership at the addresses set forth below and shall, except as otherwise provided herein, be deemed to be given when sent or transmitted.

19.2 Addresses. The addresses of the Partners for purposes of notice shall be as follows:

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.
One Shell Plaza
P.O. Box 2463
Houston, Texas 77252
Attn: President

PQ CORPORATION
Valley Forge Executive Mall
P.O. Box 840
Valley Forge, PA 19482
Attn: President, Specialty Chemicals Group

The address of the Partnership for purposes of notice shall be as follows:

ZEOLYST ENTERPRISES

c/o PQ Corporation

P.O. Box 840

Valley Forge, PA 19482

Attn: _____

Any party whose address is listed in this Article 19.2 may change its address at any time by giving notice to the other parties listed herein.

Article XX

Amendment

20.1 Written Instrument. This Agreement may be amended or modified by the Partners only by a written instrument executed by both Partners.

20.2 Tax Status. The parties intend for this to be a Partnership for tax purposes, and the Partners shall make any amendments to this Agreement which they mutually agree are necessary to receive such treatment for tax purposes, provided that no Partner shall be required to agree to an amendment which would materially adversely affect it.

Article XXI

Miscellaneous

21.1 Partnership Liabilities

(a) As approved by the Management Committee the Partnership shall establish and maintain a risk management program.

(b) If the Partnership should purchase insurance for any reason, all original policies of insurance or copies thereof shall be maintained at the Principal Office of the Partnership and be available for review by the Partners.

(c) Recoveries, judgments, settlements, damages, or liabilities against the Partnership which arise as a result of incidents, actions or occurrences which are covered by policies procured by the Partnership and which are in amounts in excess of the insurance policy limits of those policies or which are not covered by insurance shall be allocated to the Partners in

proportion to their respective Ownership Percentages as of the date of the incident, action or occurrence giving rise to such recovery or settlement. The liability of each Partner with respect to such amounts shall be individual and not joint. Each Partner hereby indemnifies and holds the other Partner harmless for the indemnitor's allocated liability pursuant to this Section. Ownership Percentages shall not be adjusted for any amounts paid by either Partner pursuant to this Section.

(d) The Partnership shall notify the Partners of each claim, suit or action asserted or filed against the Partnership.

21.2 Applicable Law. The parties hereto agree that this Agreement shall be construed and all questions relating thereto shall be determined in accordance with the laws of the State of Kansas, without recourse to the conflicts of law principles of other states.

21.3 Further Assurance. Each of the Partners agrees to execute and deliver all such other and additional instruments and documents and to do such other acts and things as may be necessary more fully to effectuate this Agreement and the Partnership created hereby and to carry on the business of the Partnership in accordance with this Agreement.

21.4 Headings. The headings used in this Agreement are for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

21.5 Article Numbers. Unless otherwise indicated, reference to Article numbers are to Articles of this Agreement.

21.6 Parties Bound. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective legal representatives, successors, and assigns where permitted by law.

21.7 Severability. In case any one or more of the provisions contained in this Agreement shall, for any reason, be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

21.8 Further Remedies. Pursuit by a Partner of any of the foregoing remedies shall not preclude pursuit by it of any of the other remedies provided by law, nor shall pursuit of any remedy herein provided constitute a forfeiture or waiver of any amount due it or of any damages accruing by reason of the violation of any of the terms, provisions and covenants contained in this Agreement.

21.9 Waiver. No waiver by any Partner of the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release the other Partner from, performance of any other provision, condition or requirement herein; nor deemed to be a waiver of, or in any manner release the other Partner from future performance of the same provision, condition or requirement; nor shall any delay or omission by any Partner to exercise any right hereunder in any manner impair the exercise of any such right or any like right accruing to it thereafter.

21.10 Trademarks and Trade Names. The establishment of the Partnership by the Partners is not construed as an express or implied assignment by either Partner to the Partnership or the other Partner of any of its trademarks or trade names.

21.11 Policy Statement on Ethical Conduct. The Management Committee should adopt at its first meeting the policy statement, substantially in the form attached hereto as Appendix B, concerning the ethical conduct of the Partnership's business. The General Managers shall be responsible for the implementation of procedures to insure compliance with the policy.

21.12 Entire Agreement. This Agreement is intended to implement the intent of the parties under the Cooperative Undertaking Agreement concerning the subject matter hereof. This Agreement, and the other agreements referred to herein constitute the entire agreement between the Partners concerning the subject matter hereof and supersede any prior understanding or written or oral agreements respecting the subject matter of this Agreement.

IN WITNESS WHEREOF, this Agreement has been duly executed on behalf of the Partners by their respective authorized officers as of the day and year first above written.

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.

By /s/ Peter M. Paolucci

PQ CORPORATION

By /s/ Richard W. Kelso P
V.P

APPENDIX A

RETURN ON INVESTMENT CALCULATION

Return on Investment shall be calculated using the formula as follows:

$$\begin{array}{r} \text{Fixed Asset} \\ \text{Plant Investment used for} \\ \text{Product} \end{array} \times \frac{20 \text{ ROI}}{100} \times \frac{\text{Days of Plant} \\ \text{Operation on} \\ \text{Product}}{\text{Annual days of Operation}}$$

$$X \frac{1}{\text{Quantity of Product} \\ \text{Produced}} = \frac{\text{ROI}}{\text{Unit of Product}}$$

POLICY STATEMENT

(On Political Contributions, Illegal Payments and Accounting Procedures)

Zeolyst Enterprises (the Partnership), recognizing responsibilities for its operations adopts this policy to conduct the business of the Partnership consistent with the highest level of integrity and in compliance with the spirit as well as the letter of the law. It is the policy of the Partnership with respect to Political Contributions, Illegal Payments and Accounting Procedures that:

- 1 All officers and employees are expected to conduct the Partnership's business in accordance with all applicable laws and regulations, including those of the country in which it operates, and consistent with the highest business standards which society develops on a continuing basis.
- 2 The use of the Partnership's funds or assets for any unlawful or improper purpose, including payments, either directly or indirectly, (a) to government officials or employees, or (b) to any other person as a commercial bribe, influence payment or kickback, is prohibited. This includes but is not limited to, payments or commitments for payments, to any third party (whether cast in the form of commissions, payments of fees or goods and services received or otherwise) on behalf of the Partnership with the understanding or under circumstances that suggest that all or any part thereof may be paid by the recipient to any of the foregoing persons. This prohibition does not preclude payments in foreign countries where such payments are either (x) modest in amount and compatible with local custom and are made for a valid business purpose and to obtain benefits to which the Partnership is entitled under local law, or (y) deemed necessary to protect property or personnel. It is the responsibility of the senior operating personnel responsible in the area to authorize any payments permitted by the preceding sentence, and to report any such payments immediately to the appropriate designated person.
- 3 No unrecorded fund or asset of the Partnership shall be established or maintained for any purpose.

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4. Except where specifically permitted by law, the use of the Partnership's assets or funds for political contributions is prohibited. Political contributions may be made where permitted by law and properly authorized, reported and recorded. Officers and employees are encouraged to make personal political contributions to candidates and organizations of their choice. However, it must be clearly understood that the officer or employee making the contribution will bear the entire financial burden. The Partnership cannot, and will not, recognize that such payments constitute a Partnership obligation and no officer or employee should attempt, directly or indirectly, to pass on such contribution, in whole or in part, to the Partnership.
 5. All fees and commissions paid to representatives, agents, attorneys, and consultants shall be supported by appropriate documentation.
 6. No payment on behalf of the Partnership shall be approved or made for any purpose other than that described on the documents supporting the transaction.
 7. The use of the Partnership's funds or assets for entertainment of, or gifts or other consideration of value to, government officials or employees or others is prohibited except to the extent customary and provided they are reasonable in amount, legal under applicable law and not in consideration of any improper action by the recipient.
 8. No entry shall be made in the Partnership's books, records, and accounts which does not fairly reflect the transaction and does not conform with generally accepted accounting principles or other applicable criteria.
 9. Officers and employees who know of a violation or potential violation of this policy are expected to report it to the appropriate designated person. Officers and appropriate employees should be prepared to respond at least annually to questionnaires relating to compliance with this Policy Statement.
 10. All officers, managers or other appropriate supervisory personnel shall be responsible and accountable for the enforcement of this policy within their specific areas of supervisory responsibility, including the periodic distribution of this Policy Statement to, and the review thereof, with affected employees under their supervision.
 11. The Management Committee shall develop and promulgate from time to time such procedures as he deems advisable to implement and maintain this policy.

March 16, 1988

LIST OF EXHIBITS

<u>Designation</u>	<u>Title</u>
Exhibit 1	Plant Purchase Agreement
Exhibit 2	Land Lease
Exhibit 3	Bill of Sale
Exhibit 4	PQ Services Agreement
Exhibit 5	PQ Produced Materials Supply Agreement
Exhibit 6	Partnership Manufacturing Agreement
Exhibit 7	Shell Sales Agreement
Exhibit 8	PQ Sales Agreement
Exhibit 9	SPACE Services Agreement
Exhibit 10	PQ Technology License Agreement
Exhibit 11	SPACE Technology License Agreement
Exhibit 12	Research and Development Agreement
Exhibit 13	Confidential Disclosure Agreement
Exhibit 14	Shell Oil Company Services Agreement

PLANT PURCHASE AGREEMENT

This Agreement is entered into as of February 1, 1988, by and between PQ Corporation ("PQ"), Shell Polymers and Catalysts Enterprises Inc. ("SPACE") and Zeolyst Enterprises, a partnership formed by PQ and SPACE (the "Partnership").

WHEREAS, PQ and SPACE have established the Partnership, and the Partnership is to acquire the Specialty Zeolite/Catalyst Plant of PQ in order to produce Zeolites and Zeolite-containing Catalysts;

AND WHEREAS, PQ and the Partnership have entered into an agreement (Bill of Sale) of even date herewith whereby PQ will sell to the Partnership various Improvements as defined in said agreement;

AND WHEREAS, the Partnership Agreement sets forth in general terms how the Partnership will be initially financed in order to carry out its objectives;

NOW THEREFORE, for and in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

1. Capitalized terms used in this Plant Purchase Agreement (the "Agreement") but not expressly defined herein shall, for all purposes of this Agreement, as the same may be amended or supplemented from time to time hereafter, have the same meanings as specified in the Partnership Agreement between PQ and Shell Polymers and Catalysts Enterprises Inc. executed simultaneously with this Agreement.

2. At the Closing, or within two (2) days thereafter:

(a) PQ and SPACE will each contribute Three Million Dollars (\$3,000,000) to the Partnership as a capital contribution;

(b) PQ will loan the Partnership Four Million Dollars (\$4,000,000) for a period not to exceed seventy-five (75) days; and

(c) PQ will make available a line of credit to the Partnership of One Million Dollars (\$1,000,000) for a period not to exceed sixty (60) days to be used for Working Capital.

The loans under (b) and (c) above shall earn interest at one percent (1%) above the Prime Rate published by Chase Manhattan Bank of New York.

3. The Partnership shall in good faith apply for long-term capital financing as soon as practicable, and when funds become available from such financing the balance of the loans outstanding owed to PQ in an amount up to Five Million Dollars (\$5,000,000) together with interest from the Closing date shall be due and payable.

4. In the event financing has not been arranged within forty-five (45) days from March 16, 1988, PQ shall have the right to go to the Management Committee of the Partnership and request that the Partners intercede and obtain necessary financing either from their own resources or in behalf of the Partnership in order to repay the loan made by PQ within thirty (30) days after such notice to the Management Committee.

5. It has been agreed by PQ and SPACE that the assets to be purchased by the Partnership from PQ have a value of Nine Million Nine Hundred Thousand Dollars (\$9,900,000). Upon execution of this Agreement and receipt of the funds in paragraph 2 (a) and (b) above, the Partnership shall pay to PQ Nine Million Nine Hundred Thousand (\$9,900,000) as full payment for the purchase of the Improvements.

IN WITNESS WHEREOF, the parties hereto have duly executed this instrument as of the date first above written.

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.

PQ CORPORATION

By: _____
Title: _____

By: _____
Title: _____

ZEOLYST ENTERPRISES

By: _____
Title: _____

LEASE AGREEMENT

This LEASE AGREEMENT dated as of February 1, 1988, by and between PQ CORPORATION, a Pennsylvania corporation ("Landlord"), and ZEOLYST ENTERPRISES, a Kansas partnership ("Tenant").

WITNESSETH:

Landlord and Tenant hereby covenant and agree as follows:

ARTICLE 1

Lease of Property—Term of Lease

Landlord, for and in consideration of the rents to be paid and of the covenants and agreements hereinafter contained to be kept and performed by Tenant, hereby leases to Tenant, and Tenant hereby hires from Landlord, all those certain plots, pieces or parcels of land situated, lying and being in Kansas City, Kansas, lying beneath the identified Improvements and described in Appendix A, attached hereto and made part of this Lease; together with all right, title and interest, if any, of Landlord in and to any improvements now or hereafter located on said land, and any easements, licenses, privileges, rights and appurtenances related thereto.

TO HAVE AND TO HOLD the same, subject as aforesaid, for a term commencing on February 1, 1988, (the "Commencement Date") and ending December 31, 1997, or such later date as contemplated in Article 12 hereof, upon and subject to the covenants, agreements, terms, provisions and limitations hereinafter set forth, all of which Tenant covenants and agrees to perform and observe.

ARTICLE 2
Definitions

Section 2.1. Capitalized terms used in this Lease Agreement (the "Agreement"), but not expressly defined herein, shall, for all purposes of this Agreement, as the same may be amended or supplemented from time to time hereafter, have the same meanings as specified in the Partnership Agreement between PQ and Shell Polymers and Catalysts Enterprises Inc. executed simultaneously with this Agreement.

Section 2.2. "Demised Land" shall mean the land lying beneath the identified Improvements and described in Appendix A and all improvements thereon other than Improvements as defined in Section 2.4.

Section 2.3. "Impositions" shall mean all taxes, assessments, special assessments, personal property and intangible taxes, use and occupancy taxes, water and sewer charges, rates and rents, charges for public utilities, excises, levies, license and permit fees and other charges of any kind, during or in respect of the term of this Lease, which shall or may be assessed, levied, charged, confirmed or imposed upon or become payable out of or become a lien on the Property or any part thereof, the appurtenances thereto or the streets adjacent thereto, or the rent and income received by or for the account of Tenant for any use or occupation of the Property, and such franchises, licenses and permits as may be appurtenant to the use of the Property; but shall not include any municipal, state or federal income, capital levy, or transfer taxes of Landlord or assessed against Landlord, or any franchise taxes imposed upon any corporate owner of the Demised Land or any part thereof, or any income, profits or revenues tax, assessment or charge imposed upon the rent received as such by Landlord under this Lease.

Section 2.4. "Improvements" shall mean the buildings, structures and machinery, apparatus, equipment, fittings, personal property and fixtures which are erected or located on the Demised Land at the initiation of this Lease and those erected or located thereon during the term of this Lease by or on behalf of Tenant.

Section 2.5. “Landlord” shall mean PQ Corporation solely in its capacity as owner of the Demised Land under the terms of this Lease.

Section 2.6. “Legal Requirements” shall mean all federal, state, county, municipal and other governmental statutes, laws, rules, orders, permits, licenses, regulations, ordinances, judgments, decrees, directions and injunctions affecting the Property or the use or occupancy thereof, whether now or hereafter enacted or in force, ordinary or extraordinary, foreseen or unforeseen, and all covenants, agreements, restrictions and encumbrances contained in any instrument affecting the Property.

Section 2.7. “Obligations” shall mean the covenants to pay rent and other sums hereunder and all other covenants, agreements, terms, conditions, limitations, exceptions and reservations contained in this Lease. The terms “Tenant’s Obligations” and “Landlord’s Obligations” shall mean the Obligations of this Lease which are imposed upon and are to be performed, observed or kept by Tenant or by Landlord, as the case may be.

Section 2.8. “Property” shall mean the Demised Land and the Improvements.

Section 2.9. “Sublease” shall mean any lease (other than this Lease), sublease or other agreement for the use or occupancy of the Demised Land or any part thereof.

Section 2.10. "Taking" shall mean a taking or voluntary conveyance of title to, or any interest in, the Demised Land, or any part thereof, or of the right to use all or any part thereof, pursuant to, as a result of, in lieu of or in anticipation of the exercise of the right of condemnation, expropriation or eminent domain.

ARTICLE 3

Rent

Section 3.1. Tenant covenants and agrees to pay to Landlord during the term of this Lease a net rental (herein sometimes referred to as the "Fixed Rent") at the rate of Ten Dollars (\$10.00) per annum.

Section 3.2. Tenant shall pay the Fixed Rent provided for in Section 3.1 hereof annually, in advance on the first day of each calendar year, commencing January 1, 1989, provided however, payment for 1988 shall be made upon execution of this Agreement.

Section 3.3. All payments of Fixed Rent and other sums required to be made to Landlord shall be in U.S. dollars and shall be paid to Landlord at its address hereinafter specified in Section 15.2 or to such other person and/or at such other place as Landlord may designate from time to time in writing.

Section 3.4. This Lease shall be deemed and construed to be a "net lease," and Tenant shall pay Landlord throughout the term of this Lease the Fixed Rent and other sums payable hereunder free of any charges, assessments, impositions or deductions of any kind and without abatement, deduction or set-off, other than those herein provided for.

ARTICLE 4

Impositions

Section 4.1. Throughout the term of this Lease, Tenant will pay or cause to be paid, as and when the same become due, all Impositions hereunder except that: (a) all Impositions for the fiscal or tax year in which the term of this Lease commences or expires shall be apportioned; and (b) where any Imposition is permitted by law to be paid in installments, Tenant may pay such Imposition in installments as and when each such installment becomes due. Landlord will, at Tenant's request, cooperate with Tenant to arrange to the extent reasonably possible for Tenant to receive notices of Impositions directly from the taxing or other authorities involved. Those Impositions which relate to Landlord and Tenant and their respective activities, and which cannot or will not be divided by the taxing authority will be paid by Landlord, and Tenant shall promptly reimburse Landlord for its appropriate pro rata share of such Imposition. Such pro rata share shall be determined by Landlord in consultation with Tenant and shall be based upon percent of acreage under lease or improvement valuation, as is appropriate to the Imposition. Landlord will promptly transmit to Tenant copies of all notices of Impositions received by Landlord (other than notices which purport to be copies of notices to Tenant). For purposes of Article 8 of this Lease, Tenant shall not be deemed in default hereunder for failure to pay or cause to be paid any Imposition of which Tenant does not have notice or is diligently contesting.

Section 4.2. When Impositions are solely related to Tenant and its activities, Tenant shall pay all Impositions directly to the taxing authority or other person entitled to receive the same.

ARTICLE 5

Improvements

Subject to any mortgages and/or liens on the Property pursuant to Section 7.1, title to all Improvements shall remain the property of Tenant.

ARTICLE 6

Use, Alterations, Access

Section 6.1. Without the prior written consent of Landlord, Tenant shall not use or occupy the Property for any purpose other than the operation of a manufacturing facility for the manufacture of zeolite products and purposes incidental thereto.

Section 6.2. Tenant, at its sole expense, shall (subject to any restrictions in agreements that Landlord or the Partnership may have with third parties, including lenders) have the right to make additions, alterations and changes in or to the Property, or to remove or salvage the Improvements, provided however, that Tenant shall not have the right to remove or salvage any Improvements so long as any mortgage or lien created on the Demised Land under Section 7.1 hereof shall be in full force and effect. Upon request of the Partnership, Landlord shall use its best efforts to obtain any consents of or waivers by such third parties to the extent necessary to enable the Tenant to do the foregoing, provided Landlord can do so at no cost to or obligation of Landlord. Tenant shall indemnify and hold Landlord harmless from and against any and all loss, liability or damage suffered by Landlord in his capacity as Landlord as a consequence of Tenant's removal or salvage of the Improvements as hereinbefore provided. Tenant will not do, permit or suffer any waste, damages, disfigurement or injury to or upon the Demised Land or any part thereof such that the Demised Land is no longer usable for the purposes herein permitted.

Section 6.3. Landlord hereby grants Tenant during the term hereof the easements set forth in Appendix A attached hereto. Such easements are granted for the purpose of Tenant's ingress, egress, and occupancy of the Demised Land, and for no other purpose. Tenant shall permit Landlord to have such access to the Property at all reasonable times as is reasonably necessary to permit Landlord to confirm Tenant's compliance with Tenant's Obligations hereunder and otherwise as is consistent with the agreements between Landlord and Tenant pertaining to the use and occupancy of the Demised Land.

Section 6.4. Tenant shall, at all times, use and occupy the Demised Land in accordance with all Legal Requirements provided however, that Tenant's good faith disagreement with any governmental agency concerning the applicability or scope of any such Legal Requirement(s) shall not be a violation of Tenant's Obligations hereunder unless and until Tenant, if it so elects, shall have exhausted its right to appeal or otherwise contest such Legal Requirement and its applicability to Tenant's occupation of the Demised Land; and provided further, that Tenant may not so postpone compliance with any Legal Requirement so as to subject Landlord to any fine or penalty or to prosecution for a crime or to cause the Property or any part thereof to be condemned, to be vacated or to become uninsurable. In a like manner, Landlord shall not postpone compliance with any Legal Requirements so as to subject Tenant to any fine or penalty.

Section 6.5. Landlord represents and warrants that to the best knowledge of Landlord all chemical and oil wastes, spills, remains, trash and other debris, hazardous, contaminated, or otherwise, placed or brought onto the property prior to the date of this Lease (collectively "Landlord Wastes") have been removed from the property in compliance with federal and state laws, and that no Landlord Wastes, in any form, remain on

the property. Landlord shall indemnify Tenant with respect to any costs, penalties or other liability with respect to any Landlord Wastes remaining on the Property. Upon termination of this lease, a letter will be furnished to Landlord from Tenant representing and warranting that to the best knowledge of Tenant all chemical and oil wastes, spills, remains, trash and other debris, hazardous, contaminated, or otherwise, placed or brought onto the Property during the term of the Lease (collectively "Tenant Wastes") have been removed from the Property in compliance with federal and state laws, and that no Tenant Wastes, in any form, remain on the Property. Tenant shall indemnify Landlord for any costs, penalties or any other liability that may be incurred as a result of Tenant's handling of Tenant Wastes being located on the Property.

Section 6.6. Landlord shall not be responsible or liable hereunder for any damage or injury to the Property or to Tenant, or for any accident or injury, including death, to any person or persons (including any of Tenant's servants, employees or agents) at any time on the Property, except (but only to the extent) as may be occasioned by the act of Landlord when acting in any capacity other than Partner.

Section 6.7. Notice is hereby given that Landlord shall not be liable under this Lease for any labor or materials furnished or to be furnished to Tenant upon credit, and that no mechanic's or other lien for any such labor or materials shall attach to or affect the estate or interest of Landlord as owner of Demised Land. Whenever and as often as any such lien shall have been filed against the Property or if any conditional bill of sale shall have been filed for or affecting any materials, machinery or fixtures used in the construction, repair or operation thereof, or annexed thereto by Tenant, Tenant shall forthwith take, or cause to be taken, such action by bonding, deposit or payment as will remove or satisfy the lien or conditional bill of sale.

ARTICLE 7

Assignment, Mortgage, Subletting

Section 7.1. Tenant shall not assign, mortgage, pledge, encumber, sublet or in any manner transfer (collectively, "Transfer") its interest in this Lease, or any part thereof, without the prior written consent of Landlord in each instance, which consent shall not be unreasonably withheld (subject to any restrictions in agreements that Landlord may have with third parties), and any attempt to do any of such acts without such consent shall be null and void and of no effect. Article 12 hereof constitutes such consent for the circumstances set forth therein. Upon request of the Partnership, Landlord, so long as it shall be a Partner, shall use its best efforts to obtain any such third-party consents or waivers necessary to enable Landlord validly to give its consent as aforesaid, provided Landlord can obtain the same at no cost or obligation to it. Upon obtaining any necessary third-party consents or waivers, Landlord, so long as it shall be a Partner, shall join in the execution of a mortgage which will encumber the Demised Land (and the interest of Landlord therein) and/or the Improvements for the purpose of enabling the Tenant to finance the acquisition or construction of any Improvements. During the existence of any such mortgage on the Demised Land Landlord shall hold a security interest in all Improvements to the extent of the mortgage. Landlord represents and warrants that, as of the date hereof, it has lawful title to the Demised Land free and clear of all liens, mortgages and encumbrances (except as the same may be imposed in connection with a transfer as aforesaid), and full power and authority to execute and perform this Agreement. Landlord further agrees that it will execute all papers necessary to give effect to an undertaking to obtain such mortgage(s), including the application papers which may be required by the proposed mortgagee(s); but such application papers shall contain a statement that Landlord shall not be rendered liable in its capacity as Landlord hereunder (as distinguished from its capacity as Partner of the Partnership) for the payment of the debt proposed to be secured by such mortgage(s).

Section 7.2. The making of any assignment, mortgage, pledge, encumbrance or subletting, in whole or in part, made in accordance with Section 7.1 hereof, shall not operate to relieve Tenant herein named from its Obligations under this Lease and, notwithstanding any such assignment, mortgage, pledge, encumbrance or subletting, Tenant herein named shall remain liable for the payment of all Fixed Rent and other sums and for the due performance of all of Tenant's Obligations under this Lease for the full term hereof.

Section 7.3. Landlord shall not assign, mortgage, pledge or encumber its Facility in any manner that contravenes the rights of Tenant under this agreement.

ARTICLE 8

Default Provisions

Section 8.1. This Lease and the term and estate hereby granted are subject to the limitation that:

A. whenever Tenant:

1. shall default in the payment of any installment of Fixed Rent, or any other sum payable by Tenant to Landlord on any day upon which the same is due and payable; or
2. shall default in the payment of any Imposition or other sum payable hereunder by Tenant, and if any such default under clause 1. or 2. shall continue for thirty (30) days after Landlord shall have given to Tenant a written notice which shall state that, "A default is hereby declared pursuant to Section 8.1.A. of the Lease of the Demised Land at Kansas City, Kansas, and unless the sum of _____ is paid to Landlord (or other appropriate payee) within thirty (30) days, Tenant's lease of said Demised Land will be terminated;" or

B. whenever Tenant shall do, or permit anything to be done, whether by action or inaction, contrary to any material covenant or agreement on the part of Tenant herein contained, or contrary to any of Tenant's Obligations under this Lease, or shall fail in the keeping or performance of any of Tenant's Obligations under this Lease, and Tenant shall fail to remedy the same within sixty (60) days after Landlord shall have given Tenant written notice specifying the same or, if such situation cannot be remedied within said sixty (60-) day period, Tenant shall fail to commence to take steps to remedy the same within said sixty (60-) day period or, having so commenced, shall thereafter fail to proceed diligently to remedy the same; or

C. whenever Tenant shall desert or abandon the Demised Land; or

D. whenever Tenant shall become a bankrupt, voluntarily or involuntarily;

then:

A. at any time after the date of the expiration of any such period of thirty (30) or sixty (60) days, as the case may be, after Landlord shall have given to Tenant a thirty (30-) or sixty (60-) day notice as hereinbefore provided and if Tenant shall not have taken the demanded action; or

B. at any time thereafter if Tenant shall have failed to proceed diligently to remedy the default; or

C. at any time after Tenant shall desert or abandon the Demised Land or become a bankrupt regardless of and notwithstanding the fact that Landlord has or may have some other remedy;

Landlord may give to Tenant a notice (the "Second Notice") of intention to end the term of this Lease specifying a day not less than ten (10) days thereafter, and, upon the day so specified, this Lease and the term and estate hereby granted shall expire and terminate as fully and completely and with the

same force and effect as if the day so specified were the date hereinbefore fixed for the expiration of the term of this Lease, and all rights of Tenant under this Lease shall expire and terminate, and Landlord may re-enter and repossess the Demised Land as set forth in Article 13, but Tenant shall remain liable for damages as may be hereinafter provided or otherwise determined.

Section 8.2. Landlord or Tenant may restrain any breach of the other's Obligations hereunder. The failure of Landlord or Tenant to insist upon the strict performance of any one of the other party's Obligations hereunder or to exercise any right, remedy or election herein contained or permitted by law shall not constitute or be construed as a waiver or relinquishment for the future of such Obligation, right, remedy or election, but the same shall continue and remain in full force and effect. Any right or remedy of Landlord or Tenant in this Lease specified upon breach of any of the other party's Obligations hereunder shall be a distinct, separate and cumulative right or remedy and no one, whether exercised or not, shall be deemed to be in exclusion of any other. Receipt or acceptance of any Rent by Landlord shall not be deemed to be a waiver of any default by Tenant in its Obligations hereunder or of any right which Landlord may be entitled to exercise under this Lease.

ARTICLE 9

Quiet Enjoyment

Landlord covenants that if and so long as Tenant duly keeps and performs each and every Obligation of Tenant hereunder, Tenant shall quietly enjoy the Demised Land without hindrance or molestation by Landlord and any person claiming by, through or under Landlord, subject to the covenants, agreements, terms, provisions and conditions of this Lease.

ARTICLE 10

Risk Management

During the term of this Lease, Tenant shall maintain a risk management program that will provide insurance or other arrangements mutually satisfactory to the Parties hereto and for the benefit of the Partnership, Partners and Parties hereto, as their interests may appear.

ARTICLE 11

Condemnation

Section 11.1. If at any time during the term of this Lease there shall be a Taking of all or substantially all of the Property, this Lease shall terminate and expire on the date of the Taking and the Fixed Rent and other sums payable hereunder shall be apportioned and paid to the date of the Taking. For purposes of this Article 11, "substantially all of the Property" shall be deemed to have been taken if the untaken portion of the Property cannot properly and economically be used or converted for use by Tenant for the purposes permitted by this Lease. In the event of any such Taking and the termination of this Lease, Landlord shall be entitled to receive such portion of the award or awards, together with the interest thereon, as shall be equal to the value (including compensation, damages, rent or otherwise) of the Demised Land so taken, and Tenant shall be entitled to receive such portion of the award or awards, together with the interest thereon, as shall be equal to the value (including compensation, damages, rent or otherwise) of the Improvements so taken.

Section 11.2. In the event of a Taking of less than all or substantially all of the Property, the term of this Lease shall not be reduced or affected in any way. Landlord shall be entitled to receive such portion of the award or awards, together with the interest thereon, as shall be equal to the value (including compensation, damages, rent or otherwise) of the Demised Land so taken, and Tenant shall be entitled to receive such portion of the award or awards, together with the interest thereon, as shall be equal to the value (including compensation, damages, rent or otherwise) of the Improvements so taken.

Section 11.3. If the order or decree in any condemnation or similar proceeding shall fail separately to state the amount to be awarded to Landlord for the particular Taking involved, and if Landlord and Tenant are unable to agree thereon within thirty (30) days after the final award or awards shall have been fixed and determined, such dispute shall be settled by arbitration in accordance with the rules of the American Arbitration Association.

ARTICLE 12

Term and Termination

Section 12.1. This Agreement shall terminate at the end of the term set forth in Article 1 or, subject to Section 12.5, upon termination of the Partnership Agreement, whichever is later.

Section 12.2. Upon termination of this Lease, Tenant shall peaceably and quietly leave, surrender and yield up unto Landlord the Demised Land but not the Improvements unless such Improvements shall be subject to the security interest provided in Section 7.1. All Improvements shall be removed from the Demised Land without prior written agreement with Landlord. With respect to the Demised Land, surrender thereof by Tenant shall be made free and clear of: (a) all lettings and occupancies other than subleases consented to by Landlord in writing; and (b) all agreements, easements, encumbrances or other liens, other than those to which this Lease was subject on its commencement and those created or consented to by Landlord in

writing other than at the request of the Partnership. Tenant shall execute and deliver to Landlord such deeds, assignments or other instruments of conveyance as Landlord may deem necessary to effectuate and evidence such ownership by Landlord.

Section 12.3. From and after any date upon which Landlord shall have specified in the Second Notice provided for in Article 8, Landlord may, without further notice, enter upon, re-enter, possess and repossess itself thereof, by summary proceedings, ejectment or otherwise, and may dispossess and remove Tenant and all other persons and property from the Demised Land and may have, hold and enjoy such land and the right to receive all rental and other income of and from the same. As used in this Lease the words "enter" and "re-enter" are not restricted to their technical legal meanings.

Section 12.4. In the event Landlord takes any action to sell its Facility surrounding the Demised Land and such action would interfere in any way with Tenant's rights under this Lease, then Tenant shall have a first right of refusal to acquire the Demised Land under conditions no less favorable than the terms of Landlord's agreement to sell its Facility.

Section 12.5. If Shell Polymers and Catalysts Enterprises Inc. or its successor or assignee under the Partnership Agreement ("SPACE") should purchase the complete Partnership interest of Landlord or its successor or assignee under the Partnership Agreement, then SPACE shall have the right to continue this Lease until the end of the term set herein or a total of not more than three (3) years, whichever is longer.

ARTICLE 13

Landlord's Lien for Rent

Notwithstanding anything in this Agreement to the contrary, it is hereby agreed that the Landlord shall have the first lien, paramount to all others, on every right and interest of the Tenant in and to this lease on any Improvements on the Demised Land or the equity of the Tenant therein, which lien is granted for the purpose of securing the payment of rents, Impositions and damages herein covenanted to be paid by the Tenant, and for the purpose of securing the performance of all and singular the covenants, conditions and Obligations of this lease to be performed and observed by the Tenant, subject only to any mortgages joined in by the Landlord pursuant to the terms hereof. Such lien shall be in addition to all rights of a Landlord given under the Statutes of the State of Kansas which are now or might hereafter be in effect.

ARTICLE 14

Indemnification

Section 14.1. Landlord agrees to indemnify, defend and hold harmless Tenant against all claims, damages, loss, liability, injury, fines, penalties and expenses (including reasonable attorney fees) of whatever kind or nature ("Claims"), suffered by persons, including employees of Landlord and Tenant, or property, including property of Landlord and Tenant, arising out of the acts or omissions of Landlord, Landlord's employees, officers or agents, and the operations of Landlord's plants or business surrounding the Demised Land, except to the extent that such Claims are the result of Tenant's negligence or willful misconduct.

Section 14.2. Tenant agrees to indemnify, defend and hold harmless Landlord against all claims, damages, loss, liability, injury, fines, penalties and expenses (including reasonable attorney fees) of whatever kind or nature ("Claims"), suffered by persons, including employees of Tenant and Landlord, or property, including property of Tenant and Landlord, arising out of the acts or omissions of Tenant, Tenant's employees, officers or agents, and the operations of Tenant's plant on the Demised Land, except to the extent that such Claims are the result of Landlord's negligence or willful misconduct.

Section 14.3. The obligations set out in this Article 14 shall survive the Termination of this Agreement for a period of ten (10) years.

ARTICLE 15

Miscellaneous

Section 15.1. Appropriate Sections of the Partnership Agreement, pertaining to Confidentiality; Force Majeure, Hardship; Disputes, Deadlock, Arbitration; Waiver; Governing Law; Severability of Provisions; Section Headings and References; Counterparts; and Amendments, respectively, are hereby incorporated herein by reference.

Section 15.2. All notices or demands under this Agreement, whether required by the terms hereof or otherwise, shall be in writing and shall be delivered or mailed by certified mail to the following addresses of the parties or to such other addresses as may be hereafter designated in writing by the respective parties:

If to Tenant:

Shell Polymers and Catalysts Enterprises Inc.
One Shell Plaza
P. O. Box 4601
Houston, TX 77210-4601
Attention: President

and

Zeolyst Enterprises
c/o PQ Corporation
P.O. Box 840
Valley Forge, PA 19482
Attention: PQ General Manager

If to Landlord:

PQ Corporation
Valley Forge Executive Mall
P.O. Box 840
Valley Forge, PA 19482
Attention: President, Specialty Chemicals Group

Section 15.3. This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of each of the parties hereto; provided however, that except as provided by Section 12.1 hereof, neither this Agreement nor any claim or interest arising directly or indirectly out of or in connection herewith shall be assignable by Tenant without the written consent of Landlord, which consent shall not unreasonably be withheld in the case of an assignment to an Affiliate.

Section 15.4. This Agreement, together with the Appendices hereto, and the Partnership Agreement (including its Exhibits and Appendices), embody the entire agreement of the parties with respect to the subject matter hereof and supersede all prior understandings and agreements of the parties, whether written or oral, relating to all or part of the subject matter hereof.

IN WITNESS WHEREOF, the parties hereto have duly executed this instrument as of the date first above written.

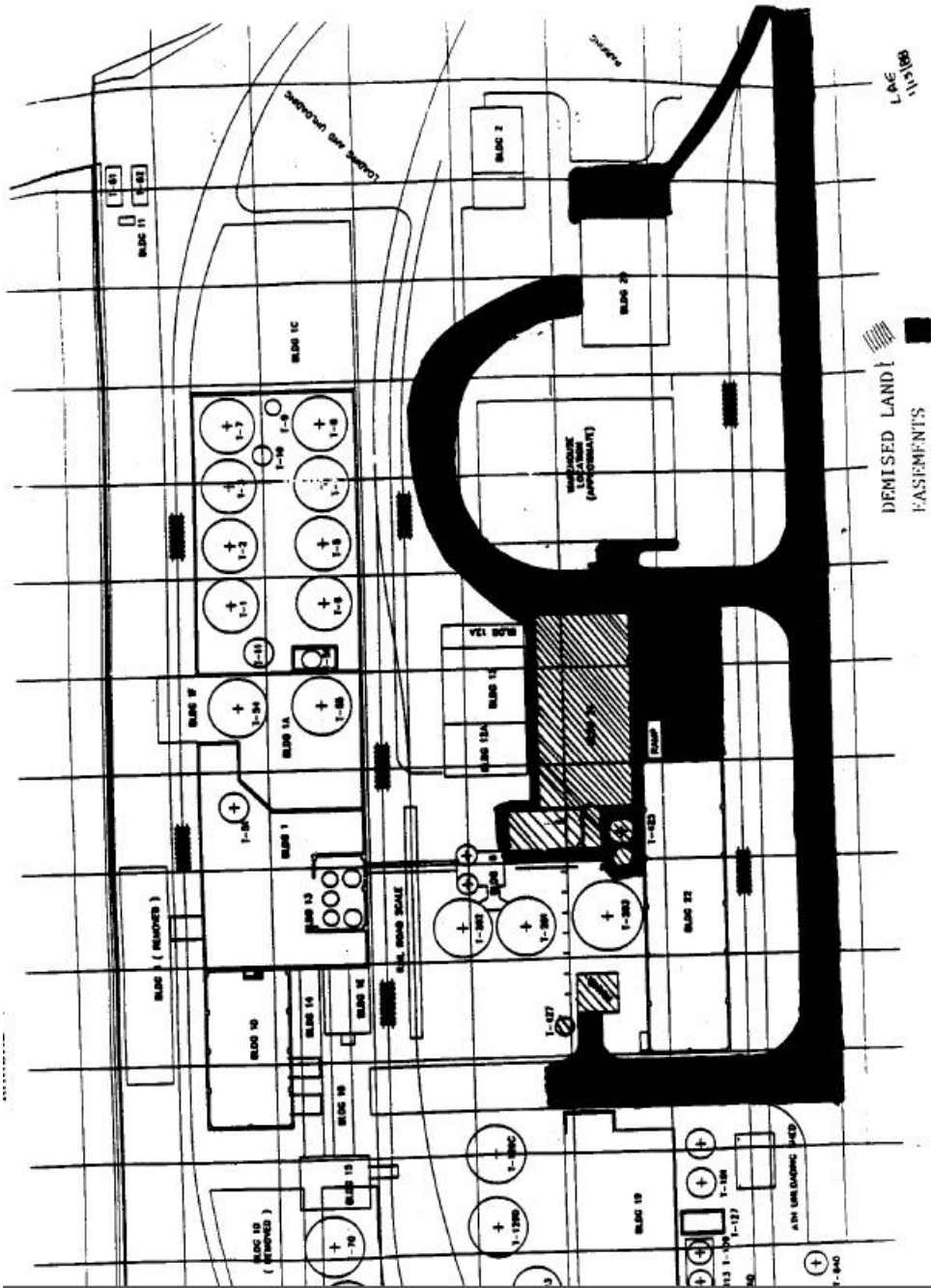
PQ CORPORATION

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

KANSAS CITY PLOT PLAN — JOINT VENTURE (PQ/SHELL) DEMISED LAND & EASEMENTS



BILL OF SALE
PQ IMPROVEMENTS TO DEMISED LAND

KNOW ALL MEN BY THESE PRESENTS, PQ CORPORATION, a corporation organized under the laws of the Commonwealth of Pennsylvania ("Seller"), in consideration of Nine Million Nine Hundred Thousand Dollars (\$9,900,000) the receipt of which is hereby acknowledged, does hereby unconditionally and irrevocably grant, convey, bargain, assign, sell, transfer and deliver unto ZEOLYST ENTERPRISES, a partnership organized under the laws of the State of Kansas ("Buyer") all of Seller's right, title and interest in all of the buildings, structures and machinery, apparatus, equipment, fittings, personal property and fixtures ("Improvements") as more fully set out in Appendix A hereto, presently located on the Demised Land on the site of Seller's facility in Kansas City, Kansas; such Demised Land being more specifically defined in the Lease Agreement of even date herewith between the parties.

1. Buyer, its successors and assigns shall have and hold all of said Improvements to its and their own use and benefit, forever.
2. All Improvements conveyed hereunder are sold "as is," "where is," and "as they stand," and Seller makes NO WARRANTIES, express or implied, with respect to said Improvements; however, Seller WARRANTS that it has good title to all Improvements and that they shall be delivered free of any security interest or lien or encumbrance.
3. Seller represents that:
 - a. There are at the date of this Agreement no actions, suits, governmental investigations or proceedings pending or, to the knowledge of Seller, likely to be instituted prior to the closing of this transaction, against Seller related to these Improvements;

b. Seller as at the date of this Agreement, has no liabilities or obligations of any nature, whether absolute, accrued, contingent or otherwise, associated with these Improvements;

c. To the best of Seller's knowledge, Seller has acquired all permits, approvals or consents necessary to the operation of the Improvements in accordance with all applicable environmental laws and regulations other than the operating permit for an afterburner for the tray calciner, which is in the final administrative approval stages.

4. But for paragraph 6 herein, the representations, warranties and agreements of the Seller and Buyer made herein shall survive the consummation of the sale of Improvements until December 31, 1988.

5. From time to time, at the Buyer's request (whether at or after the Closing and without further consideration), the Seller will execute and deliver such further instruments of conveyance and transfer and take such other action as the Buyer reasonably may request to more effectively convey and transfer any of the property to be sold hereunder, and will assist the Buyer in the collection or reduction to possession of such property. From time to time, at Seller's request (whether at or after Closing and without further consideration), the Buyer will execute and deliver such instruments and take such other action as Seller reasonably may request to effectuate the obligations of Buyer hereunder.

6. Seller agrees to indemnify, defend and hold harmless Buyer from:

a. Any and all liabilities of the Seller, or liabilities which arise from, or in connection with, the conduct or operation of Seller's business or the ownership or leasing of Seller's properties by Seller prior to the Closing Date, whether any such liabilities are accrued, absolute, contingent, future, latent or patent (including, without limitation, liabilities for defective products sold prior to the date of Closing or liabilities for environmental damage or cleanup arising from activities, acts or omissions prior to the date of Closing);

b. any and all damages or losses arising from any misrepresentation, breach of warranty, or nonfulfillment of any agreement or covenant made on the part of the Seller pursuant to this Agreement; and

c. any claims or causes of action brought by any of Seller's employees or former employees arising out of their employment with Seller.

IN WITNESS WHEREOF, Seller and Buyer have caused these presents to be signed and sealed by their duly authorized representatives, effective as of February 1, 1988.

PQ CORPORATION

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

APPENDIX A

TO

BILL OF SALE

PQ IMPROVEMENTS TO DEMISED LAND

“Improvements” to the Demised Land shall be the buildings, structures and machinery, apparatus, equipment, fittings, personal property and fixtures which are erected or located on the Demised Land at the time of sale, and are otherwise needed for the proper and safe function of the Improvements as a Zeolite/Catalysts Plant.

The principal articles subject to the sale transaction set out in this Bill of Sale are listed below.

<u>Item</u>	<u>Vendor</u>	<u>Tag No.</u>
Tank Agitators	Chemineer Inc.	A-407 A-423 A-424
Cake Crusher	Franklin Miller	CR-400
Air Dryer	C.M. Kemp Mfg.	D-402
Cooling Tower	Marley	CT-400
Ion Exch. Tk. Htrs.	Harrington Robb Co.	—
Process Tanks	Aquatech Int.	T-407 T-424 V-423
Shell & Tube Heat Exchangers	Doyle Roth	HE-403 HE-404 HE-424
Recip. Air Comp.	Ingersoll Rand	C-402
Autoclave Agitators	Chemineer	A-402 A-494
Delonizer	Hydromax	DI-400

Appendix A (cont.)

Item	Vendor	Tag No.
Hot Oil Heater and Pump	Alberts & Assoc.	HE-4
Screw Conveyors	Air Eng. Systems	P-
Plate Heat Exchanger	Harrington Robb	SC-401
Ion Exchange Tanks	R. W. Fox Co.	SC-402
Effluent Tank Autoclave	Luthy Bros. Inc.	HE-402
Vacuum Receiver	Alpha Tank & Metals	T-405, 427
Process Pumps	The Duriron Co.	T-412-416
Fluid Bed Calciner System	Procedyne Corp.	418-424
Filter Press	The Duriron Co.	418-421
Filter Plates	Lenser America, Inc.	T-425
Vacuum Filter System	Komline Sanderson	V-403
Mix Mullers	Kercher Industries	V-402
Tray Calciner	Day Engineering Co.	P-402, 403,
Extruder/Feeder	The Bonnot Co.	405, 412,
Fugitive Scrubber	Croll-Reynolds	418, 424,
		425, 426
		D-400
		CH-400
		HE (SB-401)
		SB-401
		B-401
		B-402 A/B,
		AL(-CH-400)
		AL(-D-400)
		F-401
		F-402
		T(F-402)A
		P(F-402)A
		C(F-402)
		mm-401A/B
		D-401
		Ex-401
		FD-401
		SB-402

Appendix A (cont.)

Item	Vendor	Tag No.
Heat Exchanger	Harrington Robb	HE-427
Scrubber Blower	Mutimer Co.	B-403
Filter Feed Pump	Duriron Co.	P-401
600 gal. Autoclave	Machinery & Equip. Corp.	V-494
Catalyst Plant Seal System	Duriron Co.	HE(x-401)
		P(x-401)
		T(x-401)
Platform Scales	Accu-Rate Weighing	—
Reslurry Pump	Romac	—
Flash Dryer	Fluid Energy Processing	—
Flash Dryer Feeder	Acrison, Inc.	—
Product Baghouse	Mikro-pul Corp.	—
Live Bottom Bin	Vibra-Screw	—
Nuisance Dust Collector	Smoot	—
Anchor Agitator	Chemineer	A-494A
Exhaust Blower For F-410	Cincinnati Fan	—
Belt Conveyor	Air Eng. Systems	61-6013-003
Nitric Acid Pump	Crane-Chempump	61-6013-005
Scale	Accurate Scale Co.	61-6013-016
Screener Parts	Midwestern Industries	61-6013-017
Economizer	Thermal Transfer	61-6810-001
Tail Gas Incinerator	John Zink Co.	61-7053-025
Extruder Die Plates	The Bonnot Co.	61-7053-022

PQ SERVICES AGREEMENT

This SERVICES AGREEMENT dated as of February 1, 1988, by and between PQ CORPORATION, a Pennsylvania corporation ("PQ"), and ZEOLYST ENTERPRISES, a partnership organized under the laws of the State of Kansas (the "Partnership");

W I T N E S S E T H :

WHEREAS, it is the intention of the Partnership to own and operate the Plant at the Plant Site at Kansas City, Kansas, for the production of Products;

AND WHEREAS, the Partnership desires to obtain services from PQ which are necessary for the operation of the Plant and for the production of Products at the Plant, and PQ desires to furnish such services;

NOW THEREFORE, in consideration of the premises and mutual covenants and agreements set forth herein, the parties hereto hereby covenant and agree as follows:

ARTICLE 1

Definitions

Section 1.1. General. Capitalized terms used in this Service Agreement (the "Agreement"), but not expressly defined herein, shall, for all purposes of this Agreement, as the same may be amended or supplemented from time to time hereafter, have the same meanings as specified in the Partnership Agreement.

Section 1.2. Allowable Costs. "Allowable Costs" shall mean PQ's costs and expenses actually and necessarily incurred by PQ in the provision of Reimbursable Services, and penalties and charges under Section 2.3 hereof. Notwithstanding anything herein to the contrary, Allowable Costs shall not include (a) costs or expenses paid or incurred in connection with the provision of Overhead Support; (b) taxes on revenues, earnings or profits of, or franchise or like taxes of PQ, regardless of where or by whom assessed; or (c) any amounts greater than the yearly budgeted amounts for Services, unless specifically approved in advance by the Management Committee.

Section 1.3. Effluent Discharge. “Effluent Discharge” shall mean sanitary waste and surface water from or relating to the Plant or the Plant site, and process water from the Plant if necessary.

Section 1.4. Insurance. “Insurance” shall mean the insurance coverage contemplated by Section 2.8.

Section 1.5. Overhead Support. “Overhead Support” shall mean the provision, whether at the Plant site or elsewhere, or both, of all administrative, supervisory (exclusive of the General Managers) and overhead support services as identified in Paragraph 2 of Exhibit A hereto, together with the provision of attendant equipment, materials, furnishings and supplies that are necessary in the exercise of good manufacturing or business practices to operate the Plant for the conduct of the business of the Partnership and the manufacture of Products as hereinafter provided. The scope of services listed in Paragraph 2 of Exhibit A shall be conclusively determined by the Management Committee.

Section 1.6. Partnership Agreement. “Partnership Agreement” means the Partnership Agreement, dated as of the date hereof, between PQ Corporation and Shell Polymers and Catalyst Enterprises Inc. (SPACE).

Section 1.7. Plant. “Plant” shall mean the Zeolite/Catalyst Plant purchased by The Partnership from PQ and located in Kansas City, Kansas.

Section 1.8. Plant Manager. “Plant Manager” shall mean the person designated by PQ who is responsible for the overall technical and administrative operations of the Plant on behalf of the Partnership.

Section 1.9. Plant Personnel. “Plant Personnel” shall mean all personnel engaged in providing Reimbursable Services at the Plant Site including the Plant Manager, exclusive of the Technical Manager and the General Managers.

Section 1.10. Products. “Products” shall mean Zeolites and Zeolite-containing Catalysts as defined in the Partnership Agreement.

Section 1.11. Reimbursable Services. “Reimbursable Services” shall mean: (a) the services (and attendant equipment, materials, furnishings, and supplies, excluding raw material supply), listed in Paragraph 1 of Appendix A hereto (including disposal of Effluent Discharge and provision of Plant Personnel, Insurance and Utilities); and (b) the other direct services specifically rendered at the Plant on approval and request by the Partnership, whether or not of the character listed. Reimbursable Services shall not include any items of Overhead Support; however, it shall include extraordinary support services specifically approved by the General Managers although not within the services required to operate a manufacturing facility in the ordinary course of business. The extent and cost of Reimbursable Services shall in each year be subject to a yearly operating budget to be established by the Partnership Management Committee, and any costs category which is to be exceeded by more than ten percent (10%) shall require the express prior consent of the Management Committee.

Section 1.12. Services. “Services” shall mean the provision of Overhead Support and Reimbursable Services.

Section 1.13. Utilities. “Utilities” shall mean all utilities necessary to operate the Plant and manufacture the Products, including but not limited to process/drinking water, electricity, natural gas, and, in case of emergency, steam and compressed air.

ARTICLE 2

Provision of Services

Section 2.1. Generally. PQ shall use its best efforts to provide Services to the Partnership in an efficient and timely manner and of a quantity and quality necessary to operate the Plant in a skillful and workmanlike manner and manufacture the Products in quantities requested by the Partnership.

Section 2.2. Preference to the Partnership. As to Services rendered or to be rendered by PQ to the Partnership that are similar to those performed or to be performed by PQ for its own use at the PQ Facility, the obligations of PQ to the Partnership hereunder shall take equal priority with respect to services by PQ to the PQ Facility. However, any utility allocations established with utility companies will be adhered to. In the event PQ is unable to provide all or part of the Services required by the Partnership in a timely or satisfactory manner, the Partnership shall have the right on reasonable notice to PQ to refuse or terminate some or all of such Services by PQ and to provide additional, substitute or optional services at or for the Plant site. In the event PQ is unable to provide Services to the Partnership because of increased demand, the Partnership shall reimburse PQ for actual costs or expenses suffered as a consequence of such action by the Partnership.

Section 2.3. Service Estimates. Prior to October 1 of each year the Partnership shall provide PQ with its best estimate (based on consultations with PQ) of Partnership needs and Service requirements for the next succeeding calendar year, with the exception of the first year; PQ shall provide the Partnership with its best estimate for the first year. PQ shall develop an operating budget for the Plant based upon production requirements and the provision of necessary Services. The Partnership shall provide PQ thirty (30) days before the beginning of each calendar quarter its estimate of the production requirements for that quarter. The Partnership shall have no responsibility hereunder to present more particular production estimates; however, it shall cooperate and provide information reasonably requested by PQ in order to provide Services for the production of Products. Any third-party penalties or like charges incurred by PQ as a consequence of PQ cancelling Reimbursable Services that had been reserved or obtained by it in anticipation of meeting the Partnership's estimated Product requirements under this Section 2.3, and which had not been utilized as a consequence of the Partnership's actual Product requirements being lower than the estimates thereof, shall constitute an Allowable Cost hereunder, provided such Reimbursable Services had been reserved or obtained by PQ on the terms and at the time called for in the exercise of good business judgment. PQ shall use its best efforts to avoid such costs or utilize such Reimbursable Services to meet other PQ requirements.

Section 2.4. Credits. In connection with its provision of Reimbursable Services, PQ shall, to the best of its ability, take all cash and trade discounts, rebates, allowances, credits, commissions and other amounts (including any interest thereon) (collectively "Credits"), which Credits shall be paid or credited by PQ to the Partnership. In determining Allowable Costs, there shall be deducted from costs and expenses incurred and paid by PQ Credits which have accrued to the benefit of PQ.

Title to all property purchased by PQ the cost of which is an Allowable Cost hereunder shall pass to and vest in the Partnership at such time as title thereto is relinquished by the vendor thereof. The Partnership shall be consulted regarding negotiations and contracts with third parties concerning provision of all major Services.

Section 2.5. Accident Prevention. In order to provide safety controls for protection of the life and health of the employees and other persons, for prevention of damage to property, materials, supplies and equipment, and for avoidance of work interruptions at the Plant site, PQ shall take or cause to be taken such measures as shall be reasonably necessary for such purposes.

Section 2.6. Utilities. Utilities, in accordance with specifications to be approved by the Management Committee, shall be furnished to the Partnership at the Plant site.

Section 2.7. Meters. PQ at the expense of the Partnership shall install measurement devices for the Plant that will accurately calculate the quantity of individual Utilities consumed at the Plant. At least twice annually, the Partnership shall cause such devices to be examined and calibrated as necessary.

Section 2.8. Insurance.

A. PQ shall develop an appropriate risk management program and present the same to the Management Committee for approval. The program will address insurance coverage and cost satisfactory to the Partnership and shall name SPACE and PQ as additional insureds where appropriate. The insurance provisions may be changed at the direction of the General Managers.

Initially these coverages shall be as follows:

1. Worker's Compensation insurance.
2. Automobile Liability Insurance.
3. Such other insurance coverage as the Management Committee may direct from time to time.

B. SPACE and PQ shall provide insurance on their own behalf in accordance with their own established program and policy.

Section 2.9. Plant Personnel. All Plant Personnel shall be maintained on the payroll of PQ, and shall be paid wages or salary and benefits consistent with the skills required for operation of the Plant. All modifications of wages, salaries and benefits shall be made by PQ in accordance with its practices and obligations from time to time generally in effect. General Plant staffing is to be approved by the General Managers in accordance with the Partnership's yearly operating budget.

Section 2.10. Information. PQ shall keep the Partnership currently advised of all matters pertaining to its performance of this Agreement.

Section 2.11. Quality Assurance. The Partnership will establish quality assurance procedures and criteria. Plant Personnel will do the actual sampling and testing in accordance with written procedures provided by the Partnership. The Partnership shall have the right to supervise and approve the taking and shipment of any sample for acceptance by a customer.

ARTICLE 3

Payments

Section 3.1. Payment. Subject to Section 3.2, 3.3, and 3.4, the Partnership shall pay PQ the Allowable Costs of Services rendered as follows.

Section 3.1.1. Utilities. The Partnership shall pay PQ monthly for Utilities furnished hereunder at the average billing rate for usage charged by the respective Utility companies to PQ for Utilities. Additionally the Partnership shall reimburse PQ for:

1. any charges or penalties assessed as a direct result of: (a) failure of Partnership to utilize Utilities in accordance with Partnership forecasts; or (b) Partnership use of Utilities in excess of rates or quantities established by the utility; and
2. the pro rata share of all costs for non-routine maintenance incurred by PQ to maintain Services and Utilities to the PQ Facility and the Plant based upon actual consumption by PQ and Partnership; provided however, that any major investment cost will require the prior approval of the Partnership, which shall not be unreasonably withheld. For non-emergency maintenance and major investments it is expected that these costs will ordinarily appear in the Plant operating budget.

For the consumption of steam and/or compressed air from alternate sources in the event of an emergency PQ shall charge to the Partnership its actual cost.

Section 3.1.2. Effluent Discharge. In the event that PQ furnishes treatment in respect of Effluent Discharge, the Partnership shall pay PQ an amount based upon the actual cost to PQ of such treatment. Additionally, the Partnership shall be ultimately responsible and shall reimburse PQ for any extraordinary payments, fines, contributions or charges directly related to any discharges from the Plant, unless caused by gross negligence or willful misconduct on the part of Plant Personnel.

Section 3.1.3. Plant Personnel. The Partnership shall pay PQ Allowable Costs equal to the pro rata share of the aggregate wages and salaries and costs of benefits of all Plant Personnel, as and when incurred by PQ, including any arbitration or other awards associated with labor disputes directly related to the Plant; provided however, such payments will exclude fines or penalties related to unfair labor practices.

Section 3.1.4. Maintenance. The Partnership will reimburse for the Allowable Costs of providing maintenance hereunder.

Section 3.1.5. Additional Costs. The partnership shall reimburse PQ monthly for charges for extraordinary overhead or direct costs in each case specifically agreed to in writing by the Management Committee, not otherwise reimbursed pursuant to Sections 3.1.1 through 3.1.4.

Section 3.1.6. Fee. In addition to the amounts payable as aforesaid, the Partnership shall pay PQ a quarterly fee ("Fee") payable on the first day of the second month of each quarter. This fee for February/March 1988 shall be payable March 31, 1988. The Fee includes full compensation of PQ for its costs in providing Overhead Support, and may be adjusted at the beginning of each calendar year commencing January 1, 1989, based on levels of Overhead Support approved annually by the Management Committee. The Start-Up Cost set forth in Appendix A, paragraph 3, shall be payable in two (2) equal installments on March 31, 1988, and June 30, 1988.

Section 3.2. Accounts of Reimbursable Services; Periodic Reviews. PQ will establish and maintain an accounting system for the Plant and PQ's activities hereunder, which system (subject to Section 3.4) will constitute the primary basis for calculating all amounts due PQ hereunder, and will meet at least the following criteria:

A. The system will have the capability of segregating expenses in such a manner as to provide the Partnership with an accurate accounting of such amounts;

B. The system will conform with generally accepted accounting principles which will be consistently applied; and

C. The system will not charge the following expenses, directly or indirectly as Allowable Costs due PQ hereunder (and such expenses will be excluded therefrom hereunder):

1. depreciation on the Plant;
2. income, franchise, gross receipts or similar taxes of PQ;
3. research expense;
4. interest expense (except when paid by PQ as an Allowable Cost);
5. capital expenditures, unless set forth in the operating budget or otherwise approved by the Management Committee; or
6. expense of Overhead Support.

The accounting practices and procedures proposed to be implemented shall be approved by the Management Committee.

Section 3.3. Production Cost System—Periodic Reviews. PQ shall use and maintain a production cost system for the Partnership's production of Products. The system shall have the capability of segregating all respective costs of the Zeolites and Zeolite Catalyst Products and will conform with generally accepted accounting principles which will be consistently applied.

Section 3.4. Audit. PQ shall keep such full and detailed books, records and other evidence as will enable the Partnership and/or SPACE to audit and verify all amounts paid or payable to PQ for Reimbursable Services hereunder. Once each calendar year, the Partnership and/or SPACE may require, at its expense, an independent audit of PQ's books and records related to Reimbursable Services hereunder. In each such case,

the accountants will issue to the Partnership a certified written report of their findings, a copy of which will be sent to PQ. Such report will only state the conclusions of the accountants and will not disclose any underlying data; provided however, that with the consent of PQ (not to be unreasonably withheld) such report may disclose such underlying data as may be necessary for or desired by the Partnership in connection with the preparation of any federal, state, or local tax return.

Section 3.5. Review. At the end of calendar year 1990 and thereafter, but no more often than once every two (2) years, PQ's actual costs to provide Overhead Support services shall be reviewed to determine whether they reflect actual cost. If it is determined they are not provided at cost, an adjustment in the Annual Fee for the subsequent year will be made to correct for actual costs to PQ. If agreement on the review and/or the adjustment is not resolved, either party may require an audit at the Partnership's expense, and thereafter the matter may be submitted by either party to arbitration for resolution.

ARTICLE 4

Compliance with Laws; Liens

Section 4.1. Laws. In performing its obligations under this Agreement, PQ shall comply with all federal, state, county, municipal and other governmental statutes, laws, rules, orders, permits, licenses, regulations, ordinances, judgments, decrees, directions and injunctions affecting the Partnership, the Plant site and the Zeolite products; provided however, that PQ's good faith disagreement with any government agency concerning the applicability or scope of any such legal requirement shall not be a violation of this Agreement.

Section 4.2. Liens. PQ shall promptly pay all of its indebtedness for labor, tools, materials, equipment, services and supplies used in performing its obligations under this Agreement. Except for liens or charges which the Partnership and PQ jointly determine to contest, PQ shall not permit any third-party lien or charge relating to PQ's performance under this Agreement to attach in respect of the Plant Site during the term of this Agreement; provided however, that if any lien or charge shall so attach and shall not have been caused so to attach by the Partnership, PQ shall cause such lien or charge to be removed, if necessary, in the name and on behalf of the Partnership. If any amounts due in connection with the provision of a Reimbursable Service are not paid promptly by PQ or any of its sub-contractors, as the case may be, the Partnership may in its discretion and with notice to PQ, withhold from payments otherwise due to PQ an amount equivalent to such amounts due, and pay such amounts itself.

ARTICLE 5

Indemnity

A. The Partnership shall indemnify PQ under this Agreement from and against any and all liabilities, obligations, losses, damages (including but not limited to special and consequential damages, damage to property and loss of profits), penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever which are imposed on or asserted against PQ either directly or indirectly by third parties and/or the Partnership arising from the performance or non-performance of Partnership activities under this Agreement, excluding willful misconduct and/or gross negligence of Plant Personnel or PQ.

B. The Partnership shall indemnify PQ from and against any and all liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever which are imposed on or asserted against PQ by third parties and/or the Partnership in connection with the performance or nonperformance of Partnership activities by PQ employees other than Plant Personnel under this Agreement, other than those which have arisen as a direct result of the gross negligence or willful misconduct of PQ or such PQ employees.

C. Notwithstanding Paragraphs A. or B., the Partnership will not indemnify, defend or save PQ harmless from or against any damages, consequences or otherwise to the PQ Facility or against any third-party claims arising from PQ operations at the PQ Facility.

D. The limitations and obligations set forth in A., B. and C. above shall in no manner preclude or restrict PQ from bringing any action against the Partnership in law or in equity related to claims, liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever which may be suffered by PQ whether caused by PQ employees performing work for the Partnership under the Agreement or otherwise.

E. PQ shall indemnify the Partnership from and against any and all liabilities, obligations, losses, damages, penalties, actions, judgments, suits, costs, expenses or disbursements of any kind or nature whatsoever which are imposed on or asserted against the Partnership by third Parties and/or PQ in connection with and arising out of PQ operations at the PQ Facility unrelated to activities directly in support of the Partnership except to the extent such are caused by the negligence or misfeasance of the Partnership.

ARTICLE 6

Labor Disputes

Whenever PQ has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this Agreement, PQ shall immediately give notice thereof, including all relevant information with respect thereto, to the General Managers. As used in this ARTICLE 6 and in ARTICLE 3, "labor dispute" means any controversy involving wages, hours or working conditions and includes any strike, picketing, lockout work stoppage or work suspension or slow-down.

If PQ's performance of this Agreement is excused by virtue of a labor dispute which directly affects the Plant, the Partnership shall (unless prohibited by law) have the immediate right to provide alternative personnel or services to operate the Plant during the pendency of such labor disputes.

ARTICLE 7

Term and Termination

Section 7.1. Term of Agreement. This Agreement shall terminate upon termination of the Partnership Agreement; provided however, in the event one Partner or its Affiliate shall be the Purchasing Partner of the Partnership pursuant to the Partnership Agreement it shall, as the Purchasing Partner, have the option to renew this Agreement for one three- (3-) year term provided it shall give sixty (60) days notice to PQ of such intent.

Section 7.2. Effect of Termination. Termination of this Agreement shall not terminate the obligation to make any payment that may be due at that time, or the parties' respective covenants under Section 4.2, and ARTICLE 5 hereof or the Partnership Agreement (relating to confidentiality).

ARTICLE 8

Miscellaneous

Section 8.1. Incorporation by Reference. Sections of the Partnership Agreement pertaining to Confidentiality; Force Majeure, Hardship; Disputes, Deadlock, Arbitration; Waiver; Governing Law; Severability of Provisions; Section Headings and References; Counterparts; and Amendments, respectively, are hereby incorporated herein by reference; provided that a waiver and amendment of this Agreement may also be effected as provided in the Partnership Agreement.

Section 8.2. Unity of Agreement and Appendices. This Agreement (including its Appendices) embodies the entire agreement of the parties with respect to the subject matter hereof and supersedes all prior understandings and agreements of the parties, whether written or oral, relating to all or part of the subject matter hereof.

Section 8.3. Notices. All notices, requests, demands and other communications under this Agreement, whether required by the terms hereof or otherwise, shall be in writing and shall be deemed to have been duly given if delivered personally or mailed by certified mail to the following addresses of the parties or to such other addresses as may be hereafter specified by written notice given as aforesaid to the other parties:

If to the Partnership:

Zeolyst Enterprises

Attention: General Manager

cc: Shell Polymers and Catalyst Enterprises Inc.
P.O. Box 2463
HOUSTON TX 77252
Attention: President

cc: PQ CORPORATION
P. O. Box 840
VALLEY FORGE PA 19482
Attention: President, Specialty Chemicals Group

If to PQ:

PQ CORPORATION
P. O. Box 840
VALLEY FORGE PA 19482
Attention: President, Specialty Chemicals Group

Section 8.4. Assignment. This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of each of the parties hereto; provided however, that except as set forth in Section 7.1 hereof and the Partnership Agreement, neither this Agreement nor any claim or interest arising directly or indirectly out of or in connection herewith shall be assignable by either party or by operation of law without the written consent of the other party, which consent shall not unreasonably be withheld in the case of an assignment to an affiliate that controls, is controlled by or is under common control with the assignor.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the date and year first above written.

PQ CORPORATION

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

APPENDIX A
to
SERVICES AGREEMENT

<u>Services</u>	<u>Cost Basis</u>
1. <u>Reimbursable Services</u>	
1.1 Employment Costs for Plant Personnel <u>(Salaries, wages, taxes, fringes)</u>	Actual
Operating Personnel including: Plant Management Maintenance Personnel Shipping/Receiving QA/QC Personnel (Chemists, Lab Techs) Office Personnel	
1.2 Employment Costs for non-Plant Personnel <u>(Salaries, Taxes, Fringes)</u>	Actual
<u>Providing Plant Support</u> R&D Personnel Engineering Personnel	
1.3 <u>PQ Services at Partnership Facility</u>	Actual
Communications Fire, Safety, Pollution Control, Waste Treatment Packaging and Shipping Fire Brigade Medical Service Station Warehousing Parts for Repair and Maintenance* Office Supplies Electricity and Steam PQ Purchased Raw Materials Travel R&M, Outside Contractors	
1.4 Equipment and Associated Expenses <u>for Debottlenecking and Expansion</u>	Actual

*At replacement cost

Appendix A (cont.)

Services	Cost Basis	Annual Cost*
2. Overhead Support		
2.1 <u>Finance and Accounting</u>		
a. Treasury	Fee	\$ 56,000
b. Controller	Fee	100,000
2.2 <u>MIS</u>	Fee	32,000
2.3 <u>Physical Distribution</u>	Fee	72,500
Operation Planning (Inventory)		
Distribution Planning		
Transportation (Traffic)		
Procurement		
2.4 <u>Employee Relations</u>	Fee	62,830
2.5 <u>Environmental, Health & Safety</u>	Fee	26,500
2.6 <u>Legal</u>	Fee	12,500
2.7 <u>Customer Service</u>	Fee	20,000
		<u>\$382,330</u>
3. Start-Up Cost		\$100,000**

*To be prorated for 1988 for 11 months

**For 1988 only

SUPPLY AGREEMENT
PQ PRODUCED MATERIALS

This SUPPLY AGREEMENT, dated as of February 1, 1988, by and between ZEOLYST ENTERPRISES, a Kansas partnership (hereinafter the "Partnership") and PQ Corporation, a Pennsylvania corporation (hereinafter "PQ");

W I T N E S S E T H :

WHEREAS, Sodium Y Zeolite and Ammonia Y Zeolite ("Products") and other zeolites are essential to the production of Catalyst Products;

AND WHEREAS, this Supply Agreement is executed simultaneously with a Partnership Agreement between PQ and Shell Polymers and Catalysts Enterprises Inc. ("SPACE");

AND WHEREAS, PQ, a producer of Products, desires to sell certain quantities thereof;

AND WHEREAS, the Partnership has requirements for and desires to purchase Products;

NOW, THEREFORE, the Partnership and PQ hereby covenant and agree as follows:

ARTICLE 1

Definitions

Capitalized terms used in this Supply Agreement (the "Agreement") except as expressly defined herein, shall, for all purposes of this Agreement, as the same may be amended or supplemented hereafter, have the same meanings as in the Partnership Agreement dated as of the same date by and between PQ and SPACE.

ARTICLE 2

Sale and Purchase

Section 2.1. PQ shall sell to the Partnership and the Partnership shall purchase from PQ, Products (as defined in Appendix A, and as agreed to from time to time) produced by PQ at the PQ Facility in Kansas City using the PQ Process and the same raw materials as in 1987 without prior qualification of replacement products.

Section 2.2. PQ agrees to supply and the Partnership agrees to purchase the Partnership's requirements for Products for conversion to Zeolites and Zeolite-containing Catalysts; provided however, PQ's actual commitment for any calendar year will be agreed upon no later than October 15 of the prior year based upon the Partnership's production estimates for the next calendar year.

Section 2.3. The Partnership shall notify PQ at least forty-five (45) days before each calendar quarter of its requirements for Products for the next quarter, which notice shall be deemed a firm order. At the same time, the Partnership shall notify PQ of the Partnership's estimated requirements for the next succeeding quarter; however, such notice shall not be binding.

Section 2.4. PQ shall have the right of first refusal to provide all additional zeolite requirements of the Partnership for conversion to Zeolites and Zeolite-containing Catalysts. In the event a third party proposes to supply such zeolites, PQ shall have thirty (30) days in which to exercise such right.

ARTICLE 3

Price

Section 3.1. It is the intention of the parties that the Partnership will pay a fair market price for Products purchased from PQ. Accordingly, the price for the Products purchased by the Partnership from PQ shall be the average price for such Products charged to other PQ customers for similar quantity and quality, including any rebates or discounts, during the previous six- (6-) month period. If no sales have occurred during the: said six-month period, then the price for Products can be based upon bona fide offers to purchase made to PQ during such period. If PQ has had neither sales nor offers, then PQ shall determine a price for the Products based on a profited cost for such Products or a profited cost adjustment to an established precursor price during the same period of time. PQ shall provide an explanation of such price with such information as the Partnership may reasonably request.

Section 3.2. It is agreed that the initial price for Products will be as set forth in Appendix A. PQ represents that such prices are based on actual sales of Products to customers other than the Partnership or bona fide offers to purchase during the previous six- (6-) month period. Prices may be adjusted quarterly using the criteria set forth in Section 3.1.

Section 3.3. Any tax or other governmental charge on the production, sale, shipment, purchase, or use of Products produced and sold hereunder imposed on PQ by federal, state, municipal or other governmental authorities shall be added to the price herein and shall be paid by the Partnership, except taxes on income to PQ. The Partnership shall be promptly notified of any such taxes or charges.

ARTICLE 4

Sale, Title, Risk of Loss, Storage

Section 4.1. The sale of Products to the Partnership shall occur at such time as Products are transferred to storage for the Partnership's use. Upon such sale, title and risk of loss shall pass to the Partnership.

Section 4.2. With each annual budget the Management Committee will approve the reimbursement of PQ for the lease of a fixed number of rail cars, or appropriate units of storage capacity, to be used by PQ for the storage of Products produced for the Partnership. This reimbursement is intended only as a mechanism to reimburse PQ for Partnership storage costs and does not require PQ to dedicate specific cars or other storage units for Partnership use only.

ARTICLE 5

General Terms and Conditions

Section 5.1. All payments hereunder shall be made in U.S. Dollars to PQ at the address provided from time to time. PQ shall invoice the Partnership for all Products sold in accordance with Article 4. The Partnership shall pay PQ net thirty (30) days after sale of Products; provided however, for purposes of payment only, the date of sale for the Products delivered by PQ shall not be any sooner than the first day of the quarter for which the Products were ordered under Section 2.3 hereof.

Section 5.2. PQ shall measure and analyze the Products before delivery to the Partnership, as well as provide samples to Shell Chemical Company or its designee and keep samples of each lot for at least one (1) year after delivery. Each lot shall be a maximum of thirty thousand (30,000) pounds. Each sample shall be representative of the Products delivered. PQ shall keep records of the Products analysis for a period of one (1) year.

Section 5.3. Any notice of a claim by the Partnership for any reason shall be made to PQ within one (1) year of actual receipt thereof. The absence of such notice to PQ shall constitute a waiver of such claims.

Section 5.4. Except in the case of its gross negligence or willful misconduct: (a) PQ shall in no event be liable hereunder for any incidental or consequential damages; and (b) PQ's liability, and the Partnership's exclusive remedy for any and all loss and damage for any cause of action arising out of this Agreement, however based, shall be limited to replacement of non-conforming or defective Products or, at PQ's option, payment in an amount not to exceed the replacement cost of the Products for which damages are claimed.

Section 5.5. PQ represents and warrants that Products produced and sold hereunder shall conform to the specifications annexed hereto or that may be agreed to by PQ and the Partnership from time to time. PQ will not make changes to the process for making Products or in the raw materials used in making Products without prior qualification of the new product. Subject to the preceding and except as otherwise expressly provided herein, PQ makes no representation or warranty of any kind, express or implied, as to merchantability, fitness for a particular purpose or use, or any other matter with respect to such Products, whether used alone or in combination with other materials.

Section 5.6. PQ covenants that its activities hereunder shall at all times be in compliance with the Fair Labor Standards Act, as amended, and regulations promulgated pursuant thereto and applicable laws and regulations relating to equal employment opportunity compliance. If requested by the Partnership, PQ will from time to time certify as to compliance with the foregoing in such form as the Partnership may reasonably request.

Section 5.7. Uniform Commercial Code—This contract shall be governed by and construed in accordance with the Uniform Commercial Code as in effect in the State of Kansas except as the provisions of such code are herein modified.

Section 5.8. Patent Infringement—If suit is brought against the Partnership alleging that the manufacture or sale of any staple commodity of commerce sold hereunder infringes any U.S. Patent, then PQ will defend the Partnership and pay any awards against the Partnership for such infringement, provided the Partnership gives PQ prompt written notice and permits PQ to defend. As respects all goods hereunder made especially for the Partnership, the Partnership warrants there is no U.S. Patent covering them or the Partnership has a right to have them made. PQ shall not be liable to the Partnership if sued for any U.S. Patent infringement by any goods made especially for the Partnership hereunder but, if PQ is sued, the Partnership will defend PQ and pay any awards against PQ provided PQ gives the Partnership prompt written notice and permits the Partnership to defend. the Partnership assumes all responsibility for use of any design, trademark, trade name, or part thereof, appearing on the goods at the Partnership's request.

Section 5.9. PQ's obligation to supply and the Partnership's obligation to take may be reduced proportionately to any reduction of operation at PQ's Facility in response to any governmental action relating to environmental matters.

Section 5.10. Credit—PQ may defer shipments, alter payment terms, or terminate this contract if the Partnership fails to pay any invoice in accordance with the terms of this contract with thirty (30) days' prior written notice. PQ may require cash payments or satisfactory security for future deliveries, if the Partnership's financial responsibility becomes unsatisfactory to PQ.

Section 5.11. Governmental Controls—Any governmental action substantially affecting PQ's right to maintain or change the price, transportation terms, terms of payment or minimum requirement per shipment shall give PQ at any time such governmental action is in effect the right to cancel the contract upon thirty (30) days written notice; provided, however, if PQ continues to offer product for sale to other customers in accordance with such Government regulation or law, PQ agrees that it will continue to supply the Partnership in accordance with the provisions of this contract. Rather than cancel, PQ may by written notice elect to postpone the effective date of any price increase or proposed change to the extent so prevented until such date or dates as it is not so prevented. By electing to postpone rather than cancel, PQ will not waive the right to cancel thereafter.

ARTICLE 6

Duration

Section 6.1. This Agreement upon execution by PQ and the Partnership shall be effective as of February 1, 1988.

ARTICLE 7

Miscellaneous

Section 7.1. Articles of the Partnership Agreement dealing with Force Majeure, Hardship, Assignability, Disputes, Arbitration, Waiver and Notices, respectively, are hereby incorporated herein by reference.

Section 7.2. Terms and conditions of sale shall be as set out herein, and any additional or conflicting terms and conditions contained in PQ's acknowledgment or other documents, or the Partnership's purchase order shall be void unless expressly agreed to by both parties in writing.

Section 7.3. This Agreement shall be governed by and construed in accordance with the laws of the state of Kansas.

Section 7.4. If any provision of this Agreement should be or become fully or partly invalid or unenforceable for any reason whatsoever or violate any applicable law, this Agreement is to be considered divisible as to such provision and such provision is to be deleted from this Agreement, and the remainder of this Agreement shall be deemed valid and binding as if such provision were not included herein. There shall be substituted for any such provision deemed to be deleted a suitable provision which, as far as legally possible, comes nearest to what the parties desired according to the sense and purpose of this Agreement had this point been considered when concluding this Agreement.

Section 7.5. This Agreement may be executed in one or more counterparts by either party hereto and by either party hereto in separate counterparts, each of which, when so executed and delivered to the other party, shall be deemed an original. All such counterparts together shall constitute one and the same instrument.

Section 7.6. The provisions of this Agreement shall not be changed or amended except by an instrument in writing executed and delivered by authorized representatives of each of the Partnership and PQ.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed in duplicate by their duly authorized representatives.

ZEOLYST ENTERPRISES

PQ CORPORATION

By: _____
Title: _____

By: _____
Title: _____

APPENDIX A
TO
SUPPLY AGREEMENT
PQ PRODUCED MATERIALS

Prices effective for period February 1, 1988, through December 1, 1988.

CP300-63Z Sodium Y price (total volatiles free basis)	\$ 1.00 per lb.
CP304-68Z Ammonium Y price (total volatiles free basis)	\$ 1.65 per lb.

For Product meeting the specifications of Appendix B hereto.

F.O.B. PQ's Powder Plant

APPENDIX B

SPECIFICATIONS FOR PQ ZEOLITES

<u>PROPERTY</u>	<u>VALFOR CP304-69Z</u> <u>NH₄Y</u>	<u>VALFOR CP300-63Z</u> <u>NaY</u>	<u>TEST METHOD/</u> <u>COMMENTS</u>
Unit Cell Size, A°	24.69 ± 0.03	24.63 ± 0.03	ASTM 3942
Surface Area, m ² /g	775 min	760 min	Single point N ₂ BET at P/P ₀ =0.05
Crystallinity, %	95 min	90 min	ASTM D-3906; peak area integration of four strongest peaks vs NaY standard (Lot S-472-1-Y) or NH ₄ Y standard (Lot 896-38-3)
Na ₂ O (TVM free basis), wt %	2.5 min		Atomic Absorption Spectrophotometry
pH		11.0 max	pH electrode (1% slurry, anhydrous basis, at 3 min)
Total Volatile Matter, %	report	report	Not a specification, but needed to determine TVM free weight for process control and sales records. (800°C, 30 min)

NOTE: Proposed lot size for either product is a daily composite, not to exceed 30,000 lb. (TVM free basis)

MEMORANDUM OF UNDERSTANDING

WHEREAS PQ Corporation and Shell Polymers and Catalysts Enterprises Inc (SPACE) have formed the general partnership Zeolyst Enterprises effective February 1, 1988; and

WHEREAS the Partnership Agreement forming Zeolyst Enterprises provided for a Partnership Manufacturing Agreement, Exhibit 6 of the Partnership Agreement, and said Agreement is, as of the date hereof, not complete for purposes of execution; and

WHEREAS the Partners and the Partnership have reached concurrence on the main business principles to be contained in the Partnership Manufacturing Agreement which are generally set out in a draft of said Agreement and attached hereto as Exhibit 1;

NOW THEREFORE, in consideration of the premises and mutual covenants herein set forth;

The Partners and the Partnership agree that it is in the best interests of the Partnership to allow, and therefore the Partners and Partnership agree to allow, PQ Corporation to make use of the Partnership's plant consistent with the terms and conditions set out in Exhibit 1 until a complete formal Agreement can be executed or May 1, 1988, whichever comes first.

March 16, 1988

Shell Polymers and Catalysts
Enterprises Inc

PQ Corporation

Zeolyst Enterprises

By: _____
Title: _____

By: _____
Title: _____

By: _____
Title: _____

EXHIBIT 6

PARTNERSHIP MANUFACTURING AGREEMENT

This Agreement is entered into as of February 1, 1988, by and between PQ Corporation (hereinafter "PQ") and Zeolyst Enterprises (hereinafter "Partnership").

WHEREAS, PQ and Shell Polymers and Catalysts Enterprises Inc. (hereinafter "SPACE") have created Zeolyst Enterprises as a partnership to manufacture and market Zeolites and Zeolite-containing Catalysts;

AND WHEREAS, it is within the Scope of Business of the Partnership to toll manufacture products for PQ when capacity permits;

AND WHEREAS, from time to time PQ has manufactured and sold Proprietary Zeolites and Proprietary Zeolite-containing Catalysts;

NOW THEREFORE, in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

1. Definitions. Capitalized terms used in this Partnership Manufacturing Agreement (the "Agreement") but not defined herein shall, for all purposes of this Agreement, as the same may be amended or supplemented from time to time hereafter, have the same meanings as specified in the Partnership Agreement between PQ and Shell Polymers and Catalysts Enterprises Inc. executed simultaneously with this Agreement.

2. Partnership Obligations. The Partnership hereby agrees that when capacity is available in the Specialty Zeolite/Catalyst Plant, the Partnership shall, upon the request of PQ, toll manufacture Proprietary Zeolites and Proprietary Zeolite-containing Catalysts for PQ. Such availability shall be determined in accordance with the Zeolite/Catalyst Plant access priority system set forth in Section 5.3 of the Partnership Agreement, and once the commitment has been made for plant utilization within said system, that commitment shall have priority over any new requirements of the Partnership.

3. PQ Obligations. PQ shall provide the Partnership with all raw materials required for making Proprietary Zeolites and Proprietary Zeolite-containing Catalysts.

4. Consideration. PQ shall pay to the Partnership for all plant utilization on a Profited Cost basis using the formula established in the Partnership Agreement and based upon the actual plant time and equipment utilized. Furthermore, PQ shall hold the Partnership harmless from any liability related to the sale and use of all Proprietary Zeolites and Proprietary Zeolite-containing Catalysts made for PQ under this Agreement.

5. Termination. The term of this Agreement shall begin on its effective date and shall continue in effect until terminated pursuant to Article 16 of the Partnership Agreement.

6. Assignment. This Agreement may not be assigned without the prior written consent of the other party; provided, however, that either party may assign this Agreement to a wholly-owned subsidiary.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date set forth above.

PQ CORPORATION

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

SHELL SALES AGREEMENT

THIS AGREEMENT, dated the 16th day of March, 1988, between Shell Chemical Company, a division of Shell Oil Company, a corporation organized and existing under the laws of the State of Delaware, having an office at 900 Louisiana, Houston, Texas 77001 (hereinafter referred to as the "Agent") and Zeolyst Enterprises, a general partnership organized and existing under the laws of the State of Kansas, having an address at Valley Forge Executive Mall, 500 East Swedesford, Valley Forge, Pennsylvania 19482 (hereinafter referred to as the "Seller").

WITNESSETH

WHEREAS, a partnership has been formed between Shell Polymers and Catalysts Enterprises Inc., a subsidiary of Shell Oil Company, and PQ Corporation, a corporation organized and existing under the laws of Pennsylvania (hereinafter referred to as "PQ") for the purposes of producing and marketing Zeolites and Zeolite-containing Catalysts; and

WHEREAS, to support the Partnership, the parties desire that Agent coordinate the sale of Zeolite-containing Catalysts (as defined in the Partnership Agreement); and

WHEREAS, Shell Chemical Company is willing to coordinate the sale of Zeolite-containing Catalysts and sell said Catalysts themselves or through properly chosen third parties;

NOW, THEREFORE, in consideration of the premises and of the mutual covenants herein contained, the parties hereto agree as follows:

1. Definitions

(a) "Target Price Range" shall mean the price range for Zeolite-containing Catalysts nominated by Seller, FOB Seller's plant, for sale in the Territory.

(b) "Approved Sales Contract Form" shall mean the form of contract which the parties may from time to time agree upon which the Agent is to represent to purchasers as being acceptable to Seller and under and subject to which all sales of Zeolite-containing Catalysts shall be made.

(c) "Associates" with respect to Shell Oil Company shall mean N.V. Koninklijke Nederlandsche Petroleum Maatschappij, a Netherlands company, the "Shell" Transport and Trading Company, p.l.c., an English company, and any company, (including a corporation, partnership, joint venture, or other association) other than Shell Oil Company or its Affiliates, in which the two

first-mentioned companies or either of them shall at the time in question, directly or indirectly, through one or more entities own a fifty percent (50%) or more interest in such company.

(d) "Affiliate(s)" with respect to Shell Oil Company and Shell Chemical Company shall mean any company, (including a corporation, partnership, joint venture, or any other association) other than Shell Oil Company or Shell Chemical Company, in which Shell Oil Company shall at the time in question, directly or indirectly, through one or more entities own a fifty percent (50%) or more interest in such company.

(e) For the purposes of the definitions in (c) and (d) above and Section 14(c)(1) below, it is understood that:

- (i) a company directly owns a fifty percent (50%) or more interest in a particular company if that other company holds shares or interest carrying fifty percent (50%) or more of the votes exercisable at a general meeting of shareholders (or its equivalent) of the said particular company and is entitled to appoint persons to the Board of Directors or

analogous management body holding fifty percent (50%) or more of the votes of the Board of Directors or such management body on all matters to be determined by the Board of Directors or such management body, and

- (ii) the other company (hereinafter referred to as the “parent company”) indirectly owns a fifty percent (50%), or more, interest in a particular company if a series of companies can be specified beginning with a parent company and ending with the particular company so related that each company of the series, except the particular company, directly owns a fifty percent (50%), or more, interest in a later company in the series.

(f) “Selling” shall mean all activities necessary and customary to seek out purchasers and secure binding commitments from said purchasers, including providing start-up assistance to purchasers, monitoring catalyst performance in customers units and developing and communicating product performance projections to potential purchasers by Agent or Agent’s personnel.

(g) "Territory" shall mean the United States, its possessions and territories, Canada and Mexico.

2. Appointment and Technical Services

(a) Subject to the terms and conditions of this Agreement, Seller hereby appoints Agent, and/or Agent's assignee under Section 14 hereof (collectively referred to as "Agent" hereafter), and Agent hereby accepts appointment as exclusive Selling representative to solicit sales of Zeolite-containing Catalysts from purchasers in the Territory in mutually identified Customer End Uses. Agent shall advise prospective purchasers of the characteristics of Zeolite-containing Catalyst produced by Seller and of the prices and terms and conditions of sale on which said purchasers may purchase Zeolite-containing Catalysts.

(b) Expansion of Territory. If Seller is legally and contractually able; and, at Seller's sole discretion, decides to sell into markets beyond the Territory, Seller will offer to Agent the opportunity to be appointed the exclusive sales representative into any and all expansion territory; provided however, that Agent can demonstrate to Seller's satisfaction that Agent can reasonably fulfill its obligations under this Agreement in such expanded territory. The commission structure for such expansion of the Territory shall be

substantially the same as provided in Section 5. In the event such Territory expansion includes countries where business cannot practically be conducted without the utilization of additional intermediaries, a revision to the commission structure will be considered.

(c) Agent will initially be responsible for the selling of Zeolite-containing Catalysts in the following Customer End Uses (CEU): second stage hydrocracking, G/C6 isomerization and distillate deep hydrogenation. Additionally, Agent agrees to provide services to resell regenerated Zeolite-containing Catalysts originally sold by Seller and acquired by Agent, whether or not acquired by Agent with the assistance of Seller, and the proceeds from such sale shall be shared with Seller as provided in Section 5(a) herein.

(d) Sales Staffing. Agent shall provide a Selling network sufficient to cover the Territory.

(e) Training. Agent will provide sales personnel who shall be appropriately technically trained and experienced in hydroprocessing catalyst utilization. Seller shall provide training to Agent's personnel specific to Zeolite-containing Catalyst utilization, at Seller's expense.

(f) Use Technology for Customer. Agent will make available under appropriate protective agreements, such necessary know-how as would allow a purchaser to use the Zeolite-containing Catalysts being sold by Agent. In recognition of the exclusive appointment under this Agreement and with the recognition that Shell Chemical Company and its Affiliates have specialized knowledge as to the use of Zeolite-containing Catalysts, if the obligations of Agent under this Agreement have been assigned as provided in Section 14, then Shell Chemical Company will provide to the assignee, under confidentiality agreements suitable to Shell Chemical Company, the same necessary know-how to allow assignee to fulfill its selling obligation under this Section 2(f).

(g) Technical Service Support by Agent. In addition to the activities required of Agent for Selling product hereunder, Agent will also make available appropriate customer/technical service support to Zeolite-containing Catalysts purchasers. Agent will take those steps necessary so that the customer/technical services can be provided by the Catalyst Department of Shell Development Company, a division of Shell Oil Company, under the Shell Services Agreement. This obligation shall survive any assignment of this Agreement by Agent, unless Agent can reasonably demonstrate to Seller that comparable technical services are available through assignee.

(h) Technical Service Support Forecasts. Agent will estimate the necessary technical service support requirements for each CEU for next prospective calendar year. Agent will inform Seller of these estimates at least six (6) months prior to the start of the next calendar year. Seller shall review and approve these estimates. If Seller fails to notify Agent of any objection to the estimates submitted sixty (60) days prior to the next calendar year, then the said estimate shall be deemed approved. Then during the said calendar year, Seller shall be invoiced for all actual services performed under the Shell Services Agreement between Seller and Agent dated concurrently herewith. Agent shall provide a written quarterly forecast of technical service support requirements forty-five (45) days prior to the beginning of each quarter that it intends to utilize in the next quarter.

(i) Customer End Use Expert. Agent shall identify to the Seller a single individual for each Customer End Use who shall serve as the Technical Use Expert for that CEU. Such Expert shall be skilled in the proper utilization of Zeolite-containing Catalysts within the CEU. If this Agreement is assigned as provided under Section 14, Seller shall have the right to approve any such appointment by the Assignee.

(j) Bid and Credit Requirements. Agent will promptly disclose details of all bids provided to potential purchasers and shall maintain appropriate records on such bids. Agent shall provide Seller with credit data and other information on current and prospective purchasers, prior to consummation of any sale.

(k) Market Requirement Feedback. It is specifically expected that Agent will routinely provide Seller with market information based on Agent's customer contacts to aid Seller in developing Seller's business plans and marketing strategy. Therefore Agent shall allow Seller to have access to Agent's Technical Use Experts, salesmen, and other relevant personnel at reasonable times on a quarterly basis for the purpose of discussions with such persons about market requirements.

(l) Customer Information Requirements. Agent shall provide Seller annually a current customer list for each CEU, including anticipated catalyst volume and timing requirements, for the following five (5) years, as available. This customer information will be

provided with the annual sales forecasts of Section 2(o). During each calendar year, Agent shall provide Seller, on a mutually agreed frequency and format, feedback on:

- (a) customer visits,
- (b) selling services provided,
- (c) technical service support provided, and
- (d) other promotion and advertising.

Agent shall provide Seller all CEU customer call reports, and to the extent they meet the mutually agreed requirements of (a), (b), and (c), the said call reports shall be considered to satisfy such requirements.

(m) Promotion and Advertising Requirements. Agent agrees to promote and advertise Seller's catalysts to at least the same extent Agent promotes and advertises other catalysts produced and sold by Agent. Agent and Seller agree to reasonably cooperate, including the sharing of costs for advertising and promotion activities designed to specifically promote Seller's catalysts, should Agent or Seller initiate such activity.

(n) Addition of Customer End Uses. Seller anticipates the addition of Customer End Uses during the term of this contract. Seller hereby grants to Agent the first right to negotiate the addition of any such CEU to this Agreement, should such CEU fall within Agent's marketing capability.

(o) Sales and Selling Activity Forecasts. Agent will notify Seller no later than May 15, 1988 and each succeeding September 1st thereafter during the term of the Agreement of its best estimate concerning its projected sales activities and projected sales by CEU during the next succeeding calendar year. Agent shall send Seller, within forty-five (45) days of execution of this Agreement and quarterly thereafter on the forty-fifth day of each quarter, a revised report on projected sales for the next twelve (12) months.

3. Acceptance of Orders

(a) All orders for the Zeolite-containing Catalysts shall be placed directly with Seller. Notwithstanding the right of Agent to advise prospective purchasers of the terms and conditions on which Zeolite-containing Catalysts may be purchased, no order shall be effective until accepted by Seller in writing, provided, however, that subject to the provision of Article 12 regarding force majeure, Seller agrees to accept all orders solicited by Agent and placed with Seller which contain terms and conditions substantially similar to the Approved Sales Contract Form and which comply with the provisions of this Section 3 regarding quantity and specifications, and Section 4 hereof regarding price and the establishment of satisfactory credit.

(b) At time of notification to Seller of an order, Agent shall advise Seller of transportation details associated with the order and Seller shall promptly advise Agent of the cost at which Seller will provide such transportation services (hereinafter called "Transportation Services"). Seller will provide or arrange for the Transportation Services unless the purchaser wishes to provide otherwise. In either case the Sales Contract shall provide that the risk of loss shall shift to purchaser upon the loading of purchased catalysts, and all transportation costs shall be added to the Purchase Price hereunder.

(c) Seller and Agent shall agree in writing at the beginning of each calendar year as to the specific products which will be available to Agent to market, the Customer End Uses, and the timing of the availability of such products. The products initially available to Agent, together with pertinent specifications, are set out in Exhibit A. Seller will provide Agent notice of changes in products and the expected date of introduction as soon as such information is available to Seller.

4. Purchase Price

(a) It is the intent of the parties that all Zeolite-containing Catalysts sold hereunder shall be within a Target Price Range established by the Seller.

(b) The Target Price Range is to be determined by Seller, and Agent shall be notified of such Target Price Range. Agent is authorized to quote a price for Zeolite-containing Catalysts to prospective purchasers at a Quote Price within the Target Price Range. Any further changes in price must be requested by Agent from Seller and be quoted only after receipt of written approval from Seller's General Manager.

(c) Price invoiced to purchasers shall be the Quote Price, as described in subparagraph (b) above, plus the cost of any Transportation Service, taxes (other than income taxes), tariffs, duties, and insurance paid by Seller. All invoicing shall be done by Seller at the time of shipment of the Zeolite-containing Catalysts.

(d) On the fifteenth day of each calendar month Seller shall advise Agent in writing of the Target Price Range for the next succeeding calendar month. Any failure by Seller to so notify Agent will be deemed an authorization by Seller to continue the Target Price Range of the previous month.

(e) In the event Agent requests Seller to provide a material not normally produced by Seller and if Seller agrees to do so, Seller shall quote a price to Agent for such requested materials prior to producing the material and Agent will accept or reject such quoted price without negotiation.

5. Commission

(a) First Three Years. Commissions to be paid to Agent by Seller shall be generally set at an agreed percentage of the net sales revenue in a particular Customer End Use. During the first three (3) years of a CEU, a flat rate from 10% up to and including 15% of net sales will be established and paid by the Seller to the Agent. The intent of this rate differentiation is to provide the Agent with incentive to sell Seller's higher margin products.

Net sales shall be calculated so that transportation charges, tariffs, duties, insurance, taxes (other than income taxes), paid by Seller and discounts, returns and allowances, if any, are first deducted from the gross sales revenue.

Both parties agree that for 1988, 1989, and 1990 these commission rates shall apply to the following Customer End Uses:

Second Stage Hydrocracking	10%
C5/C6 Isomerization	15%

The Distillate Deep Hydrogenation commission rate for these years will be set when additional market knowledge is available, but in any case prior to the first quotation.

(b) Commission Rates After the First Three Years into a Particular CEU. The Commission rate after the first three years shall be reduced by 20% from the initial commission rate established as in Section 5(a) above, for net sales in that CEU up to the level of the prior year's sales. Net sales above the prior year's sales in a CEU will be commissioned at the initial commission rate utilized for such CEU as in Section 5(a) above.

(c) Commissions on Additional CEU's. It is anticipated that the commission to be paid to Agent for selling into new CEU's will follow the same rates as set out in Section 5(a) and (b), i.e. a flat rate between 10% and 15% on annual net sales for the first three years, followed by a 20% lower rate on net sales, up to the prior year's net sales, with the original commission rate applying for net sales above the prior year's level.

Rate Renegotiation

The commission rates set out in this Section 5 shall be subject to renegotiation between the parties for sales made after the fifth anniversary date of this Agreement and every two years thereafter. Agent shall be paid a commission for all catalysts sold for Seller regardless of identity or affiliation of purchaser.

Regenerated Catalyst

For any resales of regenerated Zeolite-containing Catalysts (originally produced by Seller) made by Agent under this Agreement, the net profits received by Agent (i.e., gross sales minus acquisition costs, regeneration costs, and direct selling costs) shall be shared equally by Agent and Seller.

(d) Within fifteen (15) days after the end of each month, Seller shall determine the Agent's earned commissions for such month.

(e) Payment terms are net thirty (30) days from the end of said month.

(f) If following receipt of Seller's payment, Agent notifies Seller that it questions all or any part of such amounts, Seller shall provide to Agent a certificate, signed by Seller's General Manager or his designate, explaining the matter or matters in question in reasonable detail to permit Agent to verify the accuracy of such amounts, within thirty (30) days of such request.

(g) Agent, on reasonable notice, may request an annual audit to verify the accuracy of Seller's determination of earned commissions under subsection (a) above, by an independent public accounting firm, selected by Agent and reasonably acceptable to Seller. The costs of such audit shall be shared equally by Agent and Seller. The public accounting firm will report to the parties as to such accuracy. Seller will cooperate with such public accounting firm in the performance of such audit. Such audit shall be conducted during normal business hours and in a manner so as to cause minimum

inconvenience to Seller. Upon receipt from such public accounting firm of notice of any inaccuracy and upon confirmation, Seller will pay or invoice Agent as appropriate to correct any inaccuracies. Such audits may be requested no more than once every twelve (12) months and for any calendar year must be requested within six (6) months after the completion of that calendar year.

(h) If this Agreement is terminated for any reason other than misfeasance of Agent, then for a period of three (3) years from the date of termination, Agent shall receive one-half of the normal set commission for any Zeolite-containing Catalysts which are sold by Seller or an agent of Seller during said three (3) year period, provided:

- (1) Purchaser had previously purchased the same Zeolite-containing Catalyst from Seller for the same CEU at some time in the previous three (3) years prior to termination of this Agreement; and
- (2) The Zeolite-containing Catalysts purchased was one or more of the same Zeolite-containing Catalysts made available by Seller to be sold by Agent during the term of this Agreement and all extensions thereof.

6. Independent Contractor

Neither party shall have the right to control or direct the activities of the other party in the conduct of the activities hereunder in any manner whatsoever, and each party, in performing activities hereunder, shall do so as an independent contractor.

7. Product Changes

Either party may propose changes to the specifications and properties of the Zeolite-containing Catalysts to be sold hereunder. Seller will notify Agent of its decision to make any product changes in writing ninety (90) days prior to initiation of any changes to product specifications.

8. Term

This Agreement shall commence on the date of execution and continue for a primary term of five (5) years or the dissolution of Seller whichever is earlier. This Agreement shall thereafter continue on a year-to-year basis subject to termination by either party at any time on six (6) months written notice.

9. Priority

Seller acknowledges that production of sufficient product to fulfill all contractual commitments for sales of Zeolite-containing Catalysts obtained by Agent subject to compliance with Sections 3 and 4 above, for as long as Agent is the exclusive Agent hereunder, takes precedence over any other products to be produced by Seller at Seller's Zeolite Plant, but in the event

that the production of Zeolite-containing Catalysts is curtailed, Seller shall allocate its remaining production in a fair and equitable manner to enable it to fulfill sales contracts with as many purchasers of Zeolite-containing Catalysts from Seller as is practical.

10. Delivery

Unless otherwise specifically agreed by the parties, delivery of Zeolite-containing Catalysts sold hereunder will be made and title and risk of loss shall pass to the purchaser F.O.B. Seller's plant.

11. Warranties

Seller warrants that the Zeolite-containing Catalysts sold pursuant to this Agreement shall meet the specifications set forth in the attached Exhibits or as published by Seller, or as changed pursuant to Article 7. Seller also warrants that it will comply with all applicable laws and governmental regulations and orders. Except as set forth in this Article 11, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

12. Force Majeure

(a) "Force Majeure" shall mean acts of God, wars, strikes, lockouts, or other industrial disturbances, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, civil disturbances,

explosions, breakage or accident to machinery, pipelines or processing plant, government regulations, curtailment of or other inability to obtain equipment, supplies or materials, temporary failure of gas supply, and any other cause whether of the kind herein enumerated or otherwise not within the control of the party claiming suspension, all of which by the exercise of due diligence such party is unable to prevent; but provided, however, that the above requirement that any Force Majeure shall be remedied with the exercise of due diligence shall not require the settlement of strikes or lockouts by acceding to the demands of the opposing party when such course is inadvisable in the discretion of the party having the difficulty.

(b) In the event that further lawful performance of this Agreement or any part hereof by either party hereto shall be rendered impossible by or as a consequence of Force Majeure, such party shall not be considered in default hereunder by reason of such failure to perform occasioned thereby and neither party may claim penalties, interests or any other compensation or participation in damages caused by the Force Majeure.

(c) The party claiming Force Majeure shall notify the other party, in writing, within thirty (30) days after the occurrence of the Force Majeure stating the date of the beginning of same. In the event that the party claiming Force Majeure under this Article 12 fails to notify the other party, in writing, within the prescribed thirty (30) day period, the claiming party will forfeit any rights it may have by virtue of Force Majeure under this Agreement and said party will be deemed to have taken on all of the risks and consequences of said Force Majeure.

(d) In the event, however, that the party claiming Force Majeure complies with the provisions of Article 12 hereto, then the Force Majeure shall automatically extend the times called for in this Agreement for the party to perform.

13. Confidentiality and Non-Compete

(a) Each party hereby agrees that, as to confidential information disclosed by one party to the other, the following shall apply:

Any proprietary information or data (including but not limited to such information or data regarding either party's formulations, products performance, standard specifications, or customers disclosed by either party to the other party) is herein referred to as "Confidential Information". Neither party shall, without the prior written consent of the other Party, use, except

for the purpose of carrying out this Agreement, or disclose to others any Confidential Information disclosed to it by the other party. The foregoing restrictions on use and disclosure shall not apply or shall cease to apply, as the case may be, to any such Confidential Information:

- (1) which is, as can be established by competent evidence, in the possession of the nondisclosing party without obligation of confidentiality at the time it is obtained from the other party;
- (2) which is, or through no fault of the nondisclosing party becomes, available to the public; or
- (3) which becomes available to the nondisclosing party from a third party without obligation of confidentiality.

Specific Confidential Information shall not be deemed to be available to the public or in the prior possession of the nondisclosing party merely because it is embraced by more general information available to the public or in the possession of such party.

No right or license, express or implied, is granted or is intended to be granted under this Agreement by either party to the other under any patent, patent application or Confidential Information except in the case of Agent, the right to utilize Confidential Information to the extent and only to the extent for Agent to carry out its responsibility to effect sales pursuant to this Agreement.

The provisions of this section shall survive termination of this Marketing Agreement for a period of three (3) years, provided however the disclosure of customer lists and customer information by Seller to any successor Agent shall not be a violation of this clause.

(b) Agent agrees that for so long as Agent remains the Agent of Seller under this Agreement and for twelve (12) months after the termination of this Agreement, unless released by Seller in writing:

- (1) Agent shall not, other than for the benefit of Seller, sell, market, promote or perform any other related activity, for any Zeolite-containing Catalysts or zeolites to be used for catalysts, into any Customer End Use identified in accordance with this Agreement.

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- (2) The above non-compete provision is not to be construed to prohibit Agent from any other activity such as, but not limited to
- a. toll manufacturing of proprietary products for other entities or their licensees;
 - b. selling Agents own non-zeolite catalysts or precursors thereof;
 - c. developing, manufacturing and selling any products, including Zeolite-containing Catalysts, outside of the Territory subject only to the obligation contained in Section 13 a hereof;
 - d. developing, manufacturing, and selling products into any end use application not identified as a Customer End Use hereunder;
- provided such activities do not use or disclose the Confidential Information of Seller.

14. Assignability

(a) This Agreement shall inure to the benefit of and be binding upon each of the parties hereto and shall be assignable to the successors of substantially the entire business of either party relating to the subject matter of this Agreement. This Agreement shall not be otherwise assignable by either party without the written consent of the other party. Such consent shall not be unreasonably withheld.

(b) Either party may assign this Agreement to a wholly-owned subsidiary without the consent of, but with prompt written notice to, the other party. The party assigning this Agreement to a wholly-owned subsidiary shall remain primarily liable for the performance of the duties and obligations owed the non-assigning party. Except as herein provided no assignment to this Agreement shall be valid without assignment to and assumption by such successors and assigns of all the rights and obligations under this Agreement.

(c) Shell Chemical Company, the initial agent hereunder, and only Shell Chemical Company, shall have certain specific rights of assignments as follows:

- (1) To assign all or any part of the obligations for selling to any Affiliate or to a company in which Shell Oil Company, or an Affiliate of Shell Oil Company, and an Associate of Shell Oil Company together

own, directly or indirectly, a fifty percent (50%) or more interest in said company, with the prior consent of Seller, which consent shall not be unreasonably withheld; and

- (2) To assign all or any part of the obligations for selling Seller's products to any qualified third party with the consent of Seller, such consent not to be unreasonably withheld; and
- (3) Any such assignment or assignments may be made so as to result in a division of the selling responsibility for different products and/or territories to different parties.

(d) Priority Treatment. Provided that Agent assigns this Agreement to an assignee under Section 14(c) above, such assignment is conditioned upon assignee affirmatively accepting the following obligations:

- (i) Seller and Assignee shall agree that Seller is the preferred third-party supplier of zeolites for assignee and assignee is the preferred third-party manufacturer of Zeolite-containing Catalysts for Seller.

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- (ii) If either party desires the product or service available from the other party as set out in 14(d) (i) above, then both parties shall enter into good faith negotiations to reach a mutually agreeable arrangement concerning such product or service.
 - (iii) The parties agree that they will seek to negotiate an agreement during the sixty (60) day period after notice by the requesting party of its desire to enter into an agreement. The priority rights granted under this Section 14(d) are premised on the condition that the supplying party can demonstrate a satisfactory ability to provide either the product or service in a timely manner and to the standards set out by the requesting party.

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- (iv) If the parties fail to reach an agreement within the sixty (60) day period set out in Section 14(d)(iii) above, then the requesting party may enter into a contract with any other third-party it so chooses, provided however that the arrangement is not on terms more favorable than that offered the preferred supplier identified in Section 14(d)(i).

15. Notices

Notice by either Seller or Agent will be made only by personal delivery, mail or telegram addressed to the other party at its address first set forth above, and will be considered given as of the time it is deposited with the U.S. Postal Service or the telegraph company, postage or charges prepaid.

16. Governing Law

The parties hereto agree that this Agreement shall be construed and all questions relating thereto shall be determined in ACCORDANCE WITH THE LAWS OF THE STATE OF KANSAS, without recourse to its conflicts of law principles.

17. Entirety/Modifications

This Agreement is intended to implement the intent of the Partners under the Partnership Agreement concerning the subject matter hereof. This Agreement, the Partnership Agreement and the other agreements referred to herein and in the Partnership Agreement constitute the entire agreement between the parties

concerning the subject matter hereof and supersede any prior understanding or written or oral agreements respecting the subject matter of this Agreement. Neither this Agreement nor any agreements supplementing or amending this Agreement, except for any order acknowledgement issued by Seller, nor any waiver hereunder will be binding unless signed by both parties, and performance prior to such execution shall not constitute a waiver of this requirement.

18. Further Assurance

Each of the Parties agrees to execute and deliver all such other and additional instruments and documents and to do such other acts and things as may be necessary to more fully effectuate this Agreement and to carry on the business for the Partnership in accordance with this Agreement.

19. Headings

The headings used in this Agreement are for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

20. Section Numbers

Unless otherwise indicated, reference to Section numbers are to Sections of this Agreement.

21. Parties Bound

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective legal representatives, successors, and assigns where permitted by law.

22. Severability

In case any one or more of the provisions contained in this Agreement shall, for any reason, be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

23. Further Remedies

Pursuit by a party of any of the foregoing remedies shall not preclude pursuit by it of any of the other remedies provided by law, nor shall pursuit of any remedy herein provided constitute a forfeiture or waiver of any amount due it or of any damages accruing by reason of the violation of any of the terms, provisions and covenants contained in this Agreement.

24. Waiver

No waiver by any party of the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release the party from, performance of any other provision, condition or requirement herein; nor be deemed to be a

waiver of, or in any manner release the other party from future performance of the same provision, condition or requirement; nor shall any delay or omission by any party to exercise any right hereunder in any manner impair the exercise of any such right or any like right accruing to it thereafter.

IN WITNESS THEREOF, this Agreement has been duly executed on behalf of the parties by their respective authorized officers as of the day and year first above written.

SHELL CHEMICAL COMPANY,
A Division of
SHELL OIL COMPANY

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

SALES AGREEMENT
EXHIBIT A

PRODUCT SUPPLEMENT NUMBER

ZEOLYST ENTERPRISES (SELLER)
SHELL CHEMICAL COMPANY (AGENT)

<u>PRODUCT</u>	<u>QUANTITY</u>	<u>DELIVERY LOCATION</u>
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PQ SALES AGREEMENT

THIS AGREEMENT, dated the 16th day of March, 1988, between PQ Corporation, a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, having an office at P.O. Box 840, Valley Forge, Pennsylvania 19482 (hereinafter referred to as the "Agent") and Zeolyst Enterprises, a general partnership organized and existing under the laws of the State of Kansas, having an address at Valley Forge Executive Mall, 500 East Swedesford, Valley Forge, Pennsylvania 19482 (hereinafter referred to as the "Seller").

WITNESSETH

WHEREAS, a partnership has been formed between Shell Polymers and Catalysts Enterprises Inc., a subsidiary of Shell Oil Company, and PQ Corporation for the purposes of producing and marketing Zeolites and Zeolite-containing Catalysts; and

WHEREAS, to support the Partnership, the parties desire that Agent coordinate the sale of Zeolites (as defined in the Partnership Agreement); and

WHEREAS, Agent is willing to coordinate the sale of Zeolites and sell said Zeolites themselves or through properly chosen third parties;

NOW, THEREFORE, in consideration of the premises and of the mutual covenants herein contained, the parties hereto agree as follows:

1. Definitions

(a) "Target Price Range" shall mean the price range for Zeolites nominated by Seller, FOB Seller's plant, for sale in the Territory.

(b) "Approved Sales Contract Form" shall mean the form of contract which the parties may from time to time agree upon which the Agent is to represent to purchasers as being acceptable to Seller and under and subject to which all sales of Zeolites shall be made.

(c) "Affiliate(s)" with respect to Agent shall mean any company, (including a corporation, partnership, joint venture, or any other association) other than Agent in which Agent shall at the time in question, directly or indirectly, through one or more entities own a fifty percent (50%) or more interest in such company.

(d) For the purposes of the definitions in (c) and Section 14(e)(1) below, it is understood that:

- (i) a company directly owns a fifty percent (50%) or more interest in a particular company if that other company holds shares or interest carrying fifty percent (50%) or more of the votes exercisable at a general meeting of shareholders (or its equivalent) of the said particular company and is entitled to appoint persons to the Board of Directors or analogous management body holding fifty percent (50%) or more of the votes of the Board of Directors or such management body on all matters to be determined by the Board of Directors or such management body, and
- (ii) the other company (hereinafter referred to as the “parent company”) indirectly owns a fifty percent (50%), or more, interest in a particular company if a series of companies can be specified beginning with a parent company and ending with the particular company so related that each company of the series, except the particular company, directly owns a fifty percent (50%), or more, interest in a later company in the series.

(f) "Selling" shall mean all activities necessary and customary to seek out purchasers and secure binding commitments from said purchasers, including providing Zeolite use assistance to purchasers, monitoring Zeolite performance in customers plants and developing and communicating product performance expectations to potential purchasers by Agent or Agent's personnel.

(g) "Territory" shall mean the United States, its possessions and territories, Canada and Mexico.

2. Appointment and Technical Services

(a) Subject to the terms and conditions of this Agreement, Seller hereby appoints Agent, and/or Agent's assignee under Section 13 hereof (collectively referred to as "Agent" hereafter), and Agent hereby accepts appointment as exclusive Selling representative to solicit sales of Zeolites from purchasers in the Territory which Seller concurs are consistent with the marketing strategy of Seller. Agent shall advise prospective purchasers of the characteristics of Zeolites produced by Seller and of the prices and terms and conditions of sale on which said purchasers may purchase Zeolites.

(b) Expansion of Territory. If Seller is legally and contractually able; and, at Seller's sole discretion, decides to sell into markets beyond the Territory, Seller will offer to Agent the opportunity to be appointed the exclusive sales representative into any and all expansion territory; provided however, that Agent can demonstrate to Seller's satisfaction that Agent can reasonably fulfill its obligations under this Agreement in such expanded territory. The commission structure for such expansion of the Territory shall be substantially the same as provided in Section 5. In the event such Territory expansion includes countries where business cannot practically be conducted without the utilization of additional intermediaries, a revision to the commission structure will be considered.

(c) Sales Staffing. Agent shall provide a Selling network sufficient to cover the Territory.

(d) Training. Agent will provide sales personnel who shall be appropriately technically trained and experienced in Zeolite utilization. Seller shall provide training to Agent's personnel specific to Zeolites utilization, at Seller's expense.

(e) Use Technology for Customer. Agent will make available under appropriate protective agreements, such necessary know-how as would allow a purchaser to use the Zeolites being sold by Agent. In recognition of the exclusive appointment under this Agreement and with the recognition that Agent has specialized knowledge as to the use of Zeolites, if the obligations of Agent under this Agreement have been assigned as provided in Section 13, then Agent will provide to the assignee, under confidentiality agreements suitable to Agent, the same necessary know-how to allow assignee to fulfill its selling obligation under this Section 2(e).

(f) Technical Service Support by Agent. In addition to the activities required of Agent for Selling product hereunder, Agent will also make available appropriate customer/technical service support to Zeolites purchasers. Agent will take those steps necessary so that the customer/technical services can be provided by the Agent. This obligation shall survive any assignment of this Agreement by Agent, unless Agent can reasonably demonstrate to Seller that comparable technical services are available through assignee.

(g) Technical Service Support Forecasts. Agent will estimate the necessary technical service support requirements for each Zeolite for the next prospective calendar year. Agent will inform Seller of these estimates at least six (6) months prior to the start of the next calendar year. Seller shall review and approve these estimates. If Seller fails to notify Agent of any objection to the estimates submitted sixty (60) days prior to the next calendar year, then the said estimate shall be deemed approved. Then during the said calendar year, Seller shall be invoiced for all actual services performed under the PQ Services Agreement between Seller and Agent dated concurrently herewith. Agent shall provide a written quarterly forecast of technical service support requirements forty-five (45) days prior to the beginning of each quarter that it intends to utilize in the next quarter.

(h) Zeolite End Use Expert. Agent shall identify to the Seller a single individual who shall serve as the Technical Use Expert for each Zeolite. Such Expert shall be skilled in the proper utilization of each Zeolite. If this Agreement is assigned as provided under Section 13, Seller shall have the right to approve any such appointment.

(i) Bid and Credit Requirements. Agent will promptly disclose details of all bids provided to potential purchasers and shall maintain appropriate records on such bids. Agent shall provide Seller with credit data and other information on current and prospective purchasers, prior to consummation of any sale.

(j) Market Requirement Feedback. It is specifically expected that Agent will routinely provide Seller with market information based on Agent's customer contacts to aid Seller in developing Seller's business plans and marketing strategy. Therefore Agent shall allow Seller to have access to Agent's Technical Use Experts, salesmen, and other relevant personnel at reasonable times on a quarterly basis for the purpose of discussions with such persons about market requirements.

(k) Customer Information Requirements. Agent shall provide Seller annually a current customer list for each Zeolite including anticipated Zeolite volume and timing requirements, for the following five (5) years, as available. This customer information will be provided with the annual sales forecasts of Section 2(o). During each calendar year, Agent shall provide Seller, on a mutually agreed frequency and format, feedback on:

-
- (a) customer visits,
 - (b) selling services provided,
 - (c) technical service support provided, and
 - (d) other promotion and advertising.

Agent shall provide Seller all customer call reports, and to the extent they meet the mutually agreed requirements of (a), (b), and (c), said call reports shall be considered to satisfy such requirements.

(1) Promotion and Advertising Requirements. Agent agrees to promote and advertise Seller's Zeolites to at least the same extent Agent promotes and advertises other Zeolites produced and sold by Agent, Agent and Seller agree to reasonably cooperate, including the sharing of costs for advertising and promotion activities designed to specifically promote Seller's Zeolites, should Agent or Seller initiate such activity.

(m) Sales and Selling Activity Forecasts. Agent will notify Seller no later than May 15, 1988 and each succeeding September 1st thereafter during the term of the Agreement of its best estimate concerning its projected sales activities and projected sales by Zeolite during the next succeeding calendar year. Agent shall send Seller, within forty-five (45) days of execution of this Agreement and quarterly thereafter on the forty-fifth day of each quarter, a revised report on projected sales for the next twelve (12) months.

(n) Addition of Zeolites. Seller anticipates the addition of Zeolites during the term of this contract. Seller hereby grants to Agent the first right to negotiate the addition of any such Zeolite to this Agreement, should such Zeolite fall within Agents marketing capability.

3. Acceptance of Orders

(a) All orders for the Zeolites shall be placed directly with Seller. Notwithstanding the right of Agent to advise prospective purchasers of the terms and conditions on which Zeolites may be purchased, no order shall be effective until accepted by Seller in writing, provided, however, that subject to the provision of Article 11 regarding force majeure, Seller agrees to accept all orders solicited by Agent and placed with Seller which contain terms and conditions substantially similar to the Approved Sales Contract Form and which comply with the provisions of this Section 3 regarding quantity and specifications, and Section 4 hereof regarding price and the establishment of satisfactory credit.

(b) At time of notification to Seller of an order, Agent shall advise Seller of transportation details associated with the order and Seller shall promptly advise Agent of the cost at which Seller will provide such transportation services (hereinafter called "Transportation Services"). Seller will provide or arrange for the Transportation Services unless the purchaser wishes to provide otherwise. In either case the Sales Contract shall provide that the risk of loss shall shift to purchaser upon the loading of purchased Zeolites and all transportation costs shall be added to the Purchase Price hereunder.

(c) Seller and Agent shall agree in writing at the beginning of each calendar year as to the specific products which will be available to Agent to market, and the timing of the availability of such products. The products initially available to Agent, together with pertinent specifications shall be jointly determined. Seller will provide Agent notice of changes in products and the expected date of introduction as soon as such information is available to Seller.

4. Purchase Price

(a) It is the intent of the parties that all Zeolites sold hereunder shall be within a Target Price Range established by the Seller.

(b) The Target Price Range is to be determined by Seller, and Agent shall be notified of such Target Price Range. Agent is authorized to quote a price for Zeolites to prospective purchasers at a Quote Price within the Target Price Range. Any further changes in price must be requested by Agent from Seller and be quoted only after receipt of written approval from Seller's General Manager.

(c) Price invoiced to purchasers shall be the Quote Price, as described in subparagraph (b) above, plus the cost of any Transportation Service, taxes (other than income taxes), tariffs, duties, and insurance paid by Seller. All invoicing shall be done by Seller at the time of shipment of the Zeolites.

(d) On the fifteenth day of each calendar month Seller shall advise Agent in writing of the Target Price Range for the next succeeding calendar month. Any failure by Seller to so notify Agent will be deemed an authorization by Seller to continue the Target Price Range of the previous month.

(e) In the event Agent requests Seller to provide a material not normally produced by Seller and if Seller agrees to do so, Seller shall quote a price to Agent for such requested materials prior to producing the material and Agent will accept or reject such quoted price without negotiation.

5. Commission

(a) First Three Years. Commissions to be paid to Agent by Seller shall be generally set at an agreed percentage of the net sales revenue for each Zeolite. During the first three (3) years, a flat rate from 10% up to and including 15% of net sales will be established and paid by the Seller to the Agent. The intent of this rate differentiation is to provide the Agent with incentive to sell Seller's higher margin products.

It is agreed that for 1988, 1989 and 1990 the following commission rates apply:

- | | |
|-----------------------------------|-----|
| (1) Stabilized Y Zeolites | 10% |
| (2) Pressure synthesized Zeolites | 15% |

Net sales shall be calculated so that transportation charges, tariffs, duties, insurance, taxes (other than income taxes), paid by Seller and discounts, returns and allowances, if any, are first deducted from the gross sales revenue.

(b) Commission Rates After the First Three Years for a Particular Zeolite The Commission rate after the first three years shall be reduced by 20% from the initial commission rate established as in Section 5(a) above, for net sales of that Zeolite up to the level of the prior year's sales. Net sales above the prior year's sales for a Zeolite will be commissioned at the initial commission rate utilized for such Zeolite as in Section 5(a) above.

(c) Rate Renegotiation

The commission rates set out in this Section 5 shall be subject to renegotiation between the parties for sales made after the fifth anniversary date of this Agreement and every two years thereafter. Agent shall be paid a commission for all Zeolites sold for Seller regardless of identity or affiliation of purchaser.

(d) Within fifteen (15) days after the end of each month, Seller shall determine the Agent's earned commissions for such month.

(e) Payment terms are net thirty (30) days from the end of said month.

(f) If following receipt of Seller's payment, Agent notifies Seller that it questions all or any part of such amounts, Seller shall provide to Agent a certificate, signed by Seller's General Manager or his designate, explaining the matter or matters in question in reasonable detail to permit Agent to verify the accuracy of such amounts, within thirty (30) days of such request.

(g) Agent, on reasonable notice, may request an annual audit to verify the accuracy of Seller's determination of earned commissions under subsection (a) above, by an independent public accounting firm, selected by Agent and reasonably acceptable to Seller. The costs of such audit shall be shared equally by Agent and Seller. The public accounting firm will report to the parties as to such accuracy. Seller will cooperate with such public accounting firm in the performance of such audit. Such audit shall be conducted during normal business hours and in a manner so as to cause minimum inconvenience to Seller. Upon receipt from such public accounting firm of notice of any inaccuracy and upon confirmation, Seller will pay or invoice Agent as appropriate to correct any inaccuracies. Such audits may be requested no more than once every twelve (12) months and for any calendar year must be requested within six (6) months after the completion of that calendar year.

(h) If this Agreement is terminated for any reason other than misfeasance of Agent, then for a period of three (3) years from the date of termination, Agent shall receive one-half of the normal set commission for any Zeolites which are sold by Seller or an agent of Seller during said three (3) year period, provided:

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- (1) Purchaser had previously purchased the same Zeolites from Seller for the same use at some time in the previous three (3) years prior to termination of this Agreement; and
 - (2) The Zeolite purchased was one or more of the same Zeolites made available by Seller to be sold by Agent during the term of this Agreement and all extensions thereof.

6. Independent Contractor

Neither party shall have the right to control or direct the activities of the other party in the conduct of the activities hereunder in any manner whatsoever, and each party, in performing activities hereunder, shall do so as an independent contractor.

7. Product Changes

Either party may propose changes to the specifications and properties of the Zeolites to be sold hereunder. Seller will notify Agent of its decision to make any product changes in writing ninety (90) days prior to initiation of any changes to product specifications.

8. Term

This Agreement shall commence on the date of execution and continue for a primary term of five (5) years or the dissolution of Seller whichever is earlier. This Agreement shall thereafter continue on a year-to-year basis subject to termination by either party at any time on six (6) months written notice.

9. Delivery

Unless otherwise specifically agreed by the parties, delivery of Zeolites sold hereunder will be made and title and risk of loss shall pass to the purchaser F.O.B. Seller's plant.

10. Warranties

Seller warrants that the Zeolites sold pursuant to this Agreement shall meet the specifications to be established by Seller, or as changed pursuant to Article 7. Seller also warrants that it will comply with all applicable laws and governmental regulations and orders. Except as set forth in this Article 10, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

11. Force Majeure

(a) "Force Majeure" shall mean acts of God, wars, strikes, lockouts, or other industrial disturbances, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, civil disturbances,

explosions, breakage or accident to machinery, pipelines or processing plant, government regulations, curtailment of or other inability to obtain equipment, supplies or materials, temporary failure of gas supply, and any other cause whether of the kind herein enumerated or otherwise not within the control of the party claiming suspension, all of which by the exercise of due diligence such party is unable to prevent; but provided, however, that the above requirement that any Force Majeure shall be remedied with the exercise of due diligence shall not require the settlement of strikes or lockouts by acceding to the demands of the opposing party when such course is inadvisable in the discretion of the party having the difficulty.

(b) In the event that further lawful performance of this Agreement or any part hereof by either party hereto shall be rendered impossible by or as a consequence of Force Majeure, such party shall not be considered in default hereunder by reason of such failure to perform occasioned thereby and neither party may claim penalties, interests or any other compensation or participation in damages caused by the Force Majeure.

(c) The party claiming Force Majeure shall notify the other party, in writing, within thirty (30) days after the occurrence of the Force Majeure stating the date of the beginning of same. In the event that the party claiming Force Majeure under this Article 11 fails to notify the other party, in writing, within the prescribed thirty (30) day period, the claiming party will forfeit any rights it may have by virtue of Force Majeure under this Agreement and said party will be deemed to have taken on all of the risks and consequences of said Force Majeure.

(d) In the event, however, that the party claiming Force Majeure complies with the provisions of Article 11 hereto, then the Force Majeure shall automatically extend the times called for in this Agreement for the party to perform.

12. Confidentiality and Non-Compete

(a) Each party hereby agrees that, as to confidential information disclosed by one party to the other, the following shall apply:

Any proprietary information or data (including but not limited to, such information or data regarding either party's formulations, products performance, standard specifications, or customers disclosed by either party to the other party) is herein referred to as "Confidential Information". Neither party shall, without the prior written consent of the other Party,

use except for the purpose of carrying out this Agreement, or disclose to others any Confidential Information disclosed to it by the other party. The foregoing restrictions on use and disclosure shall not apply or shall cease to apply, as the case may be, to any such Confidential Information:

- (1) which is, as can be established by competent evidence, in the possession of the nondisclosing party without obligation of confidentiality at the time it is obtained from the other party;
- (2) which is, or through no fault of the nondisclosing party becomes, available to the public; or
- (3) which becomes available to the nondisclosing party from a third party without obligation of confidentiality.

Specific Confidential Information shall not be deemed to be available to the public or in the prior possession of the nondisclosing party merely because it is embraced by more general information available to the public or in the possession of such party.

No right or license, express or implied, is granted or is intended to be granted under this Agreement by either party to the other under any patent, patent application or Confidential Information except in the case of Agent, the right to utilize Confidential Information to the extent and only to the extent for Agent to carry out its responsibility to effect sales pursuant to this Agreement.

The provisions of this section shall survive termination of this Marketing Agreement for a period of three (3) years, provided however the disclosure of customer lists and customer information by Seller to any successor Agent shall not be a violation of this clause.

(b) Agent agrees that for so long as Agent remains the Agent of Seller under this Agreement and for twelve (12) months after the termination of this Agreement, unless released by Seller in writing:

- (1) Agent shall not, other than for the benefit of Seller, sell, market, promote or perform any other related activity with respect to any zeolites in competition with Seller's products, other than as may be agreed from time to time.

-
- (2) The above non-compete provision is not to be construed to prohibit Agent from any other activity such as, but not limited to
- a. toll manufacturing of proprietary products for other entities or their licensees;
 - b. selling Agent's own zeolites or precursors thereof as set forth in paragraph 5.0(b) of the Partnership Agreement;
 - c. developing, manufacturing and selling any products, including Zeolites, outside of the Territory subject only to the obligation contained in Section 12 a hereof;
- provided such activities do not use or disclose the Confidential Information of Seller.

13. Assignability

(a) This Agreement shall inure to the benefit of and be binding upon each of the parties hereto and shall be assignable to the successors of substantially the entire business of either party relating to the subject matter of this Agreement. This Agreement shall not be otherwise assignable by either party without the written consent of the other party. Such consent shall not be unreasonably withheld.

(b) Either party may assign this Agreement to a wholly-owned subsidiary without the consent of, but with prompt written notice to, the other party. The party assigning this Agreement to a wholly-owned subsidiary shall remain primarily liable for the performance of the duties and obligations owed the non-assigning party. Except as herein provided no assignment to and assumption by such successors and assigns of all the rights and obligations under this Agreement.

14. Notices

Notice by either Seller or Agent will be made only by personal delivery, mail or telegram addressed to the other party at its address first set forth above, and will be considered given as of the time it is deposited with the U.S. Postal Service or the telegraph company, postage or charges prepaid.

15. Governing Law

The parties hereto agree that this Agreement shall be construed and all questions relating thereto shall be determined in ACCORDANCE WITH THE LAWS OF THE STATE OF KANSAS, without recourse to its conflicts of law principles.

16. Entirety/Modifications

This Agreement is intended to implement the intent of the Partners under the Partnership Agreement concerning the subject matter hereof. This Agreement, the Partnership Agreement and the other agreements referred to herein and in the Partnership Agreement constitute the entire agreement between the parties concerning the subject matter hereof and supersede any prior understanding or written or oral agreements respecting the subject matter of this Agreement. Neither this Agreement nor any agreements supplementing or amending this Agreement except for any order acknowledgement issued by Seller nor any waiver hereunder will be binding unless signed by both parties, and performance prior to such execution shall not constitute a waiver of this requirement.

17. Further Assurance

Each of the Parties agrees to execute and deliver all such other and additional instruments and documents and to do such other acts and things as may be necessary to more fully effectuate this Agreement and to carry on the business for the Partnership in accordance with this Agreement.

18. Headings

The headings used in this Agreement are for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

19. Section Numbers

Unless otherwise indicated, reference to Section numbers are to Sections of this Agreement.

20. Parties Bound

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective legal representatives, successors, and assigns where permitted by law.

21. Severability

In case any one or more of the provisions contained in this Agreement shall, for any reason, be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

22. Further Remedies

Pursuit by a party of any of the foregoing remedies shall not preclude pursuit by it of any of the other remedies provided by law, nor shall pursuit of any remedy herein provided constitute a forfeiture or waiver of any amount due it or of any damages accruing by reason of the violation of any of the terms, provisions and covenants contained in this Agreement.

23. Waiver.

No waiver by any party of the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release to the party from, performance of any other provision, condition or requirement herein; nor deemed to be a waiver of, or in any manner release the other party from future performance of the same provision, condition or requirement; nor shall any delay or omission by any party to exercise any right hereunder in any manner impair the exercise of any such right or any like right accruing to it thereafter.

IN WITNESS THEREOF, this Agreement has been duly executed on behalf of the parties by their respective authorized officers as of the day and year first above written.

PQ CORPORATION

ZEOLYST ENTERPRISES

By: _____
Title: _____

By: _____
Title: _____

SERVICES AGREEMENT

BY

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.

THIS AGREEMENT, dated 1st day of February, 1988, between Shell Polymers and Catalysts Enterprises Inc., a Delaware corporation and having an office at 900 Louisiana, Houston, Texas 77001 (hereinafter referred to as the "SPACE") and Zeolyst Enterprises, a general partnership organized and existing under the laws of the State of Kansas, having an address at Valley Forge Executive Mall, 500 East Swedesford, Valley Forge, Pennsylvania 19482 (hereinafter referred to as the "Partnership").

WITNESSETH

WHEREAS, the Partnership has been formed between Shell Polymers and Catalyst Enterprises Inc. and PQ Corporation, a Pennsylvania corporation (hereinafter referred to as "PQ") for the purposes of producing and marketing Zeolites and Zeolite-containing Catalysts as defined in the Partnership Agreement; and

WHEREAS, to support the Partnership, the parties desire that SPACE provide certain services upon and as requested by Partnership; and

WHEREAS, SPACE is willing to perform or cause to be performed said services;

Now therefore, in consideration of the premises and the mutual agreements hereinafter set forth, SPACE and Partnership do hereby agree, as follows:

SPACE's Services

During the term of this Agreement, SPACE will provide employees or otherwise make available other persons to perform such administrative and staff services including, but not limited to, consultative, accounting, legal, procurement, computer, employee relations, finance, public affairs, tax, and technical services relating to the business conducted by Partnership as Partnership may from time to time request. This Agreement shall not extend to services that would require SPACE or its employees or agents (a) to perform any such acts which would submit SPACE to the jurisdiction of a foreign country or (b) to be authorized to do business in any foreign jurisdiction.

Performance Obligations

During such time as SPACE employees or employees of agents of SPACE (Employees) are rendering services hereunder on behalf of Partnership, those Employees who are engaged in the performance of such services shall, unless otherwise provided in any separate agreement covering the services of any such Employees, remain employees of SPACE or the agent of SPACE respectively, and continue to be paid by and to enjoy the benefits to which they are entitled as Employees, if any.

The obligations of SPACE and Employees to perform any such services shall be subject to the business requirements of SPACE, but SPACE shall use its best efforts, without discriminating against its own business, to provide Employees to perform such services.

Compensation

To the extent such services shall be furnished, payment therefor shall be made by Partnership to SPACE, as reimbursement, at a rate to cover all direct costs (including, without limitation, salaries of the Employees providing the services, labor burden, out-of-pocket expenses, expenses for computers, materials and supplies, and for travel and living, etc.) plus all applicable indirect costs, all of which costs, whether direct or indirect, shall be determined in accordance with generally accepted accounting methods and practices, consistently applied.

SPACE shall maintain adequate accounting records, which in reasonable detail fairly reflect the transactions contemplated hereunder, and shall maintain a system of internal controls, sufficient to provide reasonable assurances that the services are provided in accordance with this Agreement.

All related books and accounts of SPACE applicable to the performance of its obligations hereunder shall at all reasonable times be open to inspection by auditors for Partnership, subject only to execution of proper confidentiality agreements.

Independent Contractor Status

Nothing contained in this Agreement shall constitute either party hereto the agent of the other party for any purpose. All Employees shall be engaged in a capacity as an independent contractor with full control over the manner and method of performance subject to the work authorizations of Partnership.

Standard of Care

While performing the services hereunder, Employees shall perform their duties in a manner they reasonably believe to be in the best interests of Partnership, and with such care as an ordinarily prudent person in a like position would use under similar circumstances. In the event such standard of conduct is breached, SPACE shall indemnify against liability or loss so occasioned.

Nothing contained in this Agreement shall be deemed to relieve either the partners or management of Partnership from the performance of their respective duties or limit the exercise of their powers and authority under the law.

Notices

Notice by either SPACE or Partnership will be made only by mail or telegram addressed to the other party at its address first set forth above, and will be considered given as of the time it is deposited with the U.S. Postal Service or the telegraph company, postage or charges prepaid.

Assignability

- (a) This Agreement shall inure to the benefit of and be binding upon each of the parties hereto and shall be assignable to the successors of substantially the entire business of either party relating to the subject matter of this Agreement. This Agreement shall not be otherwise assignable by either party without the written consent of the other party except, however.
- (b) SPACE may assign this Agreement to Shell Oil Company or a wholly-owned subsidiary thereof without the consent of, but with the prompt written notice to Partnership.

Except as herein provided no assignment to this Agreement shall be valid without assignment to and assumption by such successors and assigns of all the rights and obligations under this Agreement.

Governing Law

The parties hereto agree that this Agreement shall be construed and all questions relating thereto shall be determined in accordance with the laws of the State of Texas, without recourse to its conflicts of law principles.

Entirety/Modifications

This Agreement is intended to implement the intent of the Partners under the Partnership Agreement concerning the subject matter hereof. This Agreement, the Partnership Agreement and the other agreements referred to herein and in the Partnership Agreement constitute the entire agreement between the parties concerning the subject matter hereof and supersede any prior understanding or written or oral agreements respecting the subject matter of this Agreement. Neither this Agreement nor any agreements supplementing or amending this Agreement or any waiver hereunder will be binding unless signed by both parties, and performance prior to such execution shall not constitute a waiver of this requirement.

Headings

The headings used in this Agreement are for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

Parties Bound

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective legal representatives, successors, and assigns where permitted by law.

Severability

In case any one or more of the provisions contained in this Agreement shall, for any reason, be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

Further Remedies

Pursuit by a party of any of the remedies available herein shall not preclude pursuit by it of any of the other remedies provided by law, nor shall pursuit of any remedy herein provided constitute a forfeiture or waiver of any amount due it or of any damages accruing by reason of the violation of any of the terms, provisions and covenants contained in this Agreement.

Waiver

No waiver by any party of the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release the other party from, performance of any other provision, condition or requirement herein; nor deemed to be

a waiver of, or in any manner release the other party from future performance of the same provision, condition or requirement; nor shall any delay or omission by any party to exercise any right hereunder in any manner impair the exercise of any such right or any like right accruing to it thereafter.

Term

This Agreement, upon execution hereof, shall be effective as of the date hereof and shall continue in effect indefinitely thereafter, subject, however, to termination at any time by either party giving thirty (30) days written notice to the other.

Warranties

SPACE warrants that the services provided pursuant to this Agreement shall be performed in a reasonably prudent and professional manner with the skill and expertise as is generally available in the Houston area for similar services. SPACE also warrants that it will comply with all applicable laws and governmental regulations and orders. Except as set forth in this paragraph, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WHEREIN, the Parties execute this agreement which shall be effective on this the 16th day of March, 1988.

SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.

By: _____
Title: _____

ZEOLYST ENTERPRISES

By: _____
Title: _____

TECHNOLOGY LICENSE AGREEMENT

This is an AGREEMENT by and between PQ Corporation (hereinafter referred to as "PQ"), and Zeolyst Enterprises (hereinafter referred to as "ZEOLYST").

WHEREAS, PQ and Shell Polymers and Catalysts Enterprises Incorporated, a subsidiary of Shell Oil Company (hereinafter referred to as "SPACE") have created ZEOLYST as a partnership to manufacture and market zeolites and zeolite-containing catalysts;

WHEREAS, PQ owns certain patent and technology rights which will be needed by ZEOLYST for its operation;

WHEREAS, PQ and Shell Oil Company (hereinafter referred to as "SHELL") have entered into a Research and Development Agreement dated MARCH 16, 1988 to develop zeolites and zeolite-containing catalysts within certain Designated Use Area(s) (hereinafter referred to as "DUA(s)") and certain Accepted Business Opportunity(ies) (hereinafter referred to as "ABO(s)") to be manufactured and sold by or for ZEOLYST;

WHEREAS, under said Research and Development Agreement PQ acquires certain patent and technology rights which will be needed by ZEOLYST for its operation;

WHEREAS, ZEOLYST desires to acquire from PQ certain patent rights that it needs to carry out operations within its scope of business;

NOW, THEREFORE, in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

ARTICLE 1 - DEFINITIONS

1.1 "Designated Use Area" or "DUA" shall mean an application area for any zeolite or zeolite-containing catalyst which has been designated herein by the parties hereto, or is later designated by the parties pursuant to Paragraph 5.1 of the Partnership Agreement and which is automatically incorporated by amendment herein. DUA does not mean a specific zeolite or zeolite-containing catalyst, but encompasses the process which uses any zeolite or zeolite-containing catalyst in an application area. As of the Effective Date of this Agreement the following DUAs are within the scope of this Agreement:

a. "C5/C6 ISOMERIZATION DUA" shall mean a process in which the primary intent is the isomerization of normal C5 and C6 paraffins to branched C5 and C6 paraffins.

b. "HYDROCRACKING DUA" shall mean a process in which the primary intent is the hydroconversion of distillate feedstocks from crude oil (atmospheric or vacuum fractionation), or distillate feedstocks produced from crude oil fractions in other conversion processes, to liquid products with a significantly lower average molecular weight.

c. "CATALYTIC DEWAXING DUA" shall mean a process in which the primary intent is the improvement of low temperature flow properties of distillate fuels and lubricating oil stocks by the hydrogenation of high melting point hydrocarbons contained therein through means of molecularly shape-selective catalytic hydrocracking; a process which results in reduction of the molecular weight of the high melting point hydrocarbons and permits their separation from the stock by distillation.

d. "DISTILLATE DEEP HYDROGENATION DUA" shall mean a process in which the primary intent is the reduction of the contents of aromatic hydrocarbons and/or functionalized aromatic compounds in a hydrocarbon stock to levels that permit its use in higher value applications, for which its original contents of these species would have made it unsuitable or less suitable. It is intended that the aromatics content reduction be achieved with minimal molecular weight reduction of the hydrocarbon stock.

1.2 "PQ Zeolite Business" as used herein shall mean all current PQ zeolite business which utilizes the Speciality Zeolite/Catalyst Plant for manufacture, excluding Proprietary Zeolites and Proprietary Zeolite-containing Catalysts.

1.3 "Other PQ Business Opportunities" shall include all opportunities for the manufacture and sale of zeolites outside of "PQ Zeolite Business", with the exclusion of:

- (1) zeolite for Detergents.
- (2) zeolites which require atmospheric synthesis and which have anticipated annual sales by PQ in excess of 200,000 lb/yr, and for which hydrothermal stabilization would not be used in their manufacture by PQ or the Partnership.
- (3) Proprietary Zeolites and Zeolite-containing Catalysts.

1.4 "Accepted Business Opportunity" or "ABO" shall mean a business opportunity related to zeolites and/or zeolite-containing catalysts which has been agreed to by the parties pursuant to Paragraph 5.2 of the Partnership Agreement and which is automatically incorporated by amendment herein.

1.5 As used herein, "zeolite(s)" shall mean any synthetic molecular sieve, consisting of an infinitely extending, three-dimensional network of AlO_4 and SiO_4 tetrahedra linked by the sharing of oxygen atoms, including synthetic molecular sieves in which the Al and Si have been replaced with other atoms, including but not limited to Fe or Ga.

1.6 "END PRODUCTS" shall mean the chemical lubricants or fuel products that are the result of a process that utilizes zeolites or zeolite-containing catalysts to modify chemical, petrochemical or oil feedstocks to said process.

1.7 "ZEOLITES" shall mean zeolites, including precursors thereto but shall not include zeolite-containing catalysts or zeolites purposefully mixed with any other materials such as, for example, but not limited to alumina, silica and mullite, or zeolites having catalytically active metals or metal ions incorporated therein or thereon.

1.8 "ZEOLITE PRODUCTS" shall mean zeolites, including precursors thereto, and zeolite-containing catalysts, including precursors thereto.

1.9 "CATALYST PRODUCTS" shall mean zeolite-containing catalysts, including precursors thereto but shall not include zeolites per se unless the zeolite per se is used as the catalyst.

1.10 "PRODUCTS" shall mean any zeolite-containing product other than CATALYST PRODUCTS.

1.11 "Contributed Know-how" shall mean all transferable technical information and data (other than PQ Patent Rights) related to DUAs, PQ Zeolite Business and Other PQ Business Opportunities within the ABOs, which are owned or controlled by PQ on the Effective Date, or which are acquired thereafter during the term of this Agreement which are related to Zeolite Products, including, but not limited to, information and data relating to research, development, technical service, manufacture, modification, use, sale and marketing.

1.12 "PQ Patent Rights" shall mean all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued thereon) in any country related to DUAs, PQ Zeolite Business and Other PQ Business Opportunities within the ABOs which are owned or controlled by PQ on the Effective Date, or which are acquired thereafter during the term of this Agreement.

1.13 "ZEOLYST Know-how" shall mean all transferable technical information and data (other than ZEOLYST Patent Rights) which are developed or acquired by ZEOLYST independently of PQ and/or SPACE during the term of this Agreement which are related to Zeolite Products, including, but not limited to, information and data relating to research, development, technical service, manufacture, modification, use, sale and marketing.

1.14 "ZEOLYST Patent Rights" shall mean all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued thereon) in any country which are acquired by ZEOLYST during the term of this Agreement.

1.15 "SPACE" shall mean Shell Polymers and Catalyst Enterprises Inc., a wholly owned subsidiary of Shell Oil Company and a Delaware corporation.

1.16 "Affiliate", with respect to SPACE shall mean SHELL or any company (including a corporation, partnership, joint venture or other association) other than SPACE, ZEOLYST and ZEOLYST Affiliates, which is now or subsequently becomes directly or indirectly affiliated with SHELL.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with SHELL if SHELL holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with SHELL if a series of companies can be specified beginning with SHELL and ending with the particular company, so related that each company of the series, except SHELL is directly affiliated with one or more companies in the series.

1.17 "SHELL" shall mean Shell Oil Company, a Delaware corporation, and its divisions, Shell Chemical Company and Shell Development Company.

1.18 "PQ" shall mean PQ Corporation, a corporation of Pennsylvania.

1.19 "Affiliate", with respect to PQ shall mean any company (including a corporation, partnership, joint venture or other association) other than PQ, ZEOLYST and ZEOLYST Affiliates, which is now or subsequently becomes directly or indirectly affiliated with PQ.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with PQ if PQ holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with PQ if a series of companies can be specified beginning with PQ and ending with the particular company, so related that each company of the series, except PQ is directly affiliated with one or more companies in the series.

1.20 "ZEOLYST" shall mean that general partnership created by by the Partnership Agreement.

1.21 "Affiliate", with respect to ZEOLYST shall mean any company (including a corporation, partnership, joint venture or other association) other than ZEOLYST, which is now or subsequently becomes directly or indirectly affiliated with ZEOLYST.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with ZEOLYST if ZEOLYST holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with ZEOLYST if a series of companies can be specified beginning with ZEOLYST and ending with the particular company, so related that each company of the series, except ZEOLYST is directly affiliated with one or more companies in the series.

1.22 "Third Party" shall mean any party other than PQ, PQ Affiliates, SPACE, SPACE Affiliates, ZEOLYST and ZEOLYST Affiliates.

1.23 "Effective Date" shall mean the Agreement Date of the Partnership Agreement (as defined therein).

1.24 "Research and Development Agreement" shall mean the Research and Development Agreement between SHELL and PQ dated March 16, 1988.

1.25 "Partnership Agreement" shall mean that Agreement by and between SPACE and PQ dated February 1, 1988, which creates the general partnership between SPACE and PQ.

ARTICLE 2 - Access/Disclosure of Contributed Know-how by PQ to ZEOLYST

2.1(a) PQ agrees that ZEOLYST will have access without payment under this Agreement to Contributed Know-how which PQ is free to disclose, and which, in the reasonable opinion of PQ, is relevant for the manufacture and sale of ZEOLITE PRODUCTS.

(b) However, where relevant, such access will be subject to the terms, conditions and/or obligations (if any) imposed on PQ by any Third Party. Without prejudice to Article 9 hereof, PQ will advise ZEOLYST of any such terms, conditions and/or obligations in a timely manner. ZEOLYST may, at its option, decline to accept any Contributed Know-how having any terms, conditions and/or obligations imposed thereon by a Third Party.

(c) Insofar as reasonably possible such Contributed Know-how shall be made available to ZEOLYST in the form of documents. At ZEOLYST's request, oral explanations of such Contributed Know-how will be provided.

2.2 If ZEOLYST wishes to know whether PQ and/or any PQ Affiliate is in possession of any additional Contributed Know-how to which it is entitled to have access under paragraph 2.1, ZEOLYST shall make such a request in writing to PQ, and PQ shall respond to ZEOLYST's request in writing within a reasonable period of time after ZEOLYST's request.

ARTICLE 3 - Licenses to ZEOLYST by PQ

3.1 For the consideration stated in Article 8, PQ hereby grants to ZEOLYST a non-exclusive, non-transferable (except as herein provided) license under PQ Patent Rights and the right to use Contributed Know-how to make, have made, and sell ZEOLITE PRODUCTS throughout the United States, its territories and possessions with the right to grant sublicenses to ZEOLYST Affiliates and to customers of ZEOLYST and ZEOLYST Affiliates but only to the extent such customers require a sublicense to enable them to use ZEOLITE PRODUCTS to produce END PRODUCTS and with the further right to authorize customers of ZEOLYST and ZEOLYST Affiliates to export END PRODUCTS made thereunder to any point in the world,

3.2 The rights and licenses granted in paragraph 3.1 will be subject to any terms, conditions and/or obligations imposed on PQ by a Third Party. Without prejudice to Article 9 hereof, PQ will advise ZEOLYST of any such terms, conditions and/or obligations in a timely manner. ZEOLYST may, at its option, decline to accept any license having any terms, conditions and/or obligations imposed thereon by a Third Party.

3.3 This Article 3 shall not be construed to require PQ to grant any right or license when such grant is prohibited by an agreement with any Third Party.

ARTICLE 4 - Access/Disclosure of ZEOLYST Know-how by ZEOLYST to PQ

4.1(a) ZEOLYST agrees that PQ will have access without payment under this Agreement to ZEOLYST Know-how which ZEOLYST is free to disclose and which PQ requests.

(b) However, where relevant, such access will be subject to the terms, conditions and/or obligations (if any) imposed on ZEOLYST by any Third Party. Without prejudice to Article 9 hereof, ZEOLYST will advise PQ of any such terms, conditions and/or obligations in a timely manner. PQ may, at its option, decline to accept any ZEOLYST Know-how having any terms, conditions and/or obligations imposed thereon by a Third Party.

(c) At PQ's request and insofar as reasonably possible, such ZEOLYST Know-how shall be made available to PQ in the form of documents. At PQ's request, oral explanations of such ZEOLYST Know-how will be provided.

4.2 If PQ wishes to know whether ZEOLYST and/or any ZEOLYST Affiliate is in possession of any additional ZEOLYST Know-how to which it is entitled to have access under paragraph 4.1, PQ shall make such a request in writing to ZEOLYST, and ZEOLYST shall respond to PQ's request in writing within a reasonable period of time after PQ's request.

ARTICLE 5 - Licenses to PQ by ZEOLYST

5.1 For the consideration stated in Article 8, ZEOLYST hereby grants to PQ an irrevocable, royalty-free (except as provided in Article 5.2), non-exclusive, non-transferable (except as herein provided) license under ZEOLYST Patent Rights and the right to use ZEOLYST Know-how to make, have made, use and sell ZEOLITES and PRODUCTS with the right to grant sublicenses to PQ Affiliates and to customers of PQ and PQ Affiliates but only to the extent such customers require a sublicense to enable them to use ZEOLITES and PRODUCTS to produce PRODUCTS or END PRODUCTS and with the further right to authorize customers of PQ and PQ Affiliates to export END PRODUCTS made thereunder to any point in the world.

5.2 During the term of this Agreement, the right to make and have made ZEOLITES and PRODUCTS granted in paragraph 5.1 shall be subject to a reasonable royalty to be determined by good faith negotiations between the parties.

5.3 The rights and licenses granted in paragraph 5.1 will be subject to any terms, conditions and/or obligations imposed on ZEOLYST by a Third Party. Without prejudice to Article 9 hereof, ZEOLYST will advise PQ of any such terms, conditions and/or obligations in a timely manner. PQ may, at its option, decline to accept any license having any terms, conditions and/or obligations imposed thereon by a Third Party.

5.4 During the term of this Agreement the rights and licenses granted in paragraph 5.1, with respect to the United States, its territories and possessions, shall be limited to use in areas outside of Designated Use Areas and Accepted Business Opportunities.

5.5 This Article 5 shall not be construed to require ZEOLYST to grant any right or license when such grant is prohibited by an agreement with any Third Party.

ARTICLE 6 - Confidentiality of Contributed Know-how

6.1 ZEOLYST agrees to maintain (and to undertake to obligate its Affiliates and sublicensees to maintain) the confidentiality of Contributed Know-how, except where disclosure or publication is necessary for medical, health or environmental reasons or is required by a government agency or a court of law or is otherwise necessary to the conduct of its business.

6.2 ZEOLYST, its Affiliates and sublicensees shall not use Contributed Know-how except in conduct of their business.

6.3 The provisions of this Article 6 shall continue in effect until such time as the Contributed Know-how becomes part of the public domain by publication or otherwise, and shall survive any prior termination of this Agreement.

ARTICLE 7 - Confidentiality of ZEOLYST Know-how

7.1 PQ agrees to maintain (and to undertake to obligate its Affiliates and sublicensees to maintain) the confidentiality of ZEOLYST Know-how, except where disclosure or publication is necessary for medical, health or environmental reasons or is required by a government agency or a court of law or is otherwise reasonably necessary to the conduct of its business.

7.2 The provisions of this Article 7 shall not apply to information or data that:

- a. is at the time of disclosure or thereafter becomes in the public domain by publication or otherwise, through no breach or fault on the part of PQ; or
- b. is in the possession of PQ at the time of disclosure; or
- c. is received in good faith by PQ from a Third Party having a bona fide right to disclose the information and who did not require PQ to hold such information in confidence; or
- d. is, as can be verified by written documentation, subsequently developed by employees or consultants of PQ independent of disclosure hereunder,

it being understood that specific ZEOLYST Know-how disclosed under this Agreement shall not be deemed to be within the foregoing exceptions merely because such information is embraced by more general know-how within one of the above exceptions.

ARTICLE 8 - Consideration

8.1 The consideration provided by PQ for this Agreement is the provision of Contributed Know-how and PQ Patent Rights hereunder and the consideration provided by ZEOLYST is the provision of ZEOLYST Know-how, ZEOLYST Patent Rights and the Partnership cash income before tax shared with PQ pursuant to Paragraph 5.5 of the Partnership Agreement in recognition of their technology contribution.

ARTICLE 9 - Warranties

9.1 It is understood and agreed between PQ and ZEOLYST that there shall be no warranty, express or implied, as to the accuracy, correctness, suitability, completeness, utility, soundness, reliability, fitness for a particular purpose, scope or validity of Contributed Know-how and/or PQ Patent Rights, or as to the freedom from infringement of any Third Party patents, by the use of such Contributed Know-how or PQ Patent Rights. ALL CONTRIBUTED KNOW-HOW AND PQ PATENT RIGHTS ARE MADE AVAILABLE HEREUNDER TO ZEOLYST ON AN "AS IS" BASIS WITHOUT WARRANTY. ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE, ARE EXCLUDED HEREUNDER. The use by ZEOLYST of Contributed Know-how and PQ Patent Rights shall solely be at ZEOLYST's risk and PQ shall not be liable to ZEOLYST for any damage or loss of any nature (including injury to or death of persons) resulting from inaccuracy, incorrectness, unsuitability, incompleteness, lack of utility, unsoundness unreliability, lack of fitness for a particular purpose, lack of scope or lack of validity.

9.2 It is understood and agreed between PQ and ZEOLYST that there shall be no warranty, express or implied, as to the accuracy, correctness, suitability, completeness, utility, soundness, reliability, fitness for a particular purpose, scope or validity of ZEOLYST Know-how and/or ZEOLYST Patent Rights, or as to the freedom from infringement of any Third Party patents, by the use of such ZEOLYST Know-how or ZEOLYST Patent Rights. ALL ZEOLYST KNOW-HOW AND ZEOLYST PATENT RIGHTS ARE MADE AVAILABLE HEREUNDER TO PQ ON AN "AS IS" BASIS WITHOUT WARRANTY. ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE, ARE EXCLUDED HEREUNDER. The use by PQ of ZEOLYST Know-how and ZEOLYST Patent Rights shall solely be at PQ's risk and ZEOLYST shall not be liable to PQ for any damage or loss of any nature (including injury to or death of persons) resulting from inaccuracy, incorrectness, unsuitability, incompleteness, lack of utility, unsoundness unreliability, lack of fitness for a particular purpose, lack of scope or lack of validity.

ARTICLE 10 - Liabilities/Indemnification

10.1 Neither party shall be responsible to the other party for any damage or loss of any nature (including injury to or death of persons) sustained by such other party arising out of negligence, strict liability or any other cause of action in connection with or related to, or arising out of a) the performance by the first party of its obligations under this Agreement or b) the exercise by the first party of rights pursuant to this Agreement. Neither party shall be responsible to the other for Third Party claims brought against the other party arising out of negligence, strict liability or any other cause of action in connection with or related to, or arising out of a) the performance by either party of its duties under this Agreement or b) the exercise by either party of rights pursuant to this Agreement. Each party shall during the term of this Agreement and at any time thereafter keep the other party fully indemnified against any claim, demand, action, or proceeding arising out of negligence, strict liability or any other cause of action brought against such other party by any Third Party if any such claim, demand, action, or proceeding is brought in connection with, relates to, or arises out of a) the performance by the first party of its obligations under this Agreement or b) the exercise by the first party of rights pursuant to this Agreement.

10.2 The provisions of this Article 10 shall apply to the Affiliates, licensees, sublicensees, and subcontractors of the parties to whom the party concerned has assigned or transferred rights or delegated or contracted the performance of obligations under this Agreement.

ARTICLE 11 - Termination

11.1 This Agreement shall take effect on its Effective Date and shall continue in effect until terminated pursuant to Article 16 of the Partnership Agreement.

11.2 The grant to PQ under Article 5, the confidentiality provisions of Article 6, the warranty provisions of Article 9 and the liability and indemnity provisions of Article 10 survive termination of this Agreement.

11.3 Upon termination of this Agreement, the grants to ZEOLYST under Article 3.1 will extend until the supply commitments of PQ under Article 16 of the Partnership Agreement expire.

ARTICLE 12 - Amendment

12.1 Neither party shall claim any amendment, modification, or rescission of any provisions hereof unless such amendment, modification or rescission is in writing, signed by both parties, and specifically refers to the provisions of the Agreement which it purports to amend, modify or rescind.

ARTICLE 13 - Assignment

13.1 This Agreement may not be assigned by either party without the prior written consent of the other party, except, however, that either party may assign this Agreement to a wholly owned subsidiary.

ARTICLE 14 - Export Control

14.1 Each party to this agreement understands and recognizes that the technology made available hereunder and the products thereof may be subject to the Export Control Regulations of the United States Department of Commerce and other United States Government regulations relating to the export of technical data and equipment and products produced therefrom. To the extent such regulations apply to technology made available hereunder, each party agrees that it will conform to such Export Control Regulations and other United States Government regulations.

ARTICLE 15 - Trademarks

15.1 Neither party shall utilize the name or trademarks' of the other party or its Affiliates in any way or connect the same with any technology or product without obtaining the written consent of the other party.

IN WITNESS THEREOF, the parties hereto have caused this Agreement to be executed as of the date set forth above.

PQ CORPORATION

By: _____
Title: _____

ZEOLYST ENTERPRISES

By: _____
Title: _____

TECHNOLOGY LICENSE AGREEMENT

This is an AGREEMENT by and between Shell Polymers and Catalysts Enterprises Incorporated, a subsidiary of Shell Oil Company (hereinafter referred to as "SPACE"), and Zeolyst Enterprises (hereinafter referred to as "ZEOLYST").

WHEREAS, SPACE and PQ Corporation (hereinafter referred to as "PQ") have created ZEOLYST as a partnership to manufacture and market zeolites and zeolite-containing catalysts;

WHEREAS, SPACE owns certain patent and technology rights which will be needed by ZEOLYST for its operation;

WHEREAS, Shell Oil Company (hereinafter referred to as "SHELL") and PQ have entered into a Research and Development Agreement dated March 16, 1988 to develop zeolites and zeolite-containing catalysts within certain Designated Use Area(s) (hereinafter referred to as "DUA(s)") and certain Accepted Business Opportunity(ies) (hereinafter referred to as "ABO(s)") to be manufactured and sold by or for ZEOLYST;

WHEREAS, under said Research and Development Agreement SHELL acquires certain patent rights which are transferred to SPACE and will be needed by ZEOLYST for its operation;

WHEREAS, ZEOLYST desires to acquire from SPACE certain patent and technology rights that it needs to carry out operations within its scope of business;

NOW, THEREFORE, in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

ARTICLE 1 - DEFINITIONS

1.1 "Designated Use Area" or "DUA" shall mean an application area for any zeolite or zeolite-containing catalyst which has been designated herein by the parties hereto, or is later designated by the parties pursuant to Paragraph 5.1 of the Partnership Agreement and which is automatically incorporated by amendment herein. DUA does not mean a specific zeolite or zeolite-containing catalyst, but encompasses the process which uses any zeolite or zeolite-containing catalyst in an application area. As of the Effective Date of this Agreement the following DUAs are within the scope of this Agreement:

a. "C5/C6 ISOMERIZATION DUA" shall mean a process in which the primary intent is the isomerization of normal C5 and C6 paraffins to branched C5 and C6 paraffins.

b. "HYDROCRACKING DUA" shall mean a process in which the primary intent is the hydroconversion of distillate feedstocks from crude oil (atmospheric or vacuum fractionation), or distillate feedstocks produced from crude oil fractions in other conversion processes, to liquid products with a significantly lower average molecular weight.

c. "CATALYTIC DEWAXING DUA" shall mean a process in which the primary intent is the improvement of low temperature flow properties of distillate fuels and lubricating oil stocks by the hydroconversion of high melting point hydrocarbons contained therein through means of molecularly shape-selective catalytic hydrocracking; a process which results in reduction of the molecular weight of the high melting point hydrocarbons and permits their separation from the stock by distillation.

d. "DISTILLATE DEEP HYDROGENATION DUA" shall mean a process in which the primary intent is the reduction of the contents of aromatic hydrocarbons and/or functionalized aromatic compounds in a hydrocarbon stock to levels that permit its use in higher value applications, for which its original contents of these species would have made it unsuitable or less suitable. It is intended that the aromatics content reduction be achieved with minimal molecular weight reduction of the hydrocarbon stock.

1.2 "SPACE" Zeolite-containing Catalyst Business" as used herein shall mean the current SPACE hydrocracking, G5/C6 isomerization, distillate deep hydrogenation and catalytic dewaxing zeolite catalyst business, with the exclusion of the current supply contract for catalytic dewaxing catalyst between Shell Oil Company and Engelhard.

1.3 "Other SPACE Business Opportunities" shall include all opportunities for the manufacture and sale of zeolite-containing catalysts outside of "SPACE Zeolite-containing Catalyst Business", with the exclusion of the current supply contract for catalytic dewaxing catalyst between Shell Oil Company and Engelhard.

1.4 "Accepted Business Opportunity" or "ABO" shall mean a business opportunity related to zeolites and/or zeolite-containing catalysts which has been agreed to by the parties pursuant to Paragraph 5.2 of the Partnership Agreement and which is automatically incorporated by amendment herein.

1.5 As used herein, "zeolite(s)" shall mean any synthetic molecular sieve, consisting of an infinitely extending, three-dimensional network of AlO₄ and SiO₄ tetrahedra linked by the sharing of oxygen atoms, including synthetic molecular sieves in which the Al and Si have been replaced with other atoms, including but not limited to Fe or Ga.

1.6 "END PRODUCTS" shall mean the chemical lubricants or fuel products that are the result of a process that utilizes zeolites or zeolite-containing catalysts to modify chemical, petrochemical or oil feedstocks to said process.

1.7 "ZEOLITE PRODUCTS" shall mean zeolites, including precursors thereto, and zeolite-containing catalysts, including precursors thereto.

1.8 "CATALYST PRODUCTS" shall mean zeolite-containing catalysts, including precursors thereto but shall not include zeolites per se unless the zeolite per se is used as the catalyst.

1.9 "Contributed Know-how" shall mean all transferable technical information and data (other than SPACE Patent Rights) related to DUAs and Other SPACE Business Opportunities within the ABOs which are owned or controlled by SPACE on the Effective Date, or which are acquired thereafter during the term of this Agreement which are related to Zeolite Products, including, but not limited to, information and data relating to research, development, technical service, manufacture, modification, use, sale and marketing.

1.10 "SPACE Patent Rights" shall mean all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued thereon) in any country related to DUAs and Other SPACE Business Opportunities within the ABOs which are owned or controlled by SPACE on the Effective Date, or which are acquired thereafter during the term of this Agreement.

1.11 "ZEOLYST Know-how" shall mean all transferable technical information and data (other than ZEOLYST Patent Rights) which are developed or acquired by ZEOLYST independently of SPACE and/or PQ during the term of this Agreement which are related to Zeolite Products, including, but not limited to, information and data relating to research, development, technical service, manufacture, modification, use, sale and marketing.

1.12 "ZEOLYST Patent Rights" shall mean all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued thereon) in any country which are acquired by ZEOLYST during the term of this Agreement.

1.13 "SPACE" shall mean Shell Polymers and Catalyst Enterprises Inc., a wholly owned subsidiary of Shell Oil Company and a Delaware corporation.

1.14 "Affiliate", with respect to SPACE shall mean SHELL or any company (including a corporation, partnership, joint venture or other association) other than SPACE, ZEOLYST and ZEOLYST Affiliates, which is now or subsequently becomes directly or indirectly affiliated with SHELL.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with SHELL if SHELL holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and

-
- (b) indirectly affiliated with SHELL if a series of companies can be specified beginning with SHELL and ending with the particular company, so related that each company of the series, except SHELL is directly affiliated with one or more companies in the series.

1.15 “Associate”, with respect to SPACE shall mean N. V. Koninklijke Nederlandsche Petroleum Maatschaappij, a Netherlands company, The “Shell” Transport and Trading Company, p.l.c., an English company, or any other company (including a corporation, partnership, joint venture, or other association) other than SPACE, SPACE Affiliates, ZEOLYST and ZEOLYST Affiliates which is now or subsequently becomes directly or indirectly affiliated with the first two mentioned companies or either of them (hereinafter the “Parent Company or Companies”).

For the purpose of this definition, a particular company is:

- (a) directly affiliated with a company or companies if the latter holds/hold fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with a Parent Company or Companies if one or more series of companies can be specified beginning with the particular company and ending with the Parent Company or Companies wherein the Parent Company or Companies through one or more of the series of companies holds/hold shares that permit the Parent Company or Companies to vote or control the vote of fifty percent (50%) or more of the shares at a general meeting, or its equivalent, of the particular company.

1.16 “SHELL” shall mean Shell Oil Company, a Delaware corporation, and its divisions, Shell Chemical Company and Shell Development Company.

1.17 “PQ” shall mean PQ Corporation, a corporation of Pennsylvania.

1.18 “Affiliate”, with respect to PQ shall mean any company (including a corporation, partnership, joint venture or other association) other than PQ, ZEOLYST and ZEOLYST Affiliates, which is now or subsequently becomes directly or indirectly affiliated with PQ.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with PQ if PQ holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and

-
- (b) indirectly affiliated with PQ if a series of companies can be specified beginning with PQ and ending with the particular company, so related that each company of the series, except PQ is directly affiliated with one or more companies in the series.

1.19 "ZEOLYST" shall mean that general partnership created by the Partnership Agreement.

1.20 "Affiliate", with respect to ZEOLYST shall mean any company (including a corporation, partnership, joint venture or other association) other than ZEOLYST, which is now or subsequently becomes directly or indirectly affiliated with ZEOLYST.

For the purpose of this definition, a particular company is:

- (a) directly affiliated with ZEOLYST if ZEOLYST holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with ZEOLYST if a series of companies can be specified beginning with ZEOLYST and ending with the particular company, so related that each company of the series, except ZEOLYST is directly affiliated with one or more companies in the series.

1.21 "Third Party" shall mean any party other than SPACE, SPACE Affiliates, PQ, PQ Affiliates, ZEOLYST and ZEOLYST Affiliates.

1.22 "Effective Date" shall mean the Agreement Date of the Partnership Agreement (as defined therein).

1.23 "Research and Development Agreement" shall mean the Research and Development Agreement between SHELL and PQ dated March 16, 1988.

1.24 "Partnership Agreement" shall mean that Agreement by and between SPACE and PQ dated February 1, 1988, which creates the general partnership between SPACE and PQ.

ARTICLE 2 - Access/Disclosure of Contributed Know-how by SPACE to ZEOLYST

2.1(a) SPACE agrees that ZEOLYST will have access without payment under this Agreement to Contributed Know-how which SPACE is free to disclose, and which, in the reasonable opinion of SPACE, is relevant for the manufacture and sale of ZEOLITE PRODUCTS.

(b) However, where relevant, such access will be subject to the terms, conditions and/or obligations (if any) imposed on SPACE by any Third Party. Without prejudice to Article 9 hereof, SPACE will advise ZEOLYST of any such terms, conditions and/or obligations in a timely manner. ZEOLYST may, at its option, decline to accept any Contributed Know-how having any terms, conditions and/or obligations imposed thereon by a Third Party.

(c) Insofar as reasonably possible such Contributed Know-how shall be made available to ZEOLYST in the form of documents. At ZEOLYST's request, oral explanations of such Contributed, Know-how will be provided.

2.2 If ZEOLYST wishes to know whether SPACE and/or any SPACE Affiliate is in possession of any additional Contributed Know-how to which it is entitled to have access under paragraph 2.1, ZEOLYST shall make such a request in writing to SPACE, and SPACE shall respond to ZEOLYST's request in writing within a reasonable period of time after ZEOLYST's request.

ARTICLE 3 - Licenses to ZEOLYST by SPACE

3.1 For the consideration stated in Article 8, SPACE hereby grants to ZEOLYST a non-exclusive, non-transferable (except as herein provided) license under SPACE Patent Rights and the right to use Contributed Know-how to make, have made, and sell ZEOLITE PRODUCTS throughout the United States, its territories and possessions with the right to grant sublicenses to ZEOLYST Affiliates and to customers of ZEOLYST and ZEOLYST Affiliates but only to the extent such customers require a sublicense to enable them to use ZEOLITE PRODUCTS to produce END PRODUCTS and with the further right to authorize customers of ZEOLYST and ZEOLYST Affiliates to export END PRODUCTS made thereunder to any point in the world.

3.2 The rights and licenses granted in paragraph 3.1 will be subject to any terms, conditions and/or obligations imposed on SPACE by a Third Party. Without prejudice to Article 9 hereof, SPACE will advise ZEOLYST of any such terms, conditions and/or obligations in a timely manner. ZEOLYST may, at its option, decline to accept any license having any terms, conditions and/or obligations imposed thereon by a Third Party.

3.3 This Article 3 shall not be construed to require SPACE to grant any right or license when such grant is prohibited by an agreement with any Third Party.

ARTICLE 4 - Access/Disclosure of ZEOLYST Know-how by ZEOLYST to SPACE

4.1(a) ZEOLYST agrees that SPACE will have access without payment under this Agreement to ZEOLYST Know-how which ZEOLYST is free to disclose and which SPACE requests.

(b) However, where relevant, such access will be subject to the terms, conditions and/or obligations (if any) imposed on ZEOLYST by any Third Party. Without prejudice to Article 9 hereof ZEOLYST will advise SPACE of any such terms, conditions and/or obligations in a timely manner. SPACE may, at its option, decline to accept any ZEOLYST Know-how having any terms, conditions and/or obligations imposed thereon by a Third Party.

(c) At SPACE'S request and insofar as reasonably possible, such ZEOLYST Know-how shall be made available to SPACE in the form of documents. At SPACE'S request, oral explanations of such ZEOLYST Know-how will be provided.

4.2 If SPACE wishes to know whether ZEOLYST and/or any ZEOLYST Affiliate is in possession of any additional ZEOLYST Know-how to which it is entitled to have access under paragraph 4.1, SPACE shall make such a request in writing to ZEOLYST, and ZEOLYST shall respond to SPACE'S request in writing within a reasonable period of time after SPACE'S request.

ARTICLE 5 - Licenses to SPACE by ZEOLYST

5.1 For the consideration stated in Article 8, ZEOLYST hereby grants to SPACE an irrevocable, royalty-free (except as provided in Article 5.2), non-exclusive, non-transferable (except as herein provided) license under ZEOLYST Patent Rights and the right to use ZEOLYST Know-how to make, have made, use and sell CATALYST PRODUCTS with the right to grant sublicenses to SPACE Affiliates, to SPACE Associates but only to the extent SPACE Associates require a sublicense to market CATALYST PRODUCTS and to customers of SPACE, SPACE Affiliates and SPACE Associates but only to the extent such customers require a sublicense to enable them to use CATALYST PRODUCTS to produce END PRODUCTS and with the further right to authorize customers of SPACE, SPACE Affiliates and SPACE Associates to export END PRODUCTS made thereunder to any point in the world.

5.2 During the term of this Agreement, the right to make and have made CATALYST PRODUCTS granted in paragraph 5.1 shall be subject to a reasonable royalty to be determined by good faith negotiations between the parties.

5.3 The rights and licenses granted in paragraph 5.1 will be subject to any terms, conditions and/or obligations imposed on ZEOLYST by a Third Party. Without prejudice to Article 9 hereof, ZEOLYST will advise SPACE of any such terms, conditions and/or obligations in a timely manner. SPACE may, at its option, decline to accept any license having any terms, conditions and/or obligations imposed thereon by a Third Party.

5.4 During the term of this Agreement the rights and licenses granted in paragraph 5.1, with respect to the United States, its territories and possessions, shall be limited to use in areas outside of Designated Use Areas and Accepted Business Opportunities.

5.5 This Article 5 shall not be construed to require ZEOLYST to grant any right or license when such grant is prohibited by an agreement with any Third Party.

ARTICLE 6 - Confidentiality of Contributed Know-how

6.1 ZEOLYST agrees to maintain (and to undertake to obligate its Affiliates and sublicensees to maintain) the confidentiality of Contributed Know-how, except where disclosure of publication is necessary for medical, health or environmental reasons or is required by a government agency or a court of law or is otherwise necessary to the conduct of its business.

6.2 ZEOLYST, its Affiliates and sublicensees shall not use Contributed Know-how except in conduct of their business.

6.3 The provisions of this Article 6 shall continue in effect until such time as the Contributed Know-how becomes part of the public domain by publication or otherwise, and shall survive any prior termination of this Agreement.

ARTICLE 7 - Confidentiality of ZEOLYST Know-how

7.1 SPACE agrees to maintain (and to undertake to obligate its Affiliates and sublicensees to maintain) the confidentiality of ZEOLYST Know-how, except where disclosure of publication is necessary for medical, health or environmental reasons or is required by a government agency or a court of law or is otherwise reasonably necessary to the conduct of its business.

7.2 The provisions of this Article 7 shall not apply to information or data that:

- a. is at the time of disclosure or thereafter becomes in the public domain by publication or otherwise, through no breach or fault on the part of SPACE; or
- b. is in the possession of SPACE at the time of disclosure; or
- c. is received in good faith by SPACE from a Third Party having having a bona fide right to disclose the information and who did not require SPACE to hold such information in confidence; or
- d. is, as can be verified by written documentation, subsequently developed by employees or consultants of SPACE independent of disclosure hereunder,

it being understood that specific ZEOLYST Know-how disclosed under this Agreement shall not be deemed to be within the foregoing exceptions merely because such information is embraced by more general know-how within one of the above exceptions.

ARTICLE 8 - Consideration

8.1 The consideration provided by SPACE for this Agreement is the provision of Contributed Know-how and SPACE Patent Rights hereunder and the consideration provided by ZEOLYST is the provision of ZEOLYST Know-how, ZEOLYST Patent Rights and the Partnership cash income before tax shared with SPACE pursuant to Paragraph 5.5 of the Partnership Agreement in recognition of their technology contribution.

ARTICLE 9 - Warranties

9.1 It is understood and agreed between SPACE and ZEOLYST that there shall be no warranty, express or implied, as to the accuracy, correctness, suitability, completeness, utility, soundness, reliability, fitness for a particular purpose, scope or validity of Contributed Know-how and/or SPACE Patent Rights, or as to the freedom from infringement of any Third Party patents, by the use of such Contributed Know-how or SPACE Patent Rights. ALL CONTRIBUTED KNOW-HOW AND SPACE PATENT RIGHTS ARE MADE AVAILABLE HEREUNDER TO ZEOLYST ON AN "AS IS" BASIS WITHOUT WARRANTY. ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE, ARE EXCLUDED HEREUNDER. The use by ZEOLYST of Contributed Know-how and SPACE Patent Rights shall solely be at ZEOLYST's risk and SPACE shall not be liable to ZEOLYST for any damage or loss of any nature (including injury to or death of persons) resulting from inaccuracy, incorrectness, unsuitability, incompleteness, lack of utility, unsoundness unreliability, lack of fitness for a particular purpose, lack of scope or lack of validity.

9.2 It is understood and agreed between SPACE and ZEOLYST that there shall be no warranty, express or implied, as to the accuracy, correctness, suitability, completeness, utility, soundness, reliability, fitness for a particular purpose, scope or validity of ZEOLYST Know-how and/or ZEOLYST Patent Rights, or as to the freedom from infringement of any Third Party patents, by the use of such ZEOLYST Know-how or ZEOLYST Patent Rights. ALL ZEOLYST KNOW-HOW AND ZEOLYST PATENT RIGHTS ARE MADE AVAILABLE HEREUNDER TO SPACE ON AN "AS IS" BASIS WITHOUT WARRANTY. ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE, ARE EXCLUDED HEREUNDER. The use by SPACE of ZEOLYST Know-how and ZEOLYST Patent Rights shall solely be at SPACE'S risk and ZEOLYST shall not be liable to SPACE for any damage or loss of any nature (including injury to or death of persons) resulting from inaccuracy, incorrectness, unsuitability, incompleteness, lack of utility, unsoundness unreliability, lack of fitness for a particular purpose, lack of scope or lack of validity.

9.3 SPACE represents and warrants that it has acquired or will acquire from SHELL:

- a) all transferable technical information and data (other than SHELL patent rights) which are within the scope of the DUAs and which are owned or controlled by SHELL on the Effective Date, or which are acquired thereafter by SHELL during the term of this Agreement which are related to ZEOLITE PRODUCTS, including, but not limited to, information and data relating to research, development, technical service, manufacture, modification, use, sale and marketing pertaining to ZEOLITE PRODUCTS, and
- b) all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued thereon) in any country which are within the scope of the DUAs which are owned or controlled by SHELL on the Effective Date, or which are acquired thereafter by SHELL during the term of this Agreement;

under terms and conditions necessary to satisfy the obligations of SPACE under this Agreement.

ARTICLE 10 - Liabilities/Indemnification

10.1 Neither party shall be responsible to the other party for any damage or loss of any nature (including injury to or death of persons) sustained by such other party arising out of negligence, strict liability or any other cause of action in connection with or related to, or arising out of a) the performance by the first party of its obligations under this Agreement or b) the exercise by the first party of rights pursuant to this Agreement. Neither party shall be responsible to the other for Third Party claims brought against the other party arising out of negligence, strict liability or any other cause of action in connection with or related to, or arising out of a) the performance by either party of its duties under this Agreement or b) the exercise by either party of rights pursuant to this Agreement. Each party shall during the term of this Agreement and at any time thereafter keep the other party fully indemnified against any claim, demand, action, or proceeding arising out of negligence, strict liability or any other cause of action brought against such other party by any Third Party if any such claim, demand, action, or proceeding is brought in connection with, relates to, or arises out of a) the performance by the first party of its obligations under this Agreement or b) the exercise by the first party of rights pursuant to this Agreement.

10.2 The provisions of this Article 10 shall apply to the Affiliates, Associates, licensees, sublicensees, and subcontractors of the parties to whom the party concerned has assigned or transferred rights or delegated or contracted the performance of obligations under this Agreement.

ARTICLE 11 - Termination

11.1 This Agreement shall take effect on its Effective Date and shall continue in effect until terminated pursuant to Article 16 of the Partnership Agreement.

11.2 The grant to SPACE under Article 5, the confidentiality provisions of Article 6, the warranty provisions of Article 9 and the liability and indemnity provisions of Article 10 survive termination of this Agreement.

11.3 Upon termination of this Agreement, the grants to ZEOLYST under Article 3.1 will extend until the supply commitments of SPACE under Article 16 of the Partnership Agreement expire.

ARTICLE 12 - Amendment

12.1 Neither party shall claim any amendment, modification, or rescission of any provisions hereof unless such amendment, modification or rescission is in writing, signed by both parties, and specifically refers to the provisions of the Agreement which it purports to amend, modify or rescind.

ARTICLE 13 - Assignment

13.1 This Agreement may not be assigned by either party without the prior written consent of the other party, except, however, that either party may assign this Agreement to a wholly owned subsidiary.

ARTICLE 14 - Export Control

14.1 Each party to this agreement understands and recognizes that the technology made available hereunder and the products thereof may be subject to the Export Control Regulations of the United States Department of Commerce and other United States Government regulations relating to the export of technical data and equipment and products produced therefrom. To the extent such regulations apply to technology made available hereunder, each party agrees that it will conform to such Export Control Regulations and other United States Government regulations.

ARTICLE 15 - Trademarks

15.1 Neither party shall utilize the name or trademarks of the other party or its Affiliates or Associates in any way or connect the same with any technology or product without obtaining the written consent of the other party.

IN WITNESS THEREOF, the parties hereto have cause this Agreement to be executed as of the date set forth above.

SHELL POLYMERS AND CATALYST ENTERPRISES INCORPORATED

By: _____
Title: _____

ZEOLYST ENTERPRISES

By: _____
Title: _____

RESEARCH AND DEVELOPMENT AGREEMENT

This is an Agreement effective the 16th day of March, 1988, by and between Shell Oil Company, a Delaware corporation (hereinafter referred to as "SHELL"), and PQ Corporation, a Pennsylvania corporation (hereinafter referred to as "PQ").

WHEREAS, Shell Polymers and Catalysts Enterprises Inc., a wholly owned subsidiary of SHELL (hereinafter referred to as "SPACE") and PQ have created Zeolyst Enterprises (hereinafter referred to as "ZEOLYST") as a partnership to manufacture and market zeolites and zeolite-containing catalysts.

WHEREAS, SHELL and PQ individually have experience and expertise in the area of zeolite and zeolite-containing catalyst development, production and marketing.

WHEREAS, SHELL and PQ are interested in cooperating with each other within certain Designated Use Areas (hereinafter referred to as "DUA(s)") and certain Accepted Business Opportunity(ies) (hereinafter referred to as "ABO(s)") to develop zeolites and zeolite-containing catalysts to be manufactured and marketed by ZEOLYST.

NOW, THEREFORE, in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

ARTICLE 1 - DEFINITIONS

1.1 "Designated Use Area" or "DUA" shall mean an application area for any zeolite or zeolite-containing catalyst which has been designated by the parties hereto, or is later designated by the parties pursuant to Paragraph 5.1 of the Partnership Agreement, and is subsequently incorporated by amendment herein upon agreement by the parties hereto. DUA does not mean a specific zeolite or zeolite-containing catalyst, but encompasses the process which uses any zeolite or zeolite-containing catalyst in an application area. As of the Effective Date of this Agreement, the following DUAs are within the scope of this Agreement:

a. "C5/C6 ISOMERIZATION DUA" shall mean a process in which the primary intent is the isomerization of normal C5 and C6 paraffins to branched C5 and C6 paraffins.

b. "HYDROCRACKING DUA" shall mean a process in which the primary intent is the hydroconversion of distillate feedstocks from crude oil (atmospheric or vacuum fractionation), or distillate feedstocks produced from crude oil fractions in other conversion processes, to liquid products with a significantly lower average molecular weight.

c. "CATALYTIC DEWAXING DUA" shall mean a process in which the primary intent is the improvement of low temperature flow properties of distillate fuels and lubricating oil stocks by the hydroconversion of high melting point hydrocarbons contained therein through means of molecularly shape-selective catalytic hydrocracking; a process which results in reduction of the molecular weight of the high melting point hydrocarbons and permits their separation from the stock by distillation.

d. "DISTILLATE DEEP HYDROGENATION DUA" shall mean a process in which the primary intent is the reduction of the contents of aromatic hydrocarbons and/or functionalized aromatic compounds in a hydrocarbon stock to levels that permit its use in higher value applications, for which its original contents of these species would have made it unsuitable or less suitable. It is intended that the aromatics content reduction be achieved with minimal molecular weight reduction of the hydrocarbon stock.

1.2 "Accepted Business Opportunity" or "ABO" shall mean a business opportunity related to zeolites and/or zeolite-containing catalysts which has been agreed to by the parties pursuant to Paragraph 5.2 of the Partnership Agreement, and is subsequently incorporated by amendment herein upon agreement by the parties hereto.

1.3 "Confidential Know-how" shall mean proprietary technical know-how, information and data (other than Patent Rights) which are within the scope of Designated Use Areas and Accepted Business Opportunities incorporated herein, including information related to the properties of zeolites and zeolite-containing catalysts and their use as well as information related to zeolite and zeolite-containing catalyst development, production and marketing, which is disclosed in writing or other tangible form and identified as being confidential, by the disclosing party to the receiving party, or which, if not initially disclosed in writing, is subsequently confirmed as confidential in writing within forty-five (45) days after disclosure.

1.4 "Patent Rights" shall mean all inventions and all patent rights appertaining thereto (including the right to file patent applications, and the applications and all patents and utility models which may be issued therefrom) in any country which are made, or which are acquired pursuant to this Agreement.

1.5 As used herein, "zeolite(s)" shall mean any synthetic molecular sieve, consisting of an infinitely extending, three-dimensional network of AlO_4 and SiO_4 tetrahedra linked by the sharing of oxygen atoms, including synthetic molecular sieves in which the Al and Si have been replaced with other atoms, including but not limited to Fe or Ga.

1.6 "END PRODUCTS" shall mean the chemical lubricants or fuel products which are the result of a process that utilizes zeolites or zeolite-containing catalysts to modify chemical, petrochemical or oil feedstocks in said process.

1.7 "CATALYTIC PRODUCTS" shall mean zeolite-containing catalysts, including precursors thereto but shall not include zeolites per se unless the zeolite per se is a precursor or is used as the catalyst.

1.8 “ZEOLITES” shall mean zeolite(s), including precursors thereto but shall not include zeolite-containing catalysts, zeolites purposefully mixed with any other materials such as, for example, but not limited to alumina, silica and mullite, or zeolites having catalytically active metals or metal ions incorporated therein or thereon.

1.9 “SHELL ZEOLITES” shall mean ZEOLITES wherein the composition, synthesis and/or manufacture is based primarily on SHELL Confidential Know-how.

1.10 “PQ ZEOLITES” shall mean ZEOLITES wherein the composition, synthesis and/or manufacture is based primarily on PQ Confidential Know-how.

1.11 “SHELL” shall mean Shell Oil Company, a Delaware corporation, and its divisions, Shell Chemical Company and Shell Development Company.

1.12 “Affiliate”, when applied to SHELL, shall mean any company (including a corporation, partnership, joint venture, or other association) other than SHELL, which is now or subsequently becomes directly or indirectly affiliated with SHELL.

For the purposes of this definition, a particular company is:

- (a) directly affiliated with SHELL if SHELL holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- (b) indirectly affiliated with SHELL if a series of companies can be specified beginning with SHELL and ending with the particular company of the series, so related that each company of the series, except SHELL, is directly affiliated with one or more companies in the series.

1.13 “Associate”, when applied to SHELL, shall mean N. V. Koninklijke Nederlandsche Petroleum Maatschaappij, a Netherlands company, The “Shell” Transport and Trading Company, p.l.c., an English company, or any other company (including a corporation, partnership, joint venture, or other association) other than SHELL and SHELL Affiliates which is now or subsequently becomes directly or indirectly affiliated with the first two mentioned companies or either of the (hereinafter the “Parent Company or Companies”).

For the purposes of this definition, a particular company is:

- (a) directly affiliated with a company if a company holds/hold fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and

-
- (b) indirectly affiliated with a Parent Company or Companies if one or more series of companies can be specified beginning with the particular company or companies and ending with the Parent Company or Companies wherein the Parent Company or Companies through one or more of the series of companies holds/hold shares that permit the Parent Company or Companies to vote or control the vote of fifty percent (50%) or more of the shares at a general meeting, or its equivalent, of the particular company.

1.14 "PQ" shall mean PQ Corporation, a corporation of Pennsylvania.

1.15 "Affiliate", when applied to PQ, shall mean any company (including a corporation, partnership, joint venture, or other association) other than PQ, which is now or subsequently becomes directly or indirectly affiliated with PQ.

For the purposes of this definition, a particular company is:

- (a) directly affiliated with PQ if PQ holds fifty percent (50%) or more of the shares carrying the right to vote at a general meeting, or its equivalent, of the particular company, and
- indirectly affiliated with PQ if a series of companies can be specified beginning with PQ and ending with the particular company of the series, so related that each company of the series, except PQ, is directly affiliated with one or more companies in the series.

1.16 "Third Party" shall mean any party other than SHELL and PQ.

1.17 "ZEOLYST" shall mean that general partnership created by the Partnership Agreement.

1.18 "Partnership Agreement" shall mean that Agreement by and between SPACE and PQ dated _____, which creates the general partnership between SPACE and PQ.

1.19 "Effective Date" shall mean the date recited in the first paragraph of this agreement.

ARTICLE 2 - PURPOSE

2.1 The purpose of this Agreement is to allow SHELL and PQ to cooperate with each other within the DUAs and within specified ABOs to develop improved performance products to be manufactured and marketed by ZEOLYST.

ARTICLE 3 - CONFIDENTIALITY OF KNOW-HOW

3.1 It is understood that for any sample(s) provided pursuant to this Agreement, the providing party shall furnish the receiving party with a written itemization of any properties and characteristics of said sample(s) which the providing party deems as Confidential Know-how hereunder. It is further understood that such deemed Confidential Know-how shall not include specific properties and characteristics of sample(s) which have been requested by the receiving party, or which are based on information disclosed by the receiving party.

3.2 Each of the parties agrees to give the other party's Confidential Know-how the same degree of protection that it gives its own Confidential Know-how and, unless written consent of the disclosing party is obtained, not to disclose any of the Confidential Know-how to any Third Party for a period of ten (10) years after the date of disclosure or ten (10) years after the termination of ZEOLYST, whichever last occurs. This requirement for confidentiality and restriction on disclosure shall not apply to know-how which:

- a. is at the time of disclosure or thereafter becomes in the public domain by publication or otherwise, through no breach or fault on the part of SHELL or PQ; or
- b. is in the possession of SHELL or PQ at the time of disclosure; or
- c. is received in good faith by SHELL or PQ from a Third Party having a bona fide right to disclose the information and who did not require SHELL or PQ to hold such information in confidence; or
- d. is, as can be verified by written documentation, subsequently developed by employees or consultants of SHELL or PQ independent of disclosure hereunder,

it being understood that specific Confidential Know-how disclosed under this Agreement shall not be deemed to be within the scope of the foregoing exceptions merely because such information is embraced by more general know-how within one of the above exceptions.

ARTICLE 4 - USE OF KNOW-HOW

4.1 Neither SHELL nor PQ may utilize any of the Confidential Know-how disclosed by the other party under this Agreement except for the purposes of this Agreement or as permitted by an agreement between the parties, for a period of ten (10) years after the date of disclosure or ten (10) years after the termination of ZEOLYST, whichever last occurs. Consent for disclosure shall not be unreasonably withheld for purposes of patent procurement pursuant to Article 6. The restrictions on the use of Confidential Know-how contained in this section shall be subject to the exceptions contained in Article 3.2.

4.2 Neither party may provide or make available to any Third Party sample(s) provided by the other party pursuant to this Agreement without the other party's written consent.

ARTICLE 5 - PATENTABLE INVENTIONS

5.1 For any inventions made under this Agreement, the parties hereto agree that inventorship of any inventive concept or subject matter shall be determined in accordance with United States Patent Law and practice.

5.2 Each of the parties hereto shall promptly bring to the other party's attention what it considers to be the basis for an invention made under this Agreement.

5.3 Within thirty (30) days after the termination of this Agreement, each of the parties shall bring to the attention of the other party any inventions made under this Agreement which have not previously been brought to the attention of the other party in accordance with the provisions of Article 5.2.

5.4 For a period of three (3) years subsequent to the termination of this Agreement, the parties hereto shall have a continuing obligation to bring to the other party's attention any invention made under this Agreement.

5.5 For any invention relating to Patent Rights under this Agreement, each of the parties hereto shall notify the other party at least thirty (30) days prior to the filing of each first-to-be-filed patent application on said invention and provide a copy of the proposed application.

ARTICLE 6 - OWNERSHIP OF PATENTS

6.1 The Patent Rights to any invention made solely by the employees of either of the parties shall be owned by the party whose employees made the invention.

6.2 The Patent Rights to any invention made jointly by employees of SHELL and PQ and which is based primarily on PQ Confidential Know-how shall be owned by PQ.

6.3 The Patent Rights to any invention made jointly by employees of SHELL and PQ and which is based primarily on SHELL Confidential Know-how shall be owned by SHELL.

6.4 The Patent Rights to any invention related to the composition, synthesis and/or manufacture of ZEOLITES which is made jointly by employees of SHELL and PQ and which is based on both SHELL and PQ Confidential Know-how shall be owned by PQ unless, however, the Patent Rights relate to SHELL ZEOLITES, in which case the Patent Rights shall be owned by SHELL.

6.5 The Patent Rights to any invention related to the composition, synthesis and/or manufacture of CATALYTIC PRODUCTS which is made jointly by employees of SHELL and PQ and which is based on both SHELL and PQ Confidential Know-how shall be owned by SHELL.

6.6 The Patent Rights to any invention related to the composition, synthesis and/or manufacture of ZEOLITES which is made jointly by employees of SHELL and PQ and which is based on neither SHELL nor PQ Confidential Know-how shall be owned by PQ.

6.7 The Patent Rights to any invention related to the composition, synthesis and/or manufacture of CATALYTIC PRODUCTS which is made jointly by employees of SHELL and PQ and which is based on neither SHELL nor PQ Confidential Know-how shall be owned by SHELL.

ARTICLE 7 - LICENSE UNDER PATENTS

7.1 SHELL grants to PQ an irrevocable, royalty-free, non-exclusive, non-transferable (except as herein noted) license under the Patent Rights owned by SHELL pursuant to Articles 6.3, 6.5 and 6.7 hereunder, to make, have made, use and sell ZEOLITES in the United States, its territories and possessions, with the right to extend sublicenses to Affiliates of PQ, customers of PQ and customers of Affiliates of PQ but only to the extent such customers require a sublicense to enable them to use ZEOLITES to produce END PRODUCTS and with the further right to authorize customers of PQ and customers of Affiliates of PQ to export END PRODUCTS made thereunder to any point in the world. Notwithstanding the above, PQ shall not receive a license under any Patent Rights owned by SHELL and based on SHELL Confidential Know-how to make, have made, use or sell SHELL ZEOLITES.

7.2 PQ grants to SHELL an irrevocable, royalty-free, non-exclusive, non-transferable (except as herein noted) license under the Patent Rights owned by PQ pursuant to Articles 6.2, 6.4 and 6.6 hereunder, to make and have made in the United States, its territories and possessions, and to use and sell CATALYTIC PRODUCTS worldwide, with the right to extend sublicenses to Affiliates of SHELL, customers of SHELL and customers of Affiliates and Associates of SHELL but only to the extent such customers require a sublicense to enable them to use CATALYTIC PRODUCTS to produce END PRODUCTS, with the further right to extend sublicenses to Associates of SHELL but only to the extent Associates of SHELL require a sublicense to market CATALYTIC PRODUCTS, and with the further right to authorize customers of SHELL, customers of Affiliates of SHELL and customers of Associates of SHELL to export END PRODUCTS made thereunder to any point in the world. Notwithstanding the above, SHELL shall not receive a license under any Patent Rights owned by PQ and based on PQ Confidential Know-how to make or have made PQ ZEOLITES.

7.3 During the term of the Partnership Agreement, neither party shall use the licenses granted in Articles 7.1 and 7.2 above to compete, either directly or indirectly, with PARTNERSHIP without the express written approval of the Management Committee (as the terms "PARTNERSHIP" and "Management Committee" are defined in the Partnership Agreement).

ARTICLE 8 - GENERAL

8.1 It is understood that this Agreement shall not be construed as granting either party any license or rights except as herein noted.

ARTICLE 9 - TERMINATION

9.1 This Agreement shall automatically terminate upon termination of ZEOLYST or upon mutual agreement of the parties, whichever first occurs.

9.2 The confidentiality provisions of Article 3, the non-use provisions of Article 4 and the licensing provisions of Article 7 survive termination of this Agreement.

ARTICLE 10 - ENTIRETY

10.1 This Agreement merges and supercedes the Cooperation Agreement dated July 15, 1987, between SHELL and PQ.

ARTICLE 11 - AMENDMENT

11.1 Neither party shall claim any amendment, modification, or rescission of any provisions hereof unless such amendment, modification or rescission is in writing, signed by both parties, and specifically refers to the provisions of this Agreement which it purports to amend, modify or rescind.

11.2 DUAs in addition to those specified in Article 1.1 of this Agreement and ABOs in which research and development cooperation has been requested by ZEOLYST are, upon agreement by SHELL and PQ, to be incorporated herein, with said agreement being signified by an amendment hereto executed by both parties.

ARTICLE 12 - NOTICES

12.1 All communications between the parties which may be given pursuant to this Agreement shall be sufficient in all respects if given in writing and mailed by registered or certified mail or overnight courier, postage and delivery costs prepaid, or sent by telex or facsimile transmission to the following addresses, or to such other addresses as the sending parties may theretofore been given proper notice:

Shell Oil Company
Patents and Licensing
One Shell Plaza
P.O. Box 2463
Houston, Texas 77252-2463

PQ Corporation
Valley Forge Executive Mall
P.O. Box 840
Valley Forge, Pennsylvania 19482

ARTICLE 13 – ASSIGNMENT

13.1 This Agreement may not be assigned by either party without the prior written consent of the other party except, however, that either party may assign this Agreement to its wholly owned subsidiary.

ARTICLE 14 – EXPORT CONTROL

14.1 Each party to this Agreement understands and recognizes that the technology made available hereunder and the products thereof may be subject to the Export Control Regulations of the United States Department of Commerce and other United States Government regulations relating to the export of technical data and equipment and products produced therefrom. To the extent such regulations apply to technology made available hereunder, each party agrees that it will conform to such Export Control Regulations and other United States Government regulations.

IN WITNESS THEREOF, the parties hereto have caused this Agreement to be executed as of the date set forth above.

SHELL OIL COMPANY

By: _____
Title: _____

PQ CORPORATION

By: _____
Title: _____

PJM: fcs

Exhibit No. 13

CONFIDENTIAL DISCLOSURE AGREEMENT

This is an Agreement effective the 16th day of March, 1988, by and between Shell Oil Company, a Delaware corporation (hereinafter referred to as "SHELL"), and PQ Corporation, a Pennsylvania corporation (hereinafter referred to as "PQ").

WHEREAS, SPACE and PQ have created Zeolyst Enterprises (hereinafter referred to as "ZEOLYST") as a partnership to manufacture and market zeolites and zeolite-containing catalysts.

WHEREAS, SHELL and PQ have entered into a Research and Development Agreement dated March 16, 1988 to develop zeolites and zeolite-containing catalysts suitable for manufacturing and marketing by ZEOLYST within certain Designated Use Areas (DUAs).

WHEREAS, SHELL and PQ are interested in exchanging proprietary information in order to explore the possibility of creating additional Designated Use Areas (DUAs) and to explore additional business opportunities for ZEOLYST relating to zeolites and zeolite-containing catalysts.

NOW, THEREFORE, in consideration of the premises and mutual covenants herein set forth, the parties hereto agree:

ARTICLE 1 – DEFINITIONS

1.1 "Confidential Know-how" shall mean proprietary information related to the properties of zeolites and zeolite-containing catalysts and their use as well as information related to zeolite and zeolite-containing catalyst development, production and marketing and other business aspects which is disclosed in writing or other tangible form and identified as being confidential, by the disclosing party or on behalf of the disclosing party to the receiving party, or which, if not initially disclosed in writing, is subsequently confirmed as confidential in writing within forty-five (45) days after disclosure.

1.2 "SHELL" shall mean Shell Oil Company, a Delaware corporation, including its divisions, Shell Chemical Company and Shell Development Company.

1.3 "SPACE" shall mean Shell Polymers and Catalyst Enterprises Inc., a wholly owned subsidiary of Shell Oil Company.

1.4 "PQ" shall mean PQ Corporation, a Pennsylvania corporation.

1.5 "ZEOLYST" shall mean that general partnership created by the Partnership Agreement.

1.6 "Designated Use Area" or "DUA" shall mean an application area for any zeolite or zeolite-containing catalyst which has been designated by the parties hereto, or is later designated by the parties pursuant to Paragraph 5.1 of the Partnership Agreement and which is automatically incorporated by amendment herein. DUA does not mean a specific zeolite or zeolite-containing catalyst, but encompasses the process which uses any zeolite or zeolite-containing catalyst in an application area. As of the Effective Date of this Agreement, the following DUAs are within the scope of this Agreement:

a. "C5/C6 ISOMERIZATION DUA" shall mean a process in which the primary intent is the isomerization of normal C5 and C6 paraffins to branched C5 and C6 paraffins.

b. "HYDROCRACKING DUA" shall mean a process in which the primary intent is the hydroconversion of distillate feedstocks from crude oil (atmospheric or vacuum fractionation), or distillate feedstocks produced from crude oil fractions in other conversion processes, to liquid products with a significantly lower average molecular weight.

c. "CATALYTIC DEWAXING DUA" shall mean a process in which the primary intent is the improvement of low temperature flow properties of distillate fuels and lubricating oil stocks by the hydroconversion of high melting point hydrocarbons contained therein through means of molecularly shape-selective catalytic hydrocracking; a process which results in reduction of the molecular weight of the high melting point hydrocarbons and permits their separation from the stock by distillation.

d. "DISTILLATE DEEP HYDROGENATION DUA" shall mean a process in which the primary intent is the reduction of the contents of aromatic hydrocarbons and/or functionalized aromatic compounds in a hydrocarbon stock to levels that permit its use in higher value applications, for which its original contents of these species would have made it unsuitable or less suitable. It is intended that the aromatics content reduction be achieved with minimal molecular weight reduction of the hydrocarbon stock.

1.7 "Accepted Business Opportunity" or "ABO" shall mean a business opportunity related to zeolites and/or zeolite-containing catalysts which has been agreed to by the parties pursuant to Paragraph 5.2 of the Partnership Agreement and which is automatically incorporated by amendment herein.

1.8 As used herein, "zeolite(s)" shall mean any synthetic molecular sieve, consisting of an infinitely extending, three-dimensional network of AlO_4 and SiO_4 tetrahedra linked by the sharing of oxygen atoms, including synthetic molecular sieves in which the Al and Si have been replaced with other atoms, including but not limited to Fe or Ga.

1.9 "Effective Date" shall mean the date recited in the first paragraph of this agreement.

1.10 "Research and Development Agreement" shall mean the Research and Development Agreement between SHELL and PQ dated MARCH 16, 1988.

1.11 "Partnership Agreement" shall mean that Agreement by and between SPACE and PQ dated February 1, 1988, which creates the general partnership between SHELL and PQ.

ARTICLE 2 – PURPOSE

2.1 The purpose of this Agreement is to allow SHELL and PQ to exchange Confidential Know-how which could lead to the establishment of Designated Use Areas in addition to those previously designated by SPACE and PQ pursuant to Paragraph 5.1 of the Partnership Agreement and Accepted Business Opportunities pursuant to Paragraph 5.2 of the Partnership Agreement, which DUAs and ABOs will be incorporated therein by amendment.

ARTICLE 3 - EXCHANGE OF KNOW-HOW

3.1 PQ, at its discretion, shall submit zeolite sample(s) and other Confidential Know-how to SHELL in order to evaluate suitability for the purpose designated in Article 2 hereof. The number, frequency and size of such sample(s) shall be mutually agreed upon.

3.2 SHELL shall disclose to SPACE and PQ information relating to its evaluation of sample(s) and other Confidential Know-how which shall allow ZEOLYST to evaluate the potential creation of new Designated Use Area(s) and Accepted Business Opportunity(ies) pursuant to Article 2 hereof.

3.3 SHELL and PQ shall submit such Confidential Know-how as is required under the Partnership Agreement to allow ZEOLYST and the other party to evaluate the creation of a Designated Use Area or an Accepted Business Opportunity.

ARTICLE 4 – CONFIDENTIALITY OF KNOW-HOW

4.1 It is understood that for any sample(s) provided pursuant to this Agreement, the providing party shall furnish the receiving party with a written itemization of any properties and characteristics of said sample(s) which the providing party deems as Confidential Know-how hereunder. It is further understood that such deemed Confidential Know-how shall not include specific properties and characteristics of sample(s) which have been requested by the receiving party, or which are based on information disclosed by the receiving party.

4.2 Each of the parties agrees to give the other party's Confidential Know-how hereunder the same degree of protection that it gives its own Confidential Know-how and, unless written consent of the disclosing party is obtained, not to disclose any of the Know-how designated in writing as confidential by the disclosing party to any third party. This requirement for confidentiality and restriction on disclosure shall not apply to know-how which:

-
- a. is at the time of disclosure or thereafter becomes in the public domain by publication or otherwise, through no breach or fault on the part of SHELL or PQ; or
 - b. is in the possession of SHELL or PQ at the time of disclosure; or
 - c. is received in good faith by SHELL or PQ from a third party having a bona fide right to disclose the information and who did not require SHELL or PQ to hold such information in confidence; or
 - d. is, as can be verified by written documentation, subsequently developed by employees or consultants of SHELL or PQ independent of the disclosure hereunder,

it being understood that specific Confidential Know-how disclosed under this Agreement shall not be deemed to be within the scope of the foregoing exceptions merely because such information is embraced by more general know-how within one of the exceptions.

4.3 Notwithstanding the provisions of Article 4.2, SHELL may disclose Confidential Know-how received from PQ under this Agreement to SPACE and ZEOLYST provided each agrees to be bound by the terms of confidentiality and non-use set forth in this Agreement, as indicated by execution of Addendums 1 and 2, which are attached hereto.

4.4 Notwithstanding the provisions of Article 4.2, PQ may disclose Confidential Know-how received from SHELL under this Agreement to ZEOLYST provided it agrees to be bound by the terms of confidentiality and non-use set forth in this Agreement, as indicated by execution of Addendum 2 which is attached hereto.

4.5 Neither of the parties may utilize any of the Confidential Know-how disclosed by the other party under this Agreement for any purpose other than that specified in Article 2 hereof, except as permitted by agreement in writing between the parties.

4.6 In the event that Confidential Know-how disclosed hereunder is encompassed within a later designated DUA or ABO, then the confidentiality provisions of the Research and Development Agreement shall apply thereto. For all other Confidential Know-how, the provisions of non-disclosure and restrictions on use under Articles 4.2 and 4.5 shall remain in effect for a period of three (3) years after the date of disclosure.

ARTICLE 5 - GENERAL

- 5.1 It is understood that nothing in this Agreement shall limit the right of either party to utilize its own know-how in any manner whatsoever.
- 5.2 It is further understood that this Agreement shall not be construed as granting either party any license or other rights except as herein noted.

ARTICLE 6 - TERMINATION

- 6.1 This Agreement shall automatically terminate upon termination of ZEOLYST or upon mutual agreement of the parties, whichever first occurs.
- 6.2 The confidentiality and non-use provisions of Article 4 shall survive termination of this Agreement.

ARTICLE 7 - ENTIRETY

7.1 This Agreement sets forth the entire and only agreement between the parties with respect to the subject matter hereof and supercedes all previous understandings, negotiations, commitments, representations, and agreements with respect hereto.

ARTICLE 8 - NOTICES

8.1 All communications between the parties which may be given pursuant to this Agreement shall be sufficient in all respects if given in writing and mailed by registered or certified mail or overnight courier, postage and delivery costs prepaid, or sent by telex or facsimile transmission to the following addresses, or to such other addresses as the parties may heretofore been given proper notice:

Shell Oil Company
Patents and Licensing
One Shell Plaza
P.O. Box 2463
Houston, Texas 77252-2463

PQ Corporation
Valley Forge, Executive Mall
P.O. Box 840
Valley Forge, Pennsylvania 19482

ARTICLE 9 - EXPORT CONTROL

9.1 Each party to this Agreement understands and recognizes that the technology made available hereunder and the products thereof may be subject to the Export Control Regulations of the United States Department of Commerce and other United States Government regulations relating to the export of technical data and equipment and products produced therefrom. To the extent such regulations apply to technology made available hereunder, each party agrees that it will conform to such Export Control Regulations and other United States Government regulations.

IN WITNESS THEREOF, the parties hereto have caused this Agreement to be executed as of the date set forth above.

SHELL OIL COMPANY

By: _____
Title: _____

PQ CORPORATION

By: _____
Title: _____

ADDENDUM 1

In the event that SHELL transfers information to SPACE pursuant to Article 4.3 of this Agreement, SPACE agrees to be bound by the terms of confidentiality and non-use set forth in this Agreement.

Accepted and Agreed:

Shell Polymers and Catalyst Enterprises Inc.

By: _____
Title: _____

ADDENDUM 2

In the event that either SHELL or PQ transfers information to ZEOLYST pursuant to Articles 4.3 and 4.4 of this Agreement, ZEOLYST agrees to be bound by the terms of confidentiality and non-use set forth in this Agreement.

Accepted and Agreed:

ZEOLYST ENTERPRISES

By: _____
Title: _____

PJM: fcs

SERVICES AGREEMENT

BY

SHELL OIL COMPANY

THIS AGREEMENT, dated 1st day of February, 1988, between Shell Oil Company, a Delaware corporation and having an office at 900 Louisiana, Houston, Texas 77001 (hereinafter referred to as the "Shell") and Zeolyst Enterprises, a general partnership organized and existing under the laws of the State of Kansas, having an address at Valley Forge Executive Mall, 500 East Swedesford, Valley Forge, Pennsylvania 19482 (hereinafter referred to as the "Partnership").

WITNESSETH

WHEREAS, the Partnership has been formed between Shell Polymers and Catalyst Enterprises Inc. and PQ Corporation, a Pennsylvania corporation (hereinafter referred to as "PQ") for the purposes of producing and marketing Zeolites and Zeolite-containing Catalysts as defined in the Partnership Agreement; and

WHEREAS, to support the Partnership, the parties desire that Shell provide certain services upon and as requested by Partnership; and

WHEREAS, Shell is willing to perform or cause to be performed said services;

Now therefore, in consideration of the premises and the mutual agreements hereinafter set forth, Shell and Partnership do hereby agree, as follows:

Shell's Services

During the term of this Agreement, Shell will provide employees or otherwise make available other persons to perform such administrative and staff services including, but not limited to, consultative, accounting, legal, procurement, computer, employee relations, finance, public affairs, tax, and technical services relating to the business conducted by Partnership as Partnership may from time to time request. This Agreement shall not extend to services that would require Shell or its employees or agents (a) to perform any such acts which would submit Shell to the jurisdiction of a foreign country or (b) to be authorized to do business in any foreign jurisdiction.

Performance Obligations

During such time as Shell employees or employees of agents of Shell (Employees) are rendering services hereunder on behalf of Partnership, those Employees who are engaged in the performance of such services shall, unless otherwise provided in any separate agreement covering the services of any such Employees, remain employees of Shell or the agent of Shell respectively, and continue to be paid by and to enjoy the benefits to which they are entitled as Employees, if any.

The obligations of Shell and Employees to perform any such services shall be subject to the business requirements of Shell, but Shell shall use its best efforts, without discriminating against its own business, to provide Employees to perform such services.

Compensation

To the extent such services shall be furnished, payment therefor shall be made by Partnership to Shell, as reimbursement, at a rate to cover all direct costs (including, without limitation, salaries of the Employees providing the services, labor burden, out-of-pocket expenses, expenses for computers, materials and supplies, and for travel and living, etc.) plus all applicable indirect costs, all of which costs, whether direct or indirect, shall be determined in accordance with generally accepted accounting methods and practices, consistently applied.

Shell shall maintain adequate accounting records, which in reasonable detail fairly reflect the transactions contemplated hereunder, and shall maintain a system of internal controls, sufficient to provide reasonable assurances that the services are provided in accordance with this Agreement.

All related books and accounts of Shell applicable to the performance of its obligations hereunder shall at all reasonable times be open to inspection by auditors for Partnership, subject only to execution of proper confidentiality agreements.

Independent Contractor Status

Nothing contained in this Agreement shall constitute either party hereto the agent of the other party for any purpose. All Employees shall be engaged in a capacity as an independent contractor with full control over the manner and method of performance subject to the work authorizations of Partnership.

Standard of Care

While performing the services hereunder, Employees shall perform their duties in a manner they reasonably believe to be in the best interests of Partnership, and with such care as an ordinarily prudent person in a like position would use under similar circumstances. In the event such standard of conduct is breached, Shell shall indemnify against liability or loss so occasioned.

Nothing contained in this Agreement shall be deemed to relieve either the partners or management of Partnership from the performance of their respective duties or limit the exercise of their powers and authority under the law.

Notices

Notice by either Shell or Partnership will be made only by mail or telegram addressed to the other party at its address first set forth above, and will be considered given as of the time it is deposited with the U.S. Postal Service or the telegraph company, postage or charges prepaid.

Assignability

- (a) This Agreement shall inure to the benefit of and be binding upon each of the parties hereto and shall be assignable to the successors of substantially the entire business of either party relating to the subject matter of this Agreement. This Agreement shall not be otherwise assignable by either party without the written consent of the other party except, however,
- (b) Shell may assign this Agreement to a wholly-owned subsidiary thereof without the consent of, but with the prompt written notice to Partnership.

Except as herein provided no assignment to this Agreement shall be valid without assignment to and assumption by such successors and assigns of all the rights and obligations under this Agreement.

Governing Law

The parties hereto agree that this Agreement shall be construed and all questions relating thereto shall be determined in accordance with the laws of the State of Texas, without recourse to its conflicts of law principles.

Entirety/Modifications

This Agreement is intended to implement the intent of the Partners under the Partnership Agreement concerning the subject matter hereof. This Agreement, the Partnership Agreement and the other agreements referred to herein and in the Partnership Agreement constitute the entire agreement between the parties concerning the subject matter hereof and supersede any prior understanding or written or oral agreements respecting the subject matter of this Agreement. Neither this Agreement nor any agreements supplementing or amending this Agreement or any waiver hereunder will be binding unless signed by both parties, and performance prior to such execution shall not constitute a waiver of this requirement.

Headings

The headings used in this Agreement are for reference purposes only and do not constitute substantive matter to be considered in construing the terms of this Agreement.

Parties Bound

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective legal representatives, successors, and assigns where permitted by law.

Severability

In case any one or more of the provisions contained in this Agreement shall, for any reason, be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

Further Remedies

Pursuit by a party of any of the remedies available herein shall not preclude pursuit by it of any of the other remedies provided by law, nor shall pursuit of any remedy herein constitute a forfeiture or waiver of any amount due it or of any damages accruing by reason of the violation of any of the terms, provisions and covenants contained in this Agreement.

Waiver

No waiver by any party of the performance of any provision, condition or requirement herein shall be deemed to be a waiver of, or in any manner release the other party from, performance of any other provision, condition or requirement herein; nor deemed to be a waiver of, or in any manner release the other party from future performance of the same provision, condition or requirement; nor shall any delay or omission by any party to exercise any right hereunder in any manner impair the exercise of any such right or any like right accruing to it thereafter.

Term

This Agreement, upon execution hereof, shall be effective as of the date hereof and shall continue in effect indefinitely thereafter, subject, however, to termination at any time by either party giving thirty (30) days written notice to the other.

Warranties

Shell warrants that the services provided pursuant to this Agreement shall be performed in a reasonably prudent and professional manner with the skill and expertise as is generally available in the Houston area for similar services. Shell also warrants that it will comply with all applicable laws and governmental regulations and orders. Except as set forth in this paragraph, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WHEREIN, the Parties execute this agreement which shall be effective on this the 16th day of March, 1988.

SHELL OIL COMPANY

By: _____
Title: _____

ZEOLYST ENTERPRISES

By: _____
Title: _____

AMENDMENT
PARTNERSHIP AGREEMENT
ZEOLYST ENTERPRISES

I. RECITALS

- A. As of February 1, 1988, Shell Catalyst Ventures Inc. (“SCVI”), formally Shell Polymers and Catalysts Enterprises Inc. (“SPACE”), and PQ Corporation (“PQ”) formed a Kansas general partnership named zeolyst Enterprises (“the Partnership”).
- B. The purpose of the Partnership was generally “to develop Zeolites and Zeolite-containing Catalysts for use in DUAs and ABOs; to cause the zeolite/Catalyst Plant to be operated for manufacture of Zeolites and Zeolite-containing Catalysts; to sell Zeolites and Zeolite-containing Catalysts produced therein and elsewhere for use in DUAs and ABOs within the United States, its possessions and Territories;...”
- C. Subsequent to the formation, and with the consent of PQ in accordance with the Partnership Agreement, SPACE or its successor has assigned its Partnership interest in the Partnership to Affiliates of SCVI so that the current partners and their percentage interests are:

PQ Corporation	50%
Shell Catalyst Ventures Inc. a Delaware corporation and wholly-owned subsidiary of Shell Oil Company	1%
CRI Zeolites Inc. (“CRIZ”) a Delaware corporation and wholly-owned subsidiary of CRI International, Inc., a Maryland corporation and 50% owned subsidiary of SCVI.	49%

(All hereinafter referred to as “a Partner” or collectively as “the Partners”.)

- D. The Partners are contemporaneously with this Amendment, directly or through an Affiliate, forming a new partnership outside the United States.
- E. As part of the consideration and agreement to form such partnership the Partners believe it to be in their individual best interests and the best interests of the Partnership to amend the Partnership Agreement in the manner set out below.

F. Unless otherwise specifically stated in this Amendment, all capitalized terms used in this Amendment shall have the same meaning as in the Partnership Agreement.

II. AMENDMENTS

A. Definitions

1. The following definitions shall replace the definitions referenced:

1.1 "SCVI" shall mean SHELL CATALYST VENTURES INC., a Delaware Corporation, a wholly owned subsidiary of Shell Oil Company.

1.1.1 "Affiliate", with respect to the Shell Partners, shall mean: (a) N. V. Koninklijke Nederlandsche Petroleum Maatschappij, a limited liability company formed under the laws of The Netherlands, (b) "Shell" Transport and Trading Company, Public Limited Company, an English company, and (c) any other company (including a corporation, partnership, joint venture, etc.) which is now or subsequently becomes directly or indirectly affiliated with one or more of the companies named in (a) and (b).

1.40 "PQ Zeolite Business" as used herein shall mean all current PQ zeolite business which utilizes the Specialty Zeolite/Catalyst Plant for manufacture, excluding the present 702 custom product and improvements thereto.

2. The following definitions shall be added to Article I.

1.1a "CRIZ" shall mean CRI ZEOLITES INC., a Delaware Corporation, a wholly owned subsidiary of CRI International, Inc., a Maryland Corporation, a 50% owned subsidiary of SCVI, with the remaining 50% owned by LP Catalyst Holdings Inc., a Delaware Corporation, both of which are Affiliate of Shell Oil Company.

1.1b "Shell Partners" shall mean collectively SCVI and CRIZ, provided that they are Affiliates of Shell Oil Company, as long as each of them holds an interest in the Partnership.

1.46 "SIPM" shall mean SHELL INTERNATIONALE PETROLEUM MAATSCHAPPIJ B. V., limited liability company formed under the laws of the Netherlands.

1.47 "SIRM" shall mean SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B. V., a limited liability company formed under the laws of the Netherlands.

1.48 "SICC" shall mean Shell International Chemical Company, a limited liability company formed under the laws of England.

1.50 "SIRM Technology License Agreement" shall mean that agreement between SIRM and the Partnership under which certain SIRM technology and know-how is non-exclusively licensed to the Partnership for use by the Partnership.

1.51 "C4/C5 Olefin Isomerization DUA" shall mean shall mean a process in which the primary intent is the isomerization of normal C4 and/or C5 olefins to iso-C4 and/or iso-C5 olefins.

1.52 "Pressure Synthesis Zeolites ABO" shall mean those zeolites prepared by a synthesis technique operated at pressures above atmospheric and which are not already encompassed within the DUAs listed in this Article 1.

1.53 "Xylene Isomerization DUA" shall mean a process for isomerization of xylenes.

1.54 "SICC Agency Agreement" shall mean that agreement entered into between SICC and Criterion Catalyst Company L.P. under which Criterion Catalyst Company L.P. will market and sell Zeolite-containing Catalysts outside North America.

3. All references in the Partnership Agreement to SPACE shall now be changed to Shell Partners, or CRIZ and SCVI, or each of them separably consistent with the context in the Agreement.

4. Definition 1.38 "Scope of Business" shall be amended to delete the phrase "... all within the United States, its possessions and Territories,".

B. Organization

1. Section 2.1 Name. shall be amended such that the name of the Partnership is now "Zeolyst International".

2. Section 2.2 Purpose. shall be amended to delete the phrase "...within the United States, its possessions and Territories..." and add after the phrase "... documents referenced herein..." the clause:

"; to enter into an agreement with Zeolyst CV, a limited partnership to be formed under the laws of the Netherlands, for the supply of Zeolites from the Zeolyst CV zeolite plant at Delfzijl, The Netherlands"

C. Partnership Zeolite Business

1. To Paragraphs 5.1(b) (i), (d) and (e); 5.2 (b) (i) and (c) SIRM shall be added to the entities listed for sharing of information and the receipt of notice.

2. Section 5.4 (a) shall be replaced with the following:

"Zeolite-containing catalyst is intended to be marketed for the partnership by Criterion Catalyst Company L.P., under the terms and conditions of the Shell Sales Agreement, as assigned to Criterion Catalyst Company L.P., and the SICC Agency Agreement or other agreement negotiated between the Partnership and Criterion Catalyst Company L.P., until the end of the first quarter of 1993. A new agreement is expected to be negotiated between the Partnership and Criterion Catalyst company L.P. for approval by the Management Committee whose essential terms are to include a maximum five percent (5%) commission on sales of the Partnership products sold by Criterion Catalyst Company and a further fee payment by the Partnership to Criterion Catalyst Company L.P. equal to \$400,000 per year to be paid in equal monthly installments for sales and technical

service. This non-commission fee payment maximum shall be subject to annual adjustments as negotiated between the parties, but such adjustments will not exceed twenty-five percent (25%) of the previous year's maximum fee payment. The contract will also set specific sales milestones and provide that the Partnership shall have the option of entering into sales agreements with other parties, or employing marketing personnel if Criterion Catalyst Company L.P. fails to meet the milestones."

If all of the partnership interest of Criterion Catalyst Company L.P. shall ever come under the direct or indirect control of the Shell Partners or their Affiliates, and the Partnership still has a product marketing agreement with Criterion Catalyst Company L.P., that agreement shall be modified, if necessary, to eliminate any commission on product sales and technical support to sales by employees of Criterion Catalyst Company L. P. in exchange for a fee structure based on total cost reimbursement generally consistent with the Partnership's then existing agreement with PQ as described in Paragraph 3 below.

3. Section 5.4 (b) shall be replaced as follows:

"Zeolites and other Zeolite-containing products will be marketed for the Partnership by PQ under the terms and conditions of the current Agreement between the Partnership and PQ but on an international basis, until the end of the first quarter of 1993. A new agreement is expected to be negotiated between Partnership and PQ for approval by the Management Committee. Essential terms of the new agreement are expected to include the elimination of commissions to PQ effective March 28, 1993 in exchange for a fee to be paid to PQ equal to the pro-rated sales and technical service employee cost up to maximum of \$716,000 per year. Such maximum fee shall be subject to annual adjustments as negotiated between the parties, but such adjustments will not exceed twenty-five percent (25%) of the previous year's maximum fee payment. The contract will also set specific sales milestones and provide that the Partnership shall have the option of entering into sales agreements with other parties, or employing marketing personnel if PQ fails to meet the milestones."

4. The word "Special" in the title to Section 5.5 shall be deleted.

5. Section 5.5 (a) shall be replaced with the following:

"The profits and losses of the Partnership will be allocated between PQ and the Shell Partners in accordance with their interest in the Partnership."

6. Section 5.5 (b) shall be amended by substituting the words "financial results" for the words "profit allocation".

D. Operation and Management

1. A new Paragraph (c) shall be added to Section 6.1 and state as follows:

“(c) The Partnership or an Affiliate of the Partnership will enter into an agreement with SIRM under which SIRM would provide the Partnership or appropriate Affiliate with access to SIRM technology sufficient to make and sell Zeolite-containing Catalysts outside the United States.”

2. A new Section 6.9 shall be added to state as follows:

“6.9 Product Purchase Agreement. The Partnership will enter into a Product Purchase Agreement with Zeolyst C.V. to provide for a preferential call on total plant capacity and to have Zeolyst C.V. available to make and sell to the Partnership all such products in such quantities as needed by the Partnership under terms negotiated between the parties.”

E. Management Committee

1. Section 9.2 shall be amended by adding new paragraph (c) which shall state:

“(c) To the extent that the Partners have authorized the Management Committee to borrow monies from any third party source, the Management Committee shall establish a debt ceiling for the Partnership and such ceiling and any increase of it shall only be made by unanimous action of the full Management Committee.”

2. Section 9.4 shall be amended to expand the Management Committee to eight (8) members with four (4) members being designated by PQ and four (4) members being designated by the Shell Partners.

3. Effective April 1, 1993, the following amendments to Section 9.7 shall be made.

Section 9.7 shall be amended by striking the first sentence of Paragraph (a) and all of Paragraph (b). At the end of Paragraph (a), the clause “ ... each succeeding calendar year” shall be deleted and a new clause shall be added which reads:

“..., provided that the Partner not providing the President, as set out below, shall have the right to nominate the Chairman.”

A new paragraph (b) shall be substituted and shall read:

“(b) Operating management of the Partnership shall be provided by individuals seconded to the Partnership by the Partners. As of April 1, 1993 it is intended that four officers will be initially appointed as follows:

1. A President;
2. A Vice-president of Manufacturing and Zeolite Technology and Sales;

3. A Vice-president of Sales Coordination (Americas and Far East) and Catalyst Technology Development;

4. A Vice-president of Sales Coordination (Europe and Near East).

“In addition the Management Committee intends to initially establish and fill the position of Manager Manufacturing Economics and Scheduling.

“The term of the President shall be two years and is intended to alternate between PQ and the Shell Partners unless a President’s term is extended by mutual agreement of all of the Partners. For the year 1993 the Shell Partners will nominate the first President and PQ will nominate the Chairman.

“As needed other management positions may be added or deleted by the unanimous action of the Management Committee and all such positions are to be equally staffed by the Partners. All positions will serve at the pleasure of the Management Committee. Annual performance appraisals are required and the continued retention of any individual shall be determined by majority vote of the Management Committee. The retention of the management shall be decided before the end of the first quarter of each calendar year.”

A new Paragraph (f) shall be added to read:

“(f) The appointment of all nominees to management positions in the Partnership under this Section 9.7 (b) shall require the unanimous approval of the Management Committee.”

4. Section 9.10 shall be amended by striking each reference to “officers” so that the restriction on remuneration and reimbursement of expenses shall only apply to members of the Management Committee. A new paragraph shall be add to read:

“The Partners shall continue to be responsible for the employment, compensation and benefits of the individuals appointed by the Management Committee to serve as its officers or other management positions. However the providing Partners shall be reimbursed by the Partnership for the services of the employees appointed to fill each of the positions set out in Section 9.7 (b) above at the rate of 1.00 times the direct salary (not including fringe benefits, bonuses or deferred compensation) of each such employee, prorated for the proportional time spent working for the Partnership in any calendar year. The Partners shall also be reimbursed the actual amount of any business expenses incurred by such employees while serving in such positions and conducting Partnership business for travel, food, lodging, and entertainment.”

Amendment

Partnership Agreement

III. COUNTERPARTS AND EXECUTION

This Agreement may be executed in one or more counterparts by the parties hereto, all of which when so executed and delivered to the other parties, shall be deemed originals. All such counterparts together shall constitute one and the same instrument.

IN WITNESS WHEREOF the Partners hereby agree and adopt this Amendment and make a part of the Partnership Agreement in accordance with Section 20.1 of the Partnership Agreement effective January 1, 1993.

PQ CORPORATION

By /s/ Dale J. Shinnors
Title _____

SHELL CATALYST VENTURES INC.

By /s/ R. F. Schimbor
Title President

CRI ZEOLITES INC.

By /s/ R. M. Foley
Title General Manager

ZEOLYST INTERNATIONAL
RTC-AMENDMENT 1.25.93

AMENDMENT TO ZEOLYST ENTERPRISES JOINT VENTURE PARTNERSHIP
BETWEEN
PQ CORPORATION AND SHELL POLYMERS AND CATALYSTS ENTERPRISES INC.
DATED FEBRUARY 1, 1988

Pursuant to Paragraph 20.1 of the above referenced Agreement, Paragraph 9.2(ix) of the same Agreement is deleted in its entirety and replaced with the following:

(ix) Approve or authorize any capital project or expenditure in excess of \$500,000 in the case of the Management Committee or \$75,000 in the case of the officers;

AGREED TO THIS 18th DAY OF October, 2002

PQ CORPORATION

By: /s/ Stanley W. Silverman
Name: Stanley W. Silverman
Title: President

SHELL CATALYST VENTURES INC.
(formerly known as Shell Polymers and Catalysts Enterprises Inc.)

By: /s/ Raymond T. Collins
Name: Raymond T. Collins
Title: President

**SECOND AMENDMENT TO
PARTNERSHIP AGREEMENT
OF
ZEOLYST INTERNATIONAL**

I. RECITAL: The Zeolyst International Partners have determined it to be in the best interests of Zeolyst International, a Kansas general partnership (“the Partnership”) to amend and restate in its entirety Article IX of the Zeolyst International Partnership Agreement, dated as of February 1, 1988, and as further amended on January 1, 1993 (the “Agreement”) to enable the Management Committee to more efficiently discharge its delegated duties.

II. AMENDMENT: Effective as of January 1, 2005, Article IX of the Agreement shall be amended to read in its entirety as follows:

Article IX

Management Committee

9.1 Responsibilities and Authority. Each Partner shall have an equal voice in the management of the Partnership and shall act (except where provided herein to the contrary) through the Management Committee. The Management Committee shall establish general policies and procedures for the Partnership and shall direct and make provision for the implementation of those policies and procedures in the conduct of the day-to-day operations of the Partnership’s business. In furtherance and not by way of limitation with respect to the foregoing, except as provided in Article 9.2(a), the Management Committee shall perform the following specific duties:

- (a) Subject to the provisions of Article 9.7, appoint and discharge officers of the Partnership.
- (b) Adopt, and may revise from time to time in whole or in part, appropriate delegations of authority for officers, agents, and any other representatives.
- (c) Review the performance of the officers of the Partnership.
- (d) Adopt, and may revise from time to time in whole or in part, and shall monitor compliance with (i) guidelines under which funds of the Partnership may be committed, and (ii) resolutions dealing with banking matters and (iii) any other necessary financial business of the Partnership.

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- (e) Adopt and review and revise, from time to time, but at least annually, a business plan, which may include objectives, strategies, programs, operating and capital budgets and shall provide the framework for the management of the business and affairs of the Partnership and the implementation of this Agreement and make provision for the implementation of said business plan. For annual planning purposes, such plan shall include forecasts of technical support activities and technical manpower requirements to be provided by each Partner as well as services to be provided by each Partner.
 - (f) Make distributions, subject to the provisions of Article XIII hereof.
 - (g) Exercise all rights, privileges, and options, if and to the extent provided, under insurance policies purchased and maintained by the Partnership pursuant to Article 21.1; and have the authority to settle or compromise any claim against the Partnership not covered by insurance.
 - (h) Except as provided herein to the contrary, the Management Committee shall have the authority to bind the Partnership in conduct of the Partnership's business and affairs.
 - (i) Review all legal actions against the Partnership, retain counsel and otherwise arrange for the defense thereof and approve settlement of any such actions by payment not in excess of \$25,000 by the Partnership.
 - (j) Establish one or more committees, for such purposes and with such duties as the Management Committee shall designate and appoint the members of each such committee from among the members of the Management Committee and/or the officers of the Partnership and/or such other persons whose services on such committee shall be considered to be beneficial to the Partnership; provided that if any members of the Management Committee shall be appointed to such a committee they shall be appointed in equal numbers from the members of the Management appointed by each Partner.
 - (k) File for or cause the filing for all necessary governmental permits and approvals and commence and arrange for participation in any administrative proceeding, hearing or action appropriate to conduct of the usual business of the Partnership.

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- (l) Do, or cause to be done, any and all things and acts and execute, or cause to be executed, any and all documents, contracts, evidences of indebtedness, security agreements, financing statements or other instruments, or purchase performance bonds, necessary or appropriate to the conduct of the usual business of the Partnership in the ordinary course and to effectuate fully the purpose of the Partnership as expressed in this Agreement.
 - (m) Resolve any disputes which may arise under any agreement executed between the Partnership and a Partner not acting in its capacity as a Partner.

9.2 Restrictions on Authority of Officers and Management Committee.

- (a) Except as otherwise mutually agreed or as set forth in Article 9.1 and 9.11 hereof, neither the Management Committee nor any of the individual members of the Management Committee or officers of the Partnership, unless otherwise authorized in writing by the Partners, shall have authority in the name and on behalf of the Partnership to:
 - (i) Do any act in contravention of this Agreement or execute any agreement between the Partnership and a Partner;
 - (ii) Possess or use Partnership property or assign any right of the Partnership property for other than a Partnership purpose;
 - (iii) Make, execute, or deliver any general assignment for the benefit of creditors, or any bond, guaranty, indemnity bond or surety bond;
 - (iv) Assign, transfer, pledge, compromise, or release any claim of the Partnership for amounts exceeding those stated in the current Manual of Authorities, except for full payment, or arbitrate or consent to the arbitration of any of its disputes or controversies;

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- (v) Make, execute, or deliver any deed, long-term ground lease or contract to sell all or substantially all of the Partnership property or to sell or dispose of any assets of the Partnership which have an original book value in excess of \$250,000 other than as provided in Articles IV, V and VI hereof;
 - (vi) Confess a judgment;
 - (vii) Make, execute, or deliver on behalf of the Partnership any mortgage, deed of trust, or accommodation paper or accommodation endorsement other than as provided in Article V hereof;
 - (viii) Delete, waive or otherwise amend or change this Agreement;
 - (ix) Approve or authorize any capital project or expenditure in excess of \$500,000 in the case of the Management Committee or \$250,000 in the case of the officers for approved items in the annual budget. For non-budgeted items, the officers authority is \$100,000;
 - (x) Commence any legal action or lawsuit for damages or equitable relief; or
 - (xi) Create any personal liability for any Partner other than that personal liability to which any Partner may have previously agreed to in writing.
- (b) Neither Partner shall represent or act for or purport to represent or act for or otherwise bind the Partnership, its affairs, business or assets, without the prior written approval of the other Partner except to the extent authorized by the provisions of this Agreement, any agreement between the Partners or any agreements between the Partnership and any one of the Partners.
- (c) To the extent that the Partners have authorized the Management Committee to borrow monies from any third party source, the Management Committee shall establish a debt ceiling for the Partnership and such ceiling and any increase of it shall only be made by unanimous action of the full Management Committee.

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- 9.3 Standard of Care. Each member of the Management Committee shall act in the same manner as would a reasonable business person in similar circumstances using sound business judgment.
- 9.4 Membership. The Management Committee shall be composed of six (6) members with three (3) members being designated by each Partner. The composition of the Management Committee may be increased at any time by the mutual agreement of the Partners. Each Partner shall designate one of its members on the Management Committee as its Management Representative. The Partners shall notify each other of their designees, which may be changed at any time. The initial members of the Management Committee shall be designated on the Agreement Date.
- 9.5 Voting Procedures. Each Partner shall have one vote which shall be cast by its designated Management Representative or in his absence by his designee. The Management Committee shall act only on the basis of unanimous vote of both Partners' Management Representative and/or designees. In the event that the Management Committee, after a meeting duly called and convened, is unable to reach a consensus on a matter (including, but not limited to, matters arising under Article 9.1 (m) hereof) within thirty (30) days, the Secretary of the Management Committee shall notify the Partners, and the Partners shall meet and resolve the matter within fourteen (14) days of the date notice is given.
- 9.6 Quorum. The quorum for Management Committee meetings shall be two (2) members, with each Partner being represented by not less than (1) member appointed by it. In the event there is not quorum for two (2) consecutive meetings, the Partners shall meet within thirty (30) days.
- 9.7 Officers. Except as otherwise mutually agreed by the Partners:
- (a) The Management Committee shall appoint two General Managers of the Partnership, one from each Partner. For the duration of the first full calendar

year of the Partnership, PQ shall designate the Chairman of the Management Committee who will preside at all meetings of the Management Committee. This responsibility shall alternate between SHELL PARTNERS and PQ each succeeding calendar year.

The Partner not designating the Chairman shall designate the Vice Chairman of the Management Committee who in the absence of the Chairman shall act as Chairman of the Management Committee.

- (b) The areas of primary responsibility for the two General Managers shall be as set out below. The Management Committee may expand or change such responsibilities as it deems necessary. In all other respects, the two General Managers shall be deemed to have equal and coextensive authority. They shall confer on all items of major importance and business planning.
- (1) The General Manager designated by PQ shall have the primary responsibility for:
- ZI pressure products business; ZI USY Zeolite powders business; and assigned portions of ZI specialty catalyst business.
 - General Management oversight and quality programs of ZI Kansas City and ZI Delfzijl Netherlands plant operations sites.
 - All Marketing, Sales, R&D, Technical Service and Customer Service activities associated with ZI product lines assigned.
- (2) The General Manager designated by SHELL PARTNERS shall have the primary responsibility for:
- ZI hydrocracking and specialty catalyst business.
 - All Marketing, Sales, R&D, Technical Service and Customer Service activities associated with ZI product lines assigned.
- (c) The Secretary of the Partnership, who shall also be Secretary to the Management Committee, shall be appointed by the Management Committee from such persons recommended by SHELL PARTNERS. The Secretary shall attend to the giving of notice of all meetings of the

Management Committee, shall keep minutes of all proceedings at meetings of the Management Committee and all meeting of the committees thereof. In the absence of the Secretary, such person as shall be designated by the Chairman shall perform his duties.

- (d) The Treasurer/Comptroller shall be appointed by the Management Committee from such persons recommended by PQ. The Treasurer/Comptroller shall be the principal accounting officer of the Partnership, be in charge of the accounting books and records of the Partnership, have the care and custody of all the funds of the Partnership and be Chairman of the accounting committee created under Article 9.1(j) hereof. However, at any time either Partner may undertake an audit in accordance with Section 11.7 hereof.
- (e) The Management Committee may appoint such other officers as it may from time to time deem advisable. All officers of the Partnership must be employees of a Partner or a wholly owned subsidiary of a Partner. Subject to the restrictions set forth in this Article 9.7, a person may hold the office of Secretary if he also holds the office of Chairman or Vice Chairman acting as Chairman of the Management Committee.
- (f) The appointment of all nominees to management positions in the Partnership under this Section 9.7(b) shall require the unanimous approval of the Management Committee.

9.8 Meetings.

- (a) The Management Committee shall have an initial meeting on the formation date of the Partnership and shall meet thereafter at least three times each calendar year. The meetings shall be called by the Chairman or by at least two members and may be at the Kansas City Plant, the respective offices of

the Partners or any other mutually acceptable location. Other meetings may be called by the Chairman or by all of the members appointed by one of the Partners and may be held at the Kansas City Plant, the respective offices of Partners or any other mutually acceptable location. The Secretary shall give written notice of any meetings by facsimile, letter, telex cable or telegram to each member at least seven (7) days in advance of the date of the meeting.

- (b) Any member may waive notice of any meeting of the Management Committee by written waiver filed with the Secretary either before or after the meeting, and attendance at any meeting shall constitute waiver of notice.
 - (c) Any member may participate in Management Committee meeting by means of conference telephone, electronically transmitted image with audio or other similar communications equipment by means of which all persons participating in the meeting can hear each other, and any member so participating shall be deemed to be present at the meeting in person.
 - (d) The minutes of all Management Committee meetings shall be approved by the Chairman and Vice-Chairman and placed in an official minute book.
- 9.9 Action Without Meeting. Any action to be taken by the Management Committee may, subject to the restrictions on the Management Committee's powers contained in Section 9.2, be taken without a meeting if a consent in writing (or separate counterparts thereof), setting forth the action so taken, and the date it shall be effective, shall be signed by both Management Representatives and such consent shall have the same force and effect as an action duly taken by the Management Committee at a meeting. Any such signed consent(s) shall be placed in the official minute book
- 9.10 Expenses. Members of the Management Committee shall receive no remuneration from the Partnership in connection with their duties on the Management Committee, nor shall the Partnership reimburse any expenses of members of the Management Committee incurred in connection with their respective duties on the Partnership Committee.

The Partners shall continue to be responsible for the employment, compensation and benefits of the individuals appointed by the Management Committee to serve as its officers or other management positions. However the providing Partners shall be reimbursed by the Partnership for the services of the employees appointed to fill each of the positions set out in Section 9.7 (b) above at the rate of 1.00 times the direct salary (including fringe benefits, and bonuses but not including deferred compensation) of each such employee, prorated for the proportional time spent working for the Partnership in any calendar year. The Partners shall also be reimbursed the actual amount of any business expenses incurred by such employees while serving in such positions and conducting Partnership business for travel, food, lodging, and entertainment.

- 9.11 Execution of Partnership Agreements. Notwithstanding any provision hereof to the contrary, all agreements entered into by the Partnership shall be upon prior authorization of the Management Committee and shall be executed on behalf of the Partnership by a General Manager, or other duly authorized representative, except,
- (a) Any agreement to be entered into between the Partnership and a Partner or a Partner's Affiliate shall be executed on behalf of the Partnership by the General Manager or other duly authorized representative of the Partner not a party to the Agreement;
 - (b) Any agreement between the Partnership and a public utility is authorized and may be executed by a General Manager of the Partnership or such other officers or representative so designated by the Management Committee; and

-
- (c) Any agreement between the Partnership and any third party other than a public utility is authorized and may be executed by a General Manager of the Partnership or such other officer or representative designated by the Management Committee (the "authorized representatives") provided such agreement is within the authorities granted the authorized representatives in the Zeolyst International Manual of Authorities, an authorities delegation instrument approved by the Management Committee.
- 9.12 Audits under Agreements with a Partner. Notwithstanding any provision hereof to the contrary, with respect to all agreements between the Partnership and a Partner, the General Manager of the Partner not a party to such an agreement shall have the authority acting alone to cause the Partnership to exercise any and all rights the Partnership might have with respect to audits or financial review under such an agreement and to act on behalf of the Partnership with respect thereto.
- 9.13 Administration of Agreements with a Partner. Notwithstanding any provision hereof to the contrary, with respect to all agreements between the Partnership and a Partner, the Partner not a party to such agreement shall select the person responsible for the administration of such agreement by the Partnership provided such person shall be reasonably acceptable to the other Partner.

III. COUNTERPARTS AND EXECUTION: This Second Amendment to Partnership Agreement of Zeolyst International may be executed in one or more counterparts by the parties hereto, all of which when so executed and delivered to the other parties, shall be deemed originals. All such counterparts together will constitute one and the same instrument.

IN WITNESS WHEREOF the Partners hereby agree to and adopt this Second Amendment to Partnership Agreement of Zeolyst International effective as of January 1, 2005, in accordance with Section 20.1 of the Agreement.

PQ CORPORATION

By: /s/ Michael Imbriani

CRI ZEOLITES INC.

By: /s/ Pat Labbs

SECOND AMENDMENT AGREEMENT

SECOND AMENDMENT AGREEMENT dated as of August 7, 2017 (this "Second Amendment") to the Term Loan Credit Agreement dated as of May 4, 2016 (as amended by the First Amendment Agreement, dated as of November 14, 2016, and as further amended, restated, amended and restated, supplemented or otherwise modified from time to time and immediately prior to the Second Amendment Effective Date (as defined below), the "Credit Agreement"), among PQ Corporation, a Pennsylvania corporation (the "Borrower"), CPQ Midco I Corporation, a Delaware corporation ("Holdings"), the Guarantors, Citibank, N.A., as an Additional Term Lender (as defined below) and Credit Suisse AG, Cayman Islands Branch, as administrative agent (the "Administrative Agent") and as collateral agent.

A. Capitalized terms used but not defined herein shall have the meanings assigned to such terms in the Amended Credit Agreement (as defined below). Citi is acting as sole lead arranger and sole bookrunner (in such capacities, the "Repricing Arranger") in connection with this Second Amendment. For purposes of this Second Amendment, "Citi" shall mean Citigroup Global Markets Inc., Citibank, N.A., Citicorp North America, Inc. and/or any of their affiliates as Citi shall determine to be appropriate to provide the services contemplated herein.

B. Pursuant to Section 9.02(c) of the Credit Agreement, the Borrower has requested that the Credit Agreement be amended to, among other things: (a) provide for a new tranche of Replacement Term Loans denominated in Dollars (the "Second Amendment Tranche B-1 Term Loans") in an aggregate amount of \$920,791,875.00, the proceeds of which will be used in part to refinance in full all Tranche B-1 Term Loans outstanding immediately prior to the effectiveness of this Second Amendment (collectively, the "Existing Tranche B-1 Term Loans"), and which Second Amendment Tranche B-1 Term Loans shall have the same terms (other than to the extent expressly provided in this Second Amendment) under the Loan Documents as the Existing Tranche B-1 Term Loans, (b) provide for a new tranche of Replacement Term Loans denominated in Euros (the "Second Amendment Tranche B-2 Term Loans") and, together with the Second Amendment Tranche B-1 Term Loans, the "Second Amendment Term Loans") in an aggregate amount of €281,212,468.75, the proceeds of which will be used in part to refinance in full all Tranche B-2 Term Loans outstanding immediately prior to the effectiveness of this Second Amendment (collectively, the "Existing Tranche B-2 Term Loans") and, together with the Existing Tranche B-1 Term Loans, the "Existing Term Loans"), and which Second Amendment Tranche B-2 Term Loans shall have the same terms (other than to the extent expressly provided in this Second Amendment) under the Loan Documents as the Existing Tranche B-2 Term Loans and (c) make certain other changes as more fully set forth herein.

C. Each Term Lender that executes and delivers a consent to this Second Amendment in the form of the Lender Consent attached to the Election Notice Memorandum posted on Intralinks on July 26, 2017 (the "Lender Consent") will be deemed (i) to have irrevocably agreed and consented to the terms of this Second Amendment and the Amended Credit Agreement and (ii) if so elected by such Term Lender (an "Exchanging Term Lender"), (A) to have irrevocably agreed to exchange (as defined below) the Allocated Amount (as defined in the Cashless Settlement of Existing Term Loans letter dated August 7, 2017 by and among the Borrower and the Administrative Agent) of its Existing Tranche B-1 Term Loans (all Existing Tranche B-1 Term Loans so exchanged, the "Exchanged Tranche B-1 Term Loans") on the Second Amendment Effective Date for Second Amendment Tranche B-1 Term Loans in an equal principal amount, (B) to have irrevocably agreed to exchange the Allocated Amount of its Existing Tranche B-2 Term Loans (all Existing Tranche B-2 Term Loans so exchanged, the "Exchanged Tranche B-2 Term Loans") and, together with the Exchanged Tranche B-1 Term Loans, the "Exchanged Term Loans") on the Second Amendment Effective Date for Second Amendment Tranche B-2 Term Loans in an equal principal amount and (C) upon the Second Amendment Effective Date, to have

exchanged (by cashless or assignment settlement, as further described in the Lender Consent) the Allocated Amount of its Existing Tranche B-1 Term Loans and/or its Existing Tranche B-2 Term Loans with Second Amendment Tranche B-1 Terms Loans and/or Second Amendment Tranche B-2 Term Loans, as applicable, in an equal principal amount.

D. Each Person that executes and delivers a signature page to this Second Amendment in the capacity of an "Additional Term Lender" (each, an Additional Term Lender) and all Additional Term Lenders, together with all Exchanging Term Lenders, collectively, the "Second Amendment Term Lenders") will be deemed to have irrevocably (i) agreed to the terms of this Second Amendment and the Amended Credit Agreement, (ii) committed to make the Second Amendment Tranche B-1 Term Loans and/or Second Amendment Tranche B-2 Term Loans to the Borrower on the Second Amendment Effective Date (the "Additional Term Loans") in the amount notified to such Additional Term Lender by the Administrative Agent (but in no event greater than the amount such Additional Term Lender committed to make as Additional Term Loans) and (iii) upon the Second Amendment Effective Date, made such Additional Term Loans to the Borrower.

E. By executing and delivering a signature page to this Second Amendment, the Administrative Agent will be deemed upon the Second Amendment Effective Date to have irrevocably agreed to the terms of this Second Amendment and the Amended Credit Agreement.

F. The aggregate proceeds of the Additional Term Loans will be used to refinance in full all Existing Term Loans, other than Exchanged Term Loans, on the terms and subject to the conditions set forth herein.

G. To accomplish the foregoing (a) the Borrower and the Administrative Agent (on behalf of itself and on behalf of Lenders that have executed Lender Consents and the Exchanging Term Lenders) and the Additional Term Lenders whose signatures appear below, are willing to amend the Credit Agreement as set forth below (the Credit Agreement as amended by this Second Amendment, the "Amended Credit Agreement"), (b) the Exchanging Term Lenders are willing to exchange the Allocated Amount of their Existing Tranche B-1 Term Loans and/or Existing Tranche B-2 Term Loans with the Second Amendment Tranche B-1 Term Loans and/or Second Amendment Tranche B-2 Term Loans, as applicable and (c) the Additional Term Lenders are willing to replace in full all Existing Term Loans, other than Exchanged Term Loans, with Additional Term Loans on the Second Amendment Effective Date.

H. The amendments to the Credit Agreement set forth below are each subject to the satisfaction of the conditions precedent to effectiveness referred to herein and shall become effective as provided herein.

Accordingly, in consideration of the mutual agreements herein contained and other good and valuable consideration, the sufficiency and receipt of which are hereby acknowledged, the parties hereto agree as follows:

SECTION 1. Amendments to Credit Agreement. The Borrower and the Administrative Agent (on behalf of itself and on behalf of Lenders that have executed Lender Consents and the Exchanging Term Lenders) and the Additional Term Lenders whose signatures appear below agree that the Credit Agreement shall be amended as follows:

(a) Section 1.01 of the Credit Agreement is hereby amended by adding thereto the following new defined terms in proper alphabetical order:

"Second Amendment" shall mean the Second Amendment Agreement, dated as of August 7, 2017 among the Borrower, Holdings, each Guarantor, the Administrative Agent and the Lenders party thereto.

“Second Amendment Effective Date” shall mean August 7, 2017.

(b) Section 1.01 of the Credit Agreement is hereby amended by amending and restating the following defined terms therein in their entirety as follows:

“Applicable Rate” means, for any day,

(a) with respect to Initial Term Loans, the rate per annum applicable to the relevant Class of Loans set forth below:

<u>ABR Spread for Tranche B-1 Term Loans</u>	<u>LIBO Rate Spread for Tranche B-1 Term Loans</u>	<u>LIBO Spread for Tranche B-2 Term Loans</u>
2.25%	3.25%	3.25%

(b) with respect to any Additional Loan of any Class, the rate or rates per annum specified in the applicable Refinancing Amendment, Incremental Facility, or Extension Amendment.

“LIBO Rate” means, the Published LIBO Rate, as adjusted to reflect applicable reserves prescribed by governmental authorities provided that, (i) in the case of the Tranche B-1 Term Loans, in no event shall the LIBO Rate be less than 0.00% per annum and (ii) in the case of the Tranche B-2 Term Loans, in no event shall the LIBO Rate be less than 0.75% per annum.

“Published LIBO Rate” means, with respect to any Interest Period when used in reference to any Loan or Borrowing,

(a) in the case of any LIBO Rate Loan denominated in Dollars, (1) the rate of interest appearing on Reuters Screen LIBOR01 Page (or on any successor or substitute page of such service, or any successor to such service as determined by Administrative Agent) as the London interbank offered rate for deposits in Dollars for a term comparable to such Interest Period, at approximately 11:00 a.m. (London time) on the date which is two Business Days prior to the commencement of such Interest Period (but if more than one rate is specified on such page, the rate will be an arithmetic average of all such rates) and (2) if such rate is not available at such time for any reason, then the “Published LIBO Rate” for such Interest Period shall be (x) a comparable successor or alternative interbank rate for deposits in Dollars that is, at such time, broadly accepted by the syndicated loan market in lieu of the “Published LIBO Rate” and is reasonably acceptable to the Borrower and the Administrative Agent or (y) solely if no such broadly accepted comparable successor interbank rate exists at such time, a successor or alternative index rate as the Administrative Agent and the Borrower may determine with the consent of the Required Lenders; and

(b) in the case of any LIBO Rate Loan denominated in Euros, (1) the rate of interest appearing on the Reuters Page EURIBOR01 (or any successor or substitute page of such service, or any successor such service as determined by the Administrative Agent) as the Euro Interbank Offered Rate for deposits in Euros for a term comparable to such Interest Period at approximately 11:00 a.m. (London time) on the date which is two Business Days prior to the commencement of such Interest Period (but if more than one rate is specified on such page, the rate will be an arithmetic average of all such rates) and (2) if such rate is not available at such time for any reason, then the "Published LIBO Rate" for such Interest Period shall be (x) a comparable successor or alternative interbank rate for deposits in Euros that is, at such time, broadly accepted by the syndicated loan market in lieu of the "Published LIBO Rate" and is reasonably acceptable to the Borrower and the Administrative Agent or (y) solely if no such broadly accepted comparable successor interbank rate exists at such time, a successor or alternative index rate as the Administrative Agent and the Borrower may determine with the consent of the Required Lenders.

"Tranche B-1 Term Loans" means (a) prior to the Second Amendment Effective Date, a term loan made by a Term Lender pursuant to Section 2.01(a)(i) of the Credit Agreement (as defined in the Second Amendment) and (b) on or after the Second Amendment Effective Date, the Second Amendment Tranche B-1 Term Loans (as defined in the Second Amendment) made pursuant to and in accordance with the Second Amendment on the Second Amendment Effective Date.

"Tranche B-2 Term Loans" means (a) prior to the Second Amendment Effective Date, a term loan made by a Term Lender pursuant to Section 2.01(a)(ii) of the Credit Agreement (as defined in the Second Amendment) and (b) on or after the Second Amendment Effective Date, the Second Amendment Tranche B-2 Term Loans (as defined in the Second Amendment) made pursuant to and in accordance with the Second Amendment on the Second Amendment Effective Date.

(c) Section 2.01(a) of the Credit Agreement is hereby amended and restated in its entirety as follows:

(a) On the First Amendment Effective Date, the initial Term Lenders made (i) the Existing Tranche B-1 Term Loans (as defined in the Second Amendment) to the Borrower in the original aggregate principal amount of \$927,750,000 and (ii) the Existing Tranche B-2 Term Loans (as defined in the Second Amendment) to the Borrower in the original aggregate principal amount of €283,337,500. Subject to the terms and conditions set forth in the Second Amendment, the Second Amendment Term Lenders (as defined in the Second Amendment) agree, severally and not jointly, to make the Second Amendment Tranche B-1 Term Loans and Second Amendment Tranche B-2 Term Loans (each as defined in the Second Amendment) to the Borrower on the Second Amendment Effective Date.

(d) Section 2.12(c) of the Credit Agreement is hereby amended by deleting each reference to the phrase “six months after the First Amendment Effective Date” therein and replacing it with the phrase “six months after the Second Amendment Effective Date”.

(e) Section 5.11 of the Credit Agreement is hereby amended by adding the following new sentence immediately after the last sentence thereof:

The Borrower shall use the proceeds of the Additional Term Loans (as defined in the Second Amendment), if any, on the Second Amendment Effective Date to refinance in full all Existing Term Loans (as defined in the Second Amendment), other than Exchanged Term Loans (as defined in the Second Amendment), on the terms and subject to the conditions set forth in the Second Amendment.

(f) As used in the Credit Agreement, the terms “Agreement,” “this Agreement,” “herein,” “hereinafter,” “hereto,” “hereof,” and words of similar import shall, unless the context otherwise requires, mean, from and after the Second Amendment Effective Date, the Credit Agreement as amended by this Second Amendment.

SECTION 2. Term Lenders; Second Amendment Term Loans; Administrative Agent Authorization.

(a) Term Lenders. Subject to the terms and conditions set forth herein and in the Credit Agreement, each Exchanging Term Lender (by executing a Lender Consent) irrevocably (A) agrees to the terms of this Second Amendment and the Amended Credit Agreement, (B) if so elected in its Lender Consent, agrees to exchange (as set forth on its Lender Consent) the Allocated Amount of its Existing Tranche B-1 Term Loans with the Second Amendment Tranche B-1 Term Loans in an equal principal amount, (C) if so elected in its Lender Consent, agrees to exchange (as set forth on its Lender Consent) the Allocated Amount of its Existing Tranche B-2 Term Loans with Second Amendment Tranche B-2 Term Loans in an equal principal amount and (D) upon the Second Amendment Effective Date, shall exchange (as set forth on its Lender Consent) the Allocated Amount of its Existing Tranche B-1 Term Loans and/or Existing Tranche B-2 Term Loans with the Second Amendment Tranche B-1 Terms Loans and/or Second Amendment Tranche B-2 Term Loans, as applicable, in an equal principal amount and (ii) each Additional Term Lender irrevocably (A) agrees to the terms of this Second Amendment and the Amended Credit Agreement, (B) commits to make Additional Term Loans in the amount notified to such Additional Term Lender by the Administrative Agent (but in no event greater than the amount such Additional Term Lender committed to make as Additional Term Loans) and (C) upon the Second Amendment Effective Date, shall refinance in full all Existing Term Loans, other than Exchanged Term Loans, with such Additional Terms Loans. Each Additional Term Lender further acknowledges and agrees that, as of the Second Amendment Effective Date, it shall be a “Lender” and a “Term Lender” under, and for all purposes of, the Amended Credit Agreement and the other Loan Documents, and shall be subject to and bound by the terms thereof, and shall perform all the obligations of and shall have all rights of a Lender thereunder. For purposes of this Second Amendment, “exchange” shall mean convert and continue. For the avoidance of doubt, notwithstanding anything herein to the contrary, it is acknowledged and agreed that (i) the Existing Tranche B-1 Term Loans of the Exchanging Term Lenders will be converted into and continued as Second Amendment Tranche B-1 Term Loans and such Exchanged Tranche B-1 Term Loans shall be on the same terms (other than to the extent expressly provided in this Second Amendment) under the Loan Documents as such Existing Tranche B-1 Term Loans and (ii) the Existing Tranche B-2 Term Loans of the Exchanging Term Lenders will be converted into and continued as Second Amendment Tranche B-2 Term Loans and such Exchanged Tranche B-2 Term Loans shall be on the same terms (other than to the extent expressly provided in this Second Amendment) under the Loan Documents as such Existing Tranche B-2 Term Loans.

(b) Second Amendment Term Loans

(i) On the Second Amendment Effective Date, the proceeds of all Additional Term Loans, if any, shall be used to refinance in full all Existing Term Loans, other than Exchanged Term Loans, on the terms and subject to the conditions set forth herein. The commitments of the Additional Term Lenders and the undertakings of the Exchanging Term Lenders are several and no such Second Amendment Term Lender will be responsible for any other Second Amendment Term Lender's failure to make, acquire or exchange the Second Amendment Term Loans. On the Second Amendment Effective Date, the aggregate principal amount of the Second Amendment Tranche B-1 Term Loans shall be \$920,791,875.00 and the aggregate principal amount to the Second Amendment Tranche B-2 Term Loans shall be €281,212,468.75. Each of the parties hereto acknowledges and agrees that the terms of this Second Amendment do not constitute a novation but, rather, an amendment of the terms of a pre-existing Indebtedness and related agreement, as evidenced by this Second Amendment and the Amended Credit Agreement.

(ii) Each Exchanging Term Lender hereby waives any breakage loss or expenses due and payable to it by the Borrower pursuant to Section 2.16 of the Credit Agreement with respect to the exchange of its Exchanged Term Loans with the Second Amendment Term Loans on a date other than the last day of the Interest Period relating to such Exchanged Term Loans.

(iii) The Second Amendment Term Loans shall initially be LIBO Rate Loans with an Interest Period commencing on the Second Amendment Effective Date and ending on the date specified by the Borrower in the applicable Borrowing Request delivered by it pursuant to Section 4(a)(iv)(4) below. Such Borrowing Request shall be delivered not later than noon, New York City time, three (3) Business Days prior to the date of the Borrowing of the Second Amendment Term Loans (unless a shorter period is agreed by the Administrative Agent), in accordance with the provisions of Section 2.03 of the Credit Agreement.

(iv) The Borrower and the Administrative Agent hereby consent to any assignments made by Citi or any affiliate thereof to the Persons included in the list of allocations separately provided to the Borrower and the Administrative Agent (or any Approved Funds or Affiliate of such Persons) in connection with the primary syndication of the Second Amendment Term Loans.

(c) Administrative Agent Authorization. The Borrower, the Exchanging Term Lenders who executed and delivered a Lender Consent and the Additional Term Lenders whose signatures appear below authorize and direct the Administrative Agent to (i) execute and deliver a counterpart to this Second Amendment on its behalf and on behalf of the Required Lenders and the Exchanging Term Lenders, (ii) determine all amounts, percentages and other information with respect to the Loans of each Lender, which amounts, percentages and other information may be determined only upon receipt by the Administrative Agent of the Lender Consents and the signature pages of all Lenders whose signatures appear below and (iii) enter and complete all such amounts, percentages and other information in the Amended Credit Agreement, as appropriate. The Administrative Agent's determination and entry and completion shall be conclusive and shall be conclusive evidence of the existence, amounts, percentages and other information with respect to the obligations of the Borrower under the Amended Credit Agreement, in each case, absent clearly demonstrable error.

SECTION 3. Representations and Warranties. To induce the other parties hereto to enter into this Second Amendment, the Borrower and each Guarantor represents and warrants to each of the Lenders, and the Administrative Agent that, as of the Second Amendment Effective Date:

(a) the execution, delivery and performance of this Second Amendment are within each applicable Loan Party's corporate or other organizational power and have been duly authorized by all necessary corporate or other organizational action on the part of each such Loan Party;

(b) this Second Amendment has been duly executed and delivered by each Loan Party and is a legal, valid and binding obligation of such Loan Party; enforceable in accordance with its terms, subject to the Legal Reservations;

(c) the execution and delivery of this Second Amendment by each Loan Party party hereto and the performance by each Loan Party hereof do not require any consent or approval of, registration or filing with, or any other action by, any Governmental Authority except (i) such as have been obtained or made and are in full force and effect, (ii) in connection with the Perfection Requirements and (iii) such consents, approvals, registrations or filings or other actions the failure to obtain or make which could not reasonably be expected to have a Material Adverse Effect; and

(d) the representations and warranties set forth in Article III of the Amended Credit Agreement and each other Loan Document are true and correct in all material respects on and as of the Second Amendment Effective Date, with the same force and effect as though made on and as of such date, except to the extent such representations and warranties specifically refer to a given date or period, in which case such representations and warranties were true and correct in all material respects on and as of such date or period; provided that, any representation or warranty that is qualified as to "materiality", "Material Adverse Effect" or similar language are true and correct (after giving effect to any qualification therein) in all respects as of such respective dates.

SECTION 4. Conditions to Effectiveness of this Second Amendment.

(a) This Second Amendment shall become effective on the date (the "Second Amendment Effective Date") on which:

(i) The Administrative Agent shall have received duly executed and delivered counterparts of this Second Amendment that, when taken together, bear the signatures of the Borrower, Holdings, the Additional Term Lenders, the Administrative Agent (on its behalf, as well as on behalf of the Required Lenders and the Exchanging Term Lenders) and all Guarantors;

(ii) (A) Each of the representations and warranties set forth in Section 3 shall be true and correct in all material respects on and as of the Second Amendment Effective Date, with the same effect as though made on and as of such date, except to the extent such representations and warranties specifically refer to a given date or period, in which case such representations and warranties shall have been true and correct in all material respects on and as of such date or period; provided that, any representation or warranty that is qualified as to "materiality", "Material Adverse Effect" or similar language are true and correct (after giving effect to any qualification therein) in all respects as of such respective dates and (B) no Default or Event of Default has occurred and is continuing both before and immediately after giving effect to the transactions contemplated hereby;

(iii) The Administrative Agent shall have received a customary written opinion of (a) Ropes & Gray LLP, special counsel for the Loan Parties, dated as of the Second Amendment Effective Date and addressed to the Administrative Agent and the Lenders and (b) Babst, Calland, Clements and Zomnir, P.C., special counsel for the Borrower and any Guarantors organized under the laws of Pennsylvania, dated as of the Second Amendment Effective Date and addressed to the Administrative Agent and the Lenders;

(iv) The Administrative Agent shall have received:

(1) a certificate of the secretary or assistant secretary (or equivalent officer) on behalf of each Loan Party dated the Second Amendment Effective Date, certifying (A) that either (x) attached thereto is a true and complete copy of each Organizational Document of such Loan Party and, with respect to the articles or certificate of incorporation or organization (or similar document) certified (to the extent applicable) as of a recent date by the Secretary of State of the state of its organization or (y) the Organizational Documents of such Loan Party last delivered to the Administrative Agent have not been amended and are in full force and effect, (B) that attached thereto is a true and complete copy of resolutions duly adopted by the Board of Directors of such Loan Party authorizing the execution, delivery and performance of this Second Amendment and any other Loan Documents executed in connection with this Second Amendment to which such person is a party and, in the case of the Borrower, the Borrowings hereunder, and that such resolutions have not been modified, rescinded or amended and are in full force and effect as of the date of such certificate, and (C) as to the incumbency and specimen signature of each officer or authorized person executing this Second Amendment and any other Loan Document executed in connection with this Second Amendment or any other document delivered in connection herewith on behalf of such Loan Party (together with a certificate of another officer or authorized person as to the incumbency and specimen signature of the officer or authorized person executing the certificate in this clause (i));

(2) to the extent applicable, a certificate as to the good standing of each Loan Party as of a recent date, from such Secretary of State (or other applicable Governmental Authority) of its jurisdiction of organization;

(3) a certificate dated the Second Amendment Effective Date and signed by a Responsible Officer of the Borrower, confirming compliance with the condition precedent set forth in Section 4(a)(ii); and

(4) a Borrowing Request completed and signed by a Responsible Officer of the Borrower;

(v) The aggregate proceeds of all Additional Term Loans, if any, shall have been applied, concurrently with the exchange of the Exchanged Term Loans with the Second Amendment Term Loans, to refinance in full all Existing Term Loans, other than Exchanged Term Loans, on the terms and subject to the conditions set forth herein;

(vi) The Borrower shall have, concurrently with the exchange of Exchanged Term Loans with the Second Amendment Term Loans and the making of the Additional Term Loans, if any, (A) paid all accrued and unpaid interest and other amounts on the aggregate principal amount of the Existing Term Loans and (B) paid to all Term Lenders holding Existing Term Loans immediately prior to the Second Amendment Effective Date that are not party to this

Second Amendment, if any, all indemnities, cost reimbursements and other Obligations (as defined below), if any, then due and owing to such Term Lenders under the Loan Documents (prior to the effectiveness of this Second Amendment) and of which the Borrower has been notified; and

(vii) The Repricing Arrangers shall have received all fees and other amounts due and payable on or prior to the Second Amendment Effective Date, including, to the extent invoiced, reimbursement or other payment of all out-of-pocket expenses required to be reimbursed or paid by the Borrower hereunder or under any other Loan Document or other agreement with the Borrower relating to the transactions contemplated hereby.

SECTION 5. Post-Closing Matters.

The Borrower shall and shall cause each Guarantor to within 60 days after the Second Amendment Effective Date (or such longer period as the Administrative Agent may determine in its reasonable discretion) (and which requirements may be waived by the Administrative Agent in its reasonable discretion):

(a) execute, deliver and file amendments to the Mortgages existing prior to the Second Amendment Effective Date in a form acceptable to the Administrative Agent, together with such title endorsements as are reasonably required to give effect thereto in a form acceptable to the Administrative Agent, together with (x) such owner's title affidavits as may be reasonably required by the title insurer in substantially the form previously accepted by the title insurer with respect to such Mortgages, including therein any so-called "no-change" survey affidavit and (y) any documents required in connection with the recording of such mortgage amendments and issuance of such endorsements;

(b) to the extent reasonably requested by the Administrative Agent, deliver to the Administrative Agent legal opinions relating to the amendments to the Mortgages described above, which opinions shall be in form and substance, and from counsel, reasonably satisfactory to the Administrative Agent; and

(c) deliver to the Administrative Agent a completed standard "life of loan" flood hazard determination form for each property encumbered by a Mortgage, and if the property is located in an area designated by the U.S. Federal Emergency Management Agency (or any successor agency) as having special flood or mud slide hazards, (i) a notification to the Borrower ("Borrower Notice") and (if applicable) notification to the Borrower that flood insurance coverage under the National Flood Insurance Program ("NFIP") created by the U.S. Congress pursuant to the National Flood Insurance Act of 1968, the Flood Disaster Protection Act of 1973, the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004 is not available because the applicable community does not participate in the NFIP, (ii) documentation evidencing the Borrower's receipt of the Borrower Notice (e.g., countersigned Borrower Notice, return receipt of certified U.S. Mail, or overnight delivery), and (iii) if Borrower Notice is required to be given and flood insurance is available in the community in which the property is located, a copy of one of the following: the flood insurance policy, the Borrower's application for a flood insurance policy plus proof of premium payment, a declaration page confirming that flood insurance has been issued, or such other evidence of flood insurance reasonably satisfactory to the Administrative Agent.

SECTION 6. Effect of Amended Credit Agreement.

(a) Except as expressly set forth herein or in the Amended Credit Agreement, this Second Amendment and the Amended Credit Agreement shall not by implication or otherwise limit,

impair, constitute a waiver of or otherwise affect the rights and remedies of the Lenders or the Administrative Agent under the Credit Agreement, the Amended Credit Agreement or any other Loan Document, and shall not alter, modify, amend or in any way affect any of the terms, conditions, obligations, covenants or agreements contained in the Credit Agreement or the Amended Credit Agreement or any other provision of the Credit Agreement, the Amended Credit Agreement or of any other Loan Document, all of which are ratified and affirmed in all respects and shall continue in full force and effect. Nothing herein shall be deemed to entitle the Borrower, any Guarantor or any other Person to a consent to, or a waiver, amendment, modification or other change of, any of the terms, conditions, obligations, covenants or agreements contained in the Credit Agreement, the Amended Credit Agreement or any other Loan Document in similar or different circumstances.

(b) On the Second Amendment Effective Date, the Credit Agreement shall be amended as set forth in Section 1 above. The parties hereto acknowledge and agree that (i) this Second Amendment, the Amended Credit Agreement, any other Loan Document or other document or instrument executed and delivered in connection herewith do not constitute a novation, or termination of the obligations of the Borrower and the Guarantors under the Loan Documents, including, without limitation, the Credit Agreement and the Security Agreement, as in effect prior to the Second Amendment Effective Date (collectively, the “Obligations”) and (ii) such Obligations are in all respects continuing (as amended by this Second Amendment) with only the terms thereof being modified to the extent provided in this Second Amendment, and the Borrower and each Guarantor reaffirm such Obligations, including in respect of any guaranties of, and any pledges of collateral securing, such Obligations, including, without limitation, the Second Amendment Term Loans. Upon the satisfaction of the conditions precedent set forth in Section 4 of this Second Amendment, the provisions of this Second Amendment will become effective and binding upon, and enforceable against, the Borrower, the Administrative Agent and the Lenders.

(c) This Second Amendment shall constitute a Loan Document for all purposes under the Amended Credit Agreement and shall be administered and construed pursuant to the terms of the Amended Credit Agreement.

SECTION 7. Counterparts. This Second Amendment may be executed in counterparts (and by different parties hereto on different counterparts), each of which shall constitute an original but all of which when taken together shall constitute a single contract, and shall become effective as provided in Section 4. Delivery of an executed signature page to this Second Amendment by facsimile or other electronic transmission (including “pdf”) shall be as effective as delivery of a manually signed counterpart of this Second Amendment.

SECTION 8. Applicable Law. THIS SECOND AMENDMENT SHALL BE GOVERNED BY, AND CONSTRUED AND INTERPRETED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK.

SECTION 9. Headings. Headings used herein are for convenience of reference only, are not part of this Second Amendment and are not to affect the construction of, or to be taken into consideration in interpreting, this Second Amendment.

[Signature pages follow]

IN WITNESS WHEREOF, the parties hereto have caused this Second Amendment to be duly executed by their respective officers as of the day and year first above written.

PQ CORPORATION

as Borrower

By: /s/ Joseph S. Koscinski

Name: Joseph S. Koscinski

Title: Vice President, Secretary and
General Counsel

CPQ MIDCO I CORPORATION

as Holdings

By: /s/ Joseph S. Koscinski

Name: Joseph S. Koscinski

Title: Secretary and Vice President

**COMMERCIAL RESEARCH
ASSOCIATES, INC.**

DELPHEN CORPORATION

PQ ASIA INC.

PQ EXPORT COMPANY

PQ SYSTEMS INCORPORATED

PHILADELPHIA QUARTZ COMPANY

as Guarantors

By: /s/ Joseph S. Koscinski

Name: Joseph S. Koscinski

Title: Vice President and Secretary

PQ INTERNATIONAL, INC.

as a Guarantor

By: /s/ Joseph S. Koscinski

Name: Joseph S. Koscinski

Title: President and Secretary

PQ Second Amendment Agreement

ECO SERVICES OPERATIONS CORP.
POTTERS INDUSTRIES, LLC
as Guarantors

By: /s/ Joseph S. Koscinski
Name: Joseph S. Koscinski
Title: Vice President, General Counsel and Secretary

POTTERS INDUSTRIES HOLDING, INC.
as a Guarantor

By: /s/ Joseph S. Koscinski
Name: Joseph S. Koscinski
Title: Secretary

SAJB HOLDING COMPANY, LLC
as a Guarantor

By: /s/ Joseph S. Koscinski
Name: Joseph S. Koscinski
Title: Secretary and Vice President

POTTERS HOLDINGS II, L.P.
as a Guarantor

By: POTTERS HOLDINGS II GP, LLC, *its general partner*

By: /s/ Joseph S. Koscinski
Name: Joseph S. Koscinski
Title: Secretary and Vice President

PQ Second Amendment Agreement

ACKNOWLEDGED AND ACCEPTED BY:

CREDIT SUISSE AG, CAYMAN ISLANDS BRANCH,
as Administrative Agent

By: /s/ Vippul Dhadha

Name: Vippul Dhadha
Title: Authorized Signatory

By: /s/ Lea Baerlocher

Name: Lea Baerlocher
Title: Authorized Signatory

PQ Second Amendment Agreement

Additional Term Lenders:

Mark this box to consent as an Additional Term Lender and to make the Second Amendment Term Loans to the Borrower on the Second Amendment Effective Date in an amount not to exceed the amount expressly set forth on your signature page hereto as described in this Second Amendment.

Specify the maximum amount of Additional Term Loans you are requesting:

Second Amendment Tranche B-1 Term Loans \$ 26,304,613.65
Second Amendment Tranche B-2 Term Loans € 3,920,375.00

By executing this Second Amendment, the undersigned consents to this Second Amendment and the Amended Credit Agreement.

<p>Please enter the information of a contact for any questions on this signature page:</p> <p>Name: _____</p> <p>Tel No. _____</p> <p>Name: _____</p>	<p>Name of Institution:</p> <p>Citibank, N.A.</p> <p>By: <u>/s/ Akshay Kulkami</u> Name: Akshay Kulkami Title: Vice President</p> <p>By: _____ Name: Title:</p>
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August 14, 2017

Securities and Exchange Commission
100 F Street, N.E.
Washington, D.C. 20549-7561

Dear Sirs/Madams:

We have read the section entitled "Changes in and Disagreements With Accountants on Accounting and Financial Disclosure" included within "Management's Discussion and Analysis of Financial Condition and Results of Operations" of PQ Group Holdings Inc.'s registration statement on Form S-1 (Registration No. 333-218650), and have the following comments:

1. We agree with the statements made in the first, second and fourth paragraphs of the aforementioned section.
2. We have no basis on which to agree or disagree with the statements made in the third paragraph of the aforementioned section.

Yours truly,

/s/ DELOITTE & TOUCHE LLP

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the use in this Amendment No. 2 to the Registration Statement on Form S-1 of PQ Group Holdings Inc. of our report dated June 9, 2017 relating to the financial statements, and financial statement schedule, which appears in such Registration Statement. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ PricewaterhouseCoopers LLP

Philadelphia, PA

August 14, 2017

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the use in this Amendment No. 2 to Registration Statement No. 333-218650 of our report dated May 15, 2015, except for Note 12 and Note 20, as to which the date is June 8, 2017, relating to the consolidated financial statements of Eco Services Operations LLC and subsidiary (accounting predecessor to PQ Group Holdings Inc.) for the period from inception (July 30, 2014) to December 31, 2014 (Successor Period) and Eco, a business unit of Solvay USA Inc., for the period from January 1, 2014 to November 30, 2014 (Predecessor Period) (which report expresses an unqualified opinion and includes an emphasis of matter paragraph referring to the “carveout” of the predecessor financial statements from Solvay USA Inc.) appearing in the Prospectus, which is part of this Registration Statement.

We also consent to the reference to us under the heading “Experts” in such Prospectus.

/s/ DELOITTE & TOUCHE LLP

Parsippany, New Jersey
August 14, 2017

CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the use in this Amendment No. 2 to the Registration Statement on Form S-1 of PQ Group Holdings Inc. of our report dated March 5, 2016 relating to the financial statements of PQ Holdings Inc., which appears in such Registration Statement. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ PricewaterhouseCoopers LLP

Philadelphia, PA

August 14, 2017

CONSENT OF INDEPENDENT ACCOUNTANTS

We hereby consent to the use in this Amendment No. 2 to the Registration Statement on Form S-1 of PQ Group Holdings Inc. of our report dated March 21, 2017 relating to the financial statements of Zeolyst International, which appears in such Registration Statement. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ PricewaterhouseCoopers LLP

Philadelphia, PA

August 14, 2017



ROPES & GRAY LLP
PRUDENTIAL TOWER
800 BOYLSTON STREET
BOSTON, MA 02199-3600
WWW.ROPESGRAY.COM

August 14, 2017

VIA EDGAR

Securities and Exchange Commission
Division of Corporation Finance
100 F. Street, N.E.
Washington, D.C. 20549

Attention: Asia Timmons-Pierce/Chris Ronne—Legal
Anne McConnell/Melinda Hooker—Accounting

Re: PQ Group Holdings Inc.
Amendment No. 1 to Registration Statement on Form S-1, filed July 18, 2017
File No. 333-218650
SEC Comment Letter dated August 3, 2017

Ladies and Gentleman:

On behalf of PQ Group Holdings Inc. (the “Company”), and pursuant to the applicable provisions of the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder, we submit via EDGAR for review by the Securities and Exchange Commission (the “SEC”) the accompanying Amendment No. 2 (including certain exhibits) to the Company’s above-referenced Registration Statement on Form S-1 (the “Registration Statement”). A copy of Amendment No. 2 to the Registration Statement has been manually signed in accordance with Rule 302 of Regulation S-T and the signature pages thereto will be retained by the Company for a period of five years.

Amendment No. 2 to the Registration Statement reflects the Company’s responses to the comments received from the staff of the SEC (the “Staff”) contained in the Staff’s letter dated August 3, 2017 (the “Comment Letter”) and certain other updated information. For your convenience, the Company is supplementally providing to the Staff a typeset copy of Amendment No. 2 marked to indicate the changes from Amendment No. 1 to the Registration Statement, which was filed on July 18, 2017.

The Staff’s comments as reflected in the Comment Letter are reproduced in italics in this letter, and the corresponding responses of the Company are shown below each comment. All references to page numbers in the Company’s responses are to the page numbers in Amendment No. 2 to the Registration Statement. All capitalized terms used herein that are not defined herein shall have the meanings assigned to such terms in Amendment No. 2 to the Registration Statement.

Summary Historical and Unaudited Pro Forma Financial and Other Data, page 19

1. *Please explain to us why the tabular presentations on pages 20, 22 and 23 now include financial data related to Legacy PQ for the year ended December 31, 2014.*

Response to Comment 1:

The Company supplementally advises the Staff that the tabular presentations on pages 20, 22 and 23 include financial data related to legacy PQ for the year ended December 31, 2014 to assist investors in their evaluation of the three-year pre-Business Combination trends of both legacy PQ and legacy Eco, all of which periods are also included in the F-pages at the end of the prospectus.

2. *We have read your response to comment ten of our letter dated July 7, 2017 and your revised disclosures. We have the following comments regarding your calculation of adjusted EBITDA:*
 - *We note footnotes (a) and (b) relate to an equity method joint venture, it remains unclear to us how and why these adjustments are appropriate in a measure meant to evaluate your performance; and,*
 - *We note footnote (i) essentially relates to employee compensation, it remains unclear to us why this adjustment is appropriate in a measure meant to evaluate your performance.*

Response to Comment 2:

The Company supplementally advises the Staff that it believes that the EBITDA adjustments described in footnotes (a), (b) and (i) are appropriate adjustments in a measure meant to evaluate the Company's performance for the following reasons:

Footnotes (a) and (b) – Adjusted EBITDA is the Company's primary measure used to evaluate performance, including segment performance, and also to determine incentive compensation. The Company believes that its 50% interest in the Zeolyst Joint Venture, representing its zeolite catalysts product group discussed throughout the Registration Statement (which is included within the environmental catalysts and services segment), is integral to its ongoing business operations and financial performance. To provide a complete and accurate measure of performance, the Company includes in its calculation of Adjusted EBITDA an addback for its proportional share of the depreciation, amortization and interest reported in the Zeolyst Joint Venture, which is presented in order to have consistent treatment with the other businesses and segments included within the performance metric.

The non-cash adjustment described in footnote (b) is intended to remove the purchase accounting effects of the step-up of the Company's investment in the Zeolyst Joint Venture as a result of the Business Combination, specifically related to the values attributed to the amortization of intangible assets and amortization of the fair value step-up of inventory recorded in the Company's results of operations. This adjustment is similar to the removal of the amortization of inventory step-up and amortization of intangible assets of Company-owned assets included in footnote (c).

Footnote (i) – While the adjustment for defined benefit plan pension cost relates to employee compensation, it is primarily related to pension plans that have been frozen. Because the remaining obligations primarily relate to plans operated in certain of the Company's non-U.S. locations that, pursuant to jurisdictional requirements, cannot be frozen, the Company does not view these costs as indicative of its ongoing performance or core operating results and therefore eliminates such costs in its presentation of Adjusted EBITDA and its evaluation of the performance of its business.

Unaudited Pro Forma Condensed Combined Financial Information of PQ Group Holdings, page 61

3. *Please revise footnote (5) to discuss how you calculated the adjustments related to stock compensation expense.*

Response to Comment 3:

The Registration Statement has been revised on page 63 in response to this comment. The Company supplementally advises the Staff that the pro forma adjustment for stock-based awards represents the difference between the historical stock compensation expense recorded for legacy Eco and legacy PQ compared to the estimated stock compensation expense for the replacement awards issued to continuing employees as part of the Business Combination. Such amount is further adjusted to exclude the partial acceleration of expense due to a partial cash settlement related to the Eco Services Group Holdings LLC Class B Units ("Eco Class B Units") of \$1,174,000 upon the closing of the Business Combination, as such partial acceleration will not have a continuing impact on operations. The awards were assessed for modification in conjunction with the Business Combination. The pro forma adjustments reduce compensation expense by \$2,356,000, which is the historical stock compensation expense for legacy Eco and legacy PQ for the period from January 1, 2016 through May 3, 2016, and increase stock compensation expense by \$1,385,000, which is the estimated expense based on the fair values of the replacement awards over the same period. The fair value of the replacement stock-based awards that are subject to service vesting conditions, including stock options and restricted stock of the Company, will be recognized ratably over the contractual post-Business Combination service periods, which range from one to four years from the date of the Business Combination. There were no pro forma adjustments to stock compensation expense for awards subject to performance vesting conditions, as the respective performance conditions were deemed not probable for the old awards or the replacement awards.

4. *We have read your response to comment 20 of our letter dated July 7, 2017 and your revised disclosures in footnote (8); however, it is not clear to us where or how the adjustment related to the Zeolyst Joint Venture for the pre-Business Combination period from January 1, 2016 through May 3, 2016 is reflected in the historical financial statements such that a pro forma adjustment is required. Please clarify or revise.*

Response to Comment 4:

The Registration Statement has been revised on page 65 in response to this comment. The Company supplementally advises the Staff that the equity in net income from affiliated companies related to the Zeolyst Joint Venture in the pre-Business Combination period from January 1, 2016 through May 3, 2016 included legacy PQ's share of the net income of the Zeolyst Joint Venture as well as expense on the basis difference between the cost of the investment and the amount of underlying equity in the net assets of the Zeolyst Joint Venture from a previous business combination transaction. Legacy PQ's investment in the Zeolyst Joint Venture had been subject to a prior fair value determination as a result of such previous business combination transaction. The \$796,000 pro forma adjustment represents the amortization expense recognized by legacy PQ during the pre-Business Combination period from January 1, 2016 through May 3, 2016 associated with intangible assets identified as part of the previous transaction. With the application of purchase accounting as part of the Business Combination, the underlying assets of the Zeolyst Joint Venture were subject to a new valuation, including the identification of new intangible assets as well as the step-up in the fair values of inventory and property, plant and equipment. This led to a new basis difference between the value of the Company's investment and the amount of underlying equity in the net assets of the Zeolyst Joint Venture. The pro forma decrease to equity method investment income of \$2,211,000 represents the amortization of the basis difference on assets (excluding inventory, which was subject to a separate pro forma adjustment) for the Company's investment in the Zeolyst Joint Venture based on the fair value identified as part of the Business Combination for the period from January 1, 2016 through May 3, 2016, while the pro forma increase to equity method investment income of \$796,000 represents the elimination of the amortization of the basis difference included in legacy PQ's results of operations for the period from January 1, 2016 through May 3, 2016.

5. *Please revise footnote (9) to disclose the potential impact of a fixed change in variable interest rates on pro forma interest expense.*

Response to Comment 5:

The Registration Statement has been revised on page 66 in response to this comment to disclose the potential impact of a fixed change in variable interest rates on pro forma interest expense.

Annual Performance-Based Cash Award – The POIP, page 149

6. *Please revise to disclose the EBITDA targets and actual achievement for each of your four divisions.*

Response to Comment 6:

The Registration Statement has been revised on page 151 in response to this comment to disclose the 2016 EBITDA targets and actual achievement for each of the four historical divisions.

Director Compensation Table, page 167

7. *Please retitle the second-to-last column to read “All Other Compensation.” See Item 402(k)(2)(vii) of Regulation S-K.*

Response to Comment 7:

The Registration Statement has been revised on page 167 in response to this comment to retitle the second-to-last column of the director compensation table to read “All Other Compensation.”

Arrangement with Mr. Boyce, page 168

8. *You indicate that Mr. Boyce is entitled to receive an annual incentive bonus based on the company’s achievement of financial performance goals established by your board of directors or the Compensation Committee. Please indicate the extent to which Mr. Boyce participates in determining the level of compensation he is awarded. Please also disclose the specific targets used to determine the performance-based compensation and payouts during the last-completed fiscal year. See Instructions to Item 402(k) of Regulation S-K.*

Response to Comment 8:

The Registration Statement has been revised on pages 167 and 168 in response to this comment to include the requested information.

Consolidated Financial Statements

PQ Group Holdings Inc.

General

9. *We have read your response to comment 34 of our letter dated July 7, 2017. Please tell us the date when the change in auditor occurred. We note your belief that the disclosures specified in Item 304 of Regulation S-K are not required because there was no change in the Company's auditor; however, we also note your determination that Eco Services is the accounting predecessor. As a result, for periods prior to the business combination, the Company's financial statements are those of Eco Services. In addition, although we note your reference to Instruction 3 to Item 304(a) of Regulation S-K, it is not clear to us this instruction is applicable to an accounting predecessor. Please advise or revise.*

Response to Comment 9:

The Registration Statement has been revised on page 109 in response to this comment to provide the disclosure specified in Item 304 of Regulation S-K.

2. Summary of Significant Accounting Policies

Principles of Consolidation, page F-11

10. *Please revise your disclosure to indicate that all intercompany loans were deemed to be non-permanent in nature and explain how you made that determination, similar to your response to comment 35 of our letter dated July 7, 2017.*

Response to Comment 10:

The Registration Statement has been revised on page F-12 in response to this comment to disclose that all intercompany loans were deemed to be non-permanent in nature and to explain the basis for that determination.

7. Business Combination, page F-27

11. *We have read your response to comment 39 of our letter dated July 7, 2017. Please address the following:*
- *We note investment funds affiliated with CCMP acquired a 95% controlling equity interest in Eco Services Group Holdings LLC and an approximate 49.6% non-controlling interest in PQ Holdings in December 2014. More fully explain to us the circumstances related to these acquisitions, specifically address if CCMP intended to combine its interests in these entities when they were acquired or address when and how the combination was proposed;*
 - *We note investment funds affiliated with CCMP acquired an approximate 49.6% non-controlling interest in PQ Holdings in December 2014. More fully explain to us the operational structure of PQ Holdings subsequent to this acquisition, specifically address how this entity functioned and who controlled it, including any mechanisms in place meant to resolve disagreements among the ownership interests;*
 - *Clarify the nature of the non-controlling interest in PQ Group Holdings Inc.; and,*

- *Tell us if or how the Reclassification disclosed on page 53 will impact the current ownership interests of PQ Group Holdings Inc.*

Response to Comment 11:

The Company supplementally advises the Staff that investment funds affiliated with CCMP (the "CCMP Entities") entered into an agreement in July 2014 to purchase Solvay USA Inc.'s Eco Services business unit ("Eco Services") through the acquisition (the "Eco Acquisition") of an approximate 95% equity interest in Eco Services Group Holdings LLC ("Eco"). The Eco Acquisition was consummated in December 2014 and was financed, in part, using the proceeds from indebtedness incurred by Eco Services Operations LLC. Following the Eco Acquisition, members of Eco Services' management held the remaining approximate 5% equity interest in Eco. CCMP developed a business plan in July 2014 to grow Eco Services as a stand-alone business and the CCMP Entities communicated this business plan and potential exit strategies, none of which involved a combination with PQ Holdings Inc. ("PQ Holdings"), to their limited partners through May 2015.

In September 2014, the CCMP Entities entered into an agreement to purchase The Carlyle Group's equity interest in PQ Holdings (the "PQ Acquisition"). The PQ Acquisition was consummated subsequent to the Eco Acquisition in December 2014 and was financed, in part, through a rollover of indebtedness previously incurred by PQ Corporation. As a result of the PQ Acquisition, the CCMP Entities acquired an approximate 49.6% equity interest in PQ Holdings. INEOS Investments Partnership ("INEOS") held an approximate 40.4% equity interest in PQ Holdings and members of management and the board of directors of PQ Holdings (collectively, "PQ Management") held the remaining approximate 10% equity interest in PQ Holdings. CCMP and INEOS developed a business plan in September 2014 to grow PQ Holdings as a stand-alone business and the CCMP Entities communicated this business plan and potential exit strategies, none of which involved a combination with Eco Services, to their limited partners through May 2015.

Following the PQ Acquisition, PQ Holdings was governed by a board of directors (the "PQ Board") that, pursuant to a stockholders agreement entered into by and among the CCMP Entities, INEOS and PQ Management (collectively, the "PQ Stockholders"), consisted of seven directors, three directors appointed by each of the CCMP Entities and INEOS and one director appointed by PQ Management. Unless otherwise required by applicable law, each of the PQ Board and the PQ Stockholders acted by majority vote. Furthermore, the CCMP Entities and INEOS each had protective approval rights over certain fundamental matters, including the approval of the Business Combination.

In May 2015, upon further evaluation of its investments in Eco Services and PQ Holdings, CCMP believed that it would be potentially beneficial to the equity holders of both Eco Services and PQ Holdings if the companies were combined (the "Proposed Business Combination"). Through its active role in the management of each company following the

acquisitions, CCMP discovered that there was substantial overlap in the end use applications addressed by and the customers served by each company and that there were potential synergies at the management level. Accordingly, CCMP approached INEOS and PQ Management to discuss the Proposed Business Combination and obtain their support. As a result of the approval rights granted under the stockholders agreement, CCMP needed the full support of INEOS, in addition to majority approval by the PQ Board and PQ Stockholders, in order to approve the Proposed Business Combination. INEOS and PQ Management both supported the Proposed Business Combination and, following negotiations among the parties, a reorganization and transaction agreement was entered into in August 2015.

Following the Business Combination, the CCMP Entities held an approximate 58% equity interest in the Company, INEOS held an approximate 31% equity interest in the Company and members of management and the board of directors of the Company (collectively, "Company Management") held an approximate 11% equity interest in the Company. In connection with the Business Combination, such holders entered into a new stockholders agreement that provided certain corporate governance rights, including director nomination rights for each of the CCMP Entities, INEOS and Company Management and certain shareholder protective approval rights for each of the CCMP Entities and INEOS. In connection with its controlling equity interest in the Company, the CCMP Entities obtained the right, pursuant to the terms of the new stockholders agreement, to nominate a majority of directors for election to the board. Such corporate governance rights, including board nomination rights, will terminate in connection with the completion of the initial public offering.

As disclosed on page 52 of the Registration Statement, in connection with the initial public offering, the Company will reclassify its Class A common stock into common stock, effect a stock split of its common stock and convert each outstanding share of Class B common stock into common stock. The number of shares of common stock into which each outstanding share of Class B common stock will convert will be determined by reference to the initial public offering price in the offering. Each of the CCMP Entities and INEOS hold primarily shares of Class B common stock, while members of Company Management hold primarily shares of Class A common stock as well as a small portion of the Class B common stock. As a result, the conversion of Class B common stock into common stock will have a dilutive effect on the ownership interests obtained from shares of Class A common stock, which will primarily impact the ownership interests of Company Management.

12. *We have read your response to comment 40 of our letter dated July 7, 2017 and your revised disclosures. Please more fully explain to us how you determined the total amount of consideration related to the business combination. Please also more fully explain to us the significant assumptions underlying the estimated fair value of the equity consideration, including the impact of different equity interests.*

Response to Comment 12:

The Registration Statement has been revised on pages F-28 and F-100 in response to this comment. The Company supplementally advises the Staff that the total consideration for the Business Combination was \$2.7 billion and was determined by the Company using a

market-based approach to estimate the enterprise value of legacy PQ. The calculation of the enterprise value and the resulting equity value was based on legacy PQ as a whole and was not impacted by the different equity interests in legacy PQ. The significant assumptions used by the Company to determine enterprise value included a median enterprise value to Adjusted EBITDA multiple, based on a select group of comparable companies, applied to the Company's estimated Adjusted EBITDA for 2016. The total enterprise value of \$2.7 billion was reduced by \$1.7 billion of borrowings used to refinance the then-existing legacy PQ debt concurrently with the Business Combination to arrive at a total equity value of \$910.8 million.

13. *In regard to comments 38 and 41 of our letter dated July 7, 2017, please address the following:*

- *As previously requested, explain to us how you concluded that Eco Services Group Holdings LLC is the accounting predecessor. We note this determination could impact financial statement requirements pursuant to Rule 3-09 of Regulation S-X; and,*
- *More fully explain to us how you concluded that historical financial statements related to PQ Holdings' equity method investments are not necessary, specifically address your consideration of the significance of the income related to the equity investees relative to PQ Holdings' net income.*

Response to Comment 13:

The Company respectfully refers the Staff to the Company's response to comments 38 and 39 of the response letter dated July 18, 2017 and the Company's response to comment 11 above regarding the determination that Eco Services Operations LLC is the accounting predecessor to the Company prior to the Business Combination. The Company further supplementally advises the Staff that the determination also reflected the fact that the only change of control to occur as a result of the Business Combination was with respect to PQ Holdings. The guidance in ASC 805-10-55-10, which refers to ASC 805-10-25-5, provides that the consolidation framework under ASC 810-10 related to determining the existence of a controlling financial interest should be used to identify the acquirer in a business combination. Only when the application of this guidance does not clearly indicate which of the combining entities is the acquirer should the factors in paragraphs ASC 805-10-55-11 through 55-15 be considered in making the determination. Since the only change of control for the combining entities under the consolidation guidance occurred with respect to PQ Holdings, Eco Services Operations LLC was determined to be the acquiring entity in the Business Combination, and no further evaluation with respect to the factors outlined in ASC 805-10-55-11 through 55-15 was undertaken.

The Company supplementally advises the Staff that its conclusion regarding the financial statements of the equity method investments related to PQ Holdings was based on Section 2005.5 of the SEC's Division of Corporation Finance Financial Reporting Manual, which states that "[f]inancial statements of recently acquired businesses of the acquiree or equity

method investees of the acquiree need not be filed unless their omission would render the acquiree's financial statements misleading or substantially incomplete." The Company's interpretation of Rule 3-05 of Regulation S-X ("Rule 3-05") in this situation where PQ Holdings is considered to be the acquiree is that the quantitative conditions outlined in the definition of a significant subsidiary under Rule 1-02(w) of Regulation S-X do not apply to equity method investees that are part of acquired businesses subject to Rule 3-05. Consequently, the Company did not apply those conditions or other quantitative criteria to make its assessment regarding the significance of the financial statements of its equity method investees. Instead, the Company applied the qualitative criteria of Section 2005.5 and concluded that the financial information disclosed in the Company's financial statements, PQ Holdings' financial statements and in "Management's Discussion and Analysis of Financial Condition and Results of Operations" was sufficiently extensive such that the omission of the acquiree's equity method investee financial statements did not render PQ Holdings' financial statements misleading or substantially incomplete.

The Company expects that financial statements of the Zeolyst Joint Venture will be required under Rule 3-09 of Regulation S-X ("Rule 3-09") for the fiscal year ending December 31, 2017 based on the income test under such rule. While the thresholds for inclusion of financial statements under Rule 3-09 were not met for the year ended December 31, 2016, the Company has determined to include the financial statements for the Zeolyst Joint Venture for the periods that would have been required by Rule 3-09 as supplemental disclosure in the Registration Statement.

* * *

Securities and Exchange Commission
Division of Corporation Finance
August 14, 2017

We hope that the foregoing has been responsive to the Staff's comments. If you have any questions or comments about this letter or need any further information, please call the undersigned at (617) 951-7802 or Raymond J. Grant of our offices at (617) 235-4668.

Very truly yours,

/s/ Craig E. Marcus
Craig E. Marcus

cc: Joseph S. Koscinski (PQ Group Holdings Inc.)
Jason M. Licht (Latham & Watkins LLP)