

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

FORM 10-Q

(Mark One)

- QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the quarterly period ended **September 30, 2019**
OR
 TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____
Commission File Number: **001-38221**

PQ Group Holdings Inc.

Delaware
(State or other jurisdiction of
incorporation or organization)

81-3406833
(I.R.S. Employer
Identification No.)

300 Lindenwood Drive
Malvern, Pennsylvania
(Address of principal executive offices)

19355
(Zip Code)

(610) 651-4400

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading symbol	Name of each exchange on which registered
Common stock, par value \$0.01 per share	PQG	New York Stock Exchange

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

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	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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 pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The number of shares of common stock outstanding as of October 31, 2019 was 136,474,348.

PQ GROUP HOLDINGS INC.

INDEX—FORM 10-Q
September 30, 2019

	<u>Page</u>
<u>PART I FINANCIAL INFORMATION</u>	
<u>Item 1. Financial Statements (Unaudited)</u>	
<u>Condensed Consolidated Statements of Income</u>	<u>3</u>
<u>Condensed Consolidated Statements of Comprehensive Income</u>	<u>4</u>
<u>Condensed Consolidated Balance Sheets</u>	<u>5</u>
<u>Condensed Consolidated Statements of Stockholders' Equity</u>	<u>6</u>
<u>Condensed Consolidated Statements of Cash Flows</u>	<u>8</u>
<u>Notes to Condensed Consolidated Financial Statements</u>	<u>9</u>
<u>Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations</u>	<u>35</u>
<u>Item 3. Quantitative and Qualitative Disclosures About Market Risk</u>	<u>56</u>
<u>Item 4. Controls and Procedures</u>	<u>56</u>
<u>PART II OTHER INFORMATION</u>	
<u>Item 1. Legal Proceedings</u>	<u>57</u>
<u>Item 1A. Risk Factors</u>	<u>57</u>
<u>Item 2. Unregistered Sales of Equity Securities and Use of Proceeds</u>	<u>57</u>
<u>Item 6. Exhibits</u>	<u>58</u>
<u>SIGNATURES</u>	<u>59</u>

PART I—FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS
(UNAUDITED).PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF INCOME
(in thousands, except share and per share amounts)
(unaudited)

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Sales	\$ 423,801	\$ 427,203	\$ 1,214,697	\$ 1,228,113
Cost of goods sold	310,904	319,703	905,395	934,088
Gross profit	112,897	107,500	309,302	294,025
Selling, general and administrative expenses	39,528	42,145	123,611	126,240
Other operating expense, net	15,795	16,501	28,353	41,688
Operating income	57,574	48,854	157,338	126,097
Equity in net (income) from affiliated companies	(17,261)	(5,605)	(31,625)	(31,123)
Interest expense, net	27,697	28,238	84,855	84,622
Debt extinguishment costs	1,767	864	1,767	6,743
Other expense, net	1,834	2,451	1,890	13,114
Income before income taxes and noncontrolling interest	43,537	22,906	100,451	52,741
Provision for income taxes	16,718	8,470	39,472	21,590
Net income	26,819	14,436	60,979	31,151
Less: Net income attributable to the noncontrolling interest	106	251	541	970
Net income attributable to PQ Group Holdings Inc.	\$ 26,713	\$ 14,185	\$ 60,438	\$ 30,181
Net income per share:				
Basic income per share	\$ 0.20	\$ 0.11	\$ 0.45	\$ 0.23
Diluted income per share	\$ 0.20	\$ 0.11	\$ 0.45	\$ 0.22
Weighted average shares outstanding:				
Basic	134,511,819	133,336,352	134,213,571	133,237,653
Diluted	135,649,710	134,576,162	135,305,370	134,223,628

See accompanying notes to condensed consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(in thousands)
(unaudited)

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Net income	\$ 26,819	\$ 14,436	\$ 60,979	\$ 31,151
Other comprehensive income (loss), net of tax:				
Pension and postretirement benefits	(59)	(52)	(120)	1,305
Net (loss) gain from hedging activities	35	370	(2,684)	3,106
Foreign currency translation	(13,872)	5,186	(620)	(15,636)
Total other comprehensive income (loss)	(13,896)	5,504	(3,424)	(11,225)
Comprehensive income	12,923	19,940	57,555	19,926
Less: Comprehensive income (loss) attributable to noncontrolling interests	(304)	1,218	586	1,697
Comprehensive income attributable to PQ Group Holdings Inc.	\$ 13,227	\$ 18,722	\$ 56,969	\$ 18,229

See accompanying notes to condensed consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except share and per share amounts)
(unaudited)

	September 30, 2019	December 31, 2018
ASSETS		
Cash and cash equivalents	\$ 78,510	\$ 57,854
Accounts receivable, net	214,626	196,770
Inventories, net	259,766	264,748
Prepaid and other current assets	39,055	39,244
Total current assets	591,957	558,616
Investments in affiliated companies	477,144	468,211
Property, plant and equipment, net	1,178,479	1,208,979
Goodwill	1,251,296	1,254,929
Other intangible assets, net	683,296	728,436
Right-of-use lease assets	54,238	—
Other long-term assets	129,069	108,254
Total assets	\$ 4,365,479	\$ 4,327,425
LIABILITIES		
Notes payable and current maturities of long-term debt	\$ 8,210	\$ 7,237
Accounts payable	132,096	148,365
Operating lease liabilities—current	14,095	—
Accrued liabilities	108,365	100,009
Total current liabilities	262,766	255,611
Long-term debt, excluding current portion	2,006,717	2,106,720
Deferred income taxes	214,935	196,124
Operating lease liabilities—noncurrent	38,473	—
Other long-term liabilities	105,927	104,825
Total liabilities	2,628,818	2,663,280
Commitments and contingencies (Note 17)		
EQUITY		
Common stock (\$0.01 par); authorized shares 450,000,000; issued shares 136,469,863 and 135,758,269 on September 30, 2019 and December 31, 2018, respectively; outstanding shares 136,157,186 and 135,592,045 on September 30, 2019 and December 31, 2018, respectively	1,365	1,358
Preferred stock (\$0.01 par); authorized shares 50,000,000; no shares issued or outstanding on September 30, 2019 and December 31, 2018	—	—
Additional paid-in capital	1,692,223	1,674,703
Retained earnings	83,912	25,523
Treasury stock, at cost; shares 312,677 and 166,224 on September 30, 2019 and December 31, 2018, respectively	(5,155)	(2,920)
Accumulated other comprehensive loss	(40,699)	(39,104)
Total PQ Group Holdings Inc. equity	1,731,646	1,659,560
Noncontrolling interest	5,015	4,585
Total equity	1,736,661	1,664,145
Total liabilities and equity	\$ 4,365,479	\$ 4,327,425

See accompanying notes to condensed consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands)
(unaudited)

	Common stock	Additional paid-in capital	Retained earnings	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Non- controlling interest	Total
Balance, December 31, 2018, as previously reported	\$ 1,358	\$ 1,674,703	\$ 25,523	\$ (2,920)	\$ (39,104)	\$ 4,585	\$ 1,664,145
Cumulative effect adjustment from adoption of new accounting standards	—	—	(2,049)	—	1,874	—	(175)
Balance, December 31, 2018, as adjusted	\$ 1,358	\$ 1,674,703	\$ 23,474	\$ (2,920)	\$ (37,230)	\$ 4,585	\$ 1,663,970
Net income	—	—	3,151	—	—	290	3,441
Other comprehensive income	—	—	—	—	5,270	315	5,585
Repurchases of common shares	—	—	—	(1,339)	—	—	(1,339)
Stock compensation expense	—	3,400	—	—	—	—	3,400
Shares issued under equity incentive plan, net of forfeitures	2	213	—	—	—	—	215
Balance, March 31, 2019	\$ 1,360	\$ 1,678,316	\$ 26,625	\$ (4,259)	\$ (31,960)	\$ 5,190	\$ 1,675,272
Net income	—	—	30,574	—	—	145	30,719
Other comprehensive income	—	—	—	—	4,747	140	4,887
Distributions to noncontrolling interests	—	—	—	—	—	(156)	(156)
Stock compensation expense	—	5,370	—	—	—	—	5,370
Shares issued under equity incentive plan, net of forfeitures	4	3,256	—	—	—	—	3,260
Balance, June 30, 2019	\$ 1,364	\$ 1,686,942	\$ 57,199	\$ (4,259)	\$ (27,213)	\$ 5,319	\$ 1,719,352
Net income	—	—	26,713	—	—	106	26,819
Other comprehensive income (loss)	—	—	—	—	(13,486)	(410)	(13,896)
Repurchases of common shares	—	—	—	(896)	—	—	(896)
Stock compensation expense	—	4,806	—	—	—	—	4,806
Shares issued under equity incentive plan, net of forfeitures	1	475	—	—	—	—	476
Balance, September 30, 2019	\$ 1,365	\$ 1,692,223	\$ 83,912	\$ (5,155)	\$ (40,699)	\$ 5,015	\$ 1,736,661

	Common stock	Additional paid-in capital	Accumulated deficit	Treasury stock, at cost	Accumulated other comprehensive income (loss)	Non- controlling interest	Total
Balance, December 31, 2017	\$ 1,352	\$ 1,655,114	\$ (32,777)	\$ —	\$ 4,311	\$ 3,919	\$ 1,631,919
Net income	—	—	214	—	—	342	556
Other comprehensive income	—	—	—	—	9,532	1,304	10,836
Repurchases of common shares	—	—	—	(58)	—	—	(58)
Stock compensation expense	—	3,831	—	—	—	—	3,831
Balance, March 31, 2018	\$ 1,352	\$ 1,658,945	\$ (32,563)	\$ (58)	\$ 13,843	\$ 5,565	\$ 1,647,084
Net income	—	—	15,782	—	—	377	16,159
Other comprehensive income (loss)	—	—	—	—	(26,021)	(1,544)	(27,565)
Distributions to noncontrolling interests	—	—	—	—	—	(153)	(153)
Stock compensation expense	—	3,796	—	—	—	—	3,796
Shares issued under equity incentive plan, net of forfeitures	—	7	—	—	—	—	7
Balance, June 30, 2018	\$ 1,352	\$ 1,662,748	\$ (16,781)	\$ (58)	\$ (12,178)	\$ 4,245	\$ 1,639,328
Net income	—	—	14,185	—	—	251	14,436
Other comprehensive income	—	—	—	—	4,537	967	5,504
Repurchases of common shares	—	—	—	(710)	—	—	(710)
Distributions to noncontrolling interests	—	—	—	—	—	(373)	(373)
Stock compensation expense	—	4,252	—	—	—	—	4,252
Shares issued under equity incentive plan, net of forfeitures	—	36	—	—	—	—	36
Balance, September 30, 2018	\$ 1,352	\$ 1,667,036	\$ (2,596)	\$ (768)	\$ (7,641)	\$ 5,090	\$ 1,662,473

See accompanying notes to condensed consolidated financial statements.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)
(unaudited)

	Nine months ended September 30,	
	2019	2018
Cash flows from operating activities:		
Net income	\$ 60,979	\$ 31,151
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation	97,088	99,491
Amortization	38,142	39,807
Amortization of inventory step-up	—	1,603
Amortization of deferred financing costs and original issue discount	4,352	4,629
Debt extinguishment costs	1,767	4,619
Foreign currency exchange loss	5,380	15,347
Pension and postretirement healthcare benefit expense	2,731	347
Pension and postretirement healthcare benefit funding	(8,917)	(6,415)
Deferred income tax provision	16,822	1,494
Net (gain) loss on asset disposals	(7,697)	11,106
Stock compensation	13,576	11,879
Equity in net (income) from affiliated companies	(31,625)	(31,123)
Dividends received from affiliated companies	20,072	35,890
Net interest income on swaps designated as net investment hedges	(8,435)	(4,279)
Other, net	(887)	(6,473)
Working capital changes that provided (used) cash, excluding the effect of acquisitions and dispositions:		
Receivables	(22,472)	(43,106)
Inventories	(1,793)	8,778
Prepays and other current assets	268	(1,555)
Accounts payable	(4,072)	(7,594)
Accrued liabilities	6,615	407
Net cash provided by operating activities	<u>181,894</u>	<u>166,003</u>
Cash flows from investing activities:		
Purchases of property, plant and equipment	(91,653)	(95,322)
Investment in affiliated companies	—	(5,000)
Business combinations, net of cash acquired	—	(1,006)
Proceeds from sale of product line	28,000	—
Net interest proceeds on swaps designated as net investment hedges	8,435	4,279
Other, net	475	1,142
Net cash used in investing activities	<u>(54,743)</u>	<u>(95,907)</u>
Cash flows from financing activities:		
Draw down of revolving credit facilities	161,630	139,577
Repayments of revolving credit facilities	(160,342)	(163,103)
Issuance of long-term debt	—	1,267,000
Debt issuance costs	—	(6,156)
Repayments of long-term debt	(105,821)	(1,313,832)
Stock repurchases	(2,235)	(768)
Distributions to noncontrolling interests	(156)	(526)
Proceeds from stock options exercised	3,956	43
Other, net	(283)	—
Net cash used in financing activities	<u>(103,251)</u>	<u>(77,765)</u>
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(3,371)	(1,537)
Net change in cash, cash equivalents and restricted cash	<u>20,529</u>	<u>(9,226)</u>
Cash, cash equivalents and restricted cash at beginning of period	59,726	67,243
Cash, cash equivalents and restricted cash at end of period	<u>\$ 80,255</u>	<u>\$ 58,017</u>

For supplemental cash flow disclosures, see Note 21.
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)
(unaudited)

1. Background and Basis of Presentation:

Description of Business

PQ Group Holdings Inc. and subsidiaries (the “Company” or “PQ Group Holdings”) is a leading integrated and innovative global provider of specialty catalysts, materials, chemicals and services. The Company supports customers globally through its strategically located network of manufacturing facilities. The Company believes that its products, which are predominantly inorganic, and services contribute to improving the sustainability of the environment.

The Company has four uniquely positioned specialty businesses: Refining Services provides sulfuric acid recycling to the North American refining industry; Catalysts serves the packaging and engineered plastics and the global refining, petrochemical and emissions control industries; Performance Materials produces transportation reflective safety markings for roads and airports; and Performance Chemicals supplies diverse product end uses, including personal and industrial cleaning products, fuel-efficient tires, surface coatings, and food and beverage products.

Effective March 1, 2019, the Company changed the structure of its internal organization to create the four independent businesses described above in order to promote increased visibility to business unit performance, optimize the Company’s product portfolio and create efficiencies. Previously, the Company had two reportable segments, namely the Environmental Catalysts and Services segment and the Performance Materials and Chemicals segment. Beginning with the quarter ended March 31, 2019, the segment results and disclosures included in the Company’s consolidated financial statements reflect the new segment structure for all periods presented. The changes to the Company’s segment structure affect only the results of the Company’s reportable segments were previously reported; there are no changes to the Company’s consolidated balance sheet, statement of income or cash flows for the prior periods. For the purposes of the Company’s goodwill impairment testing, the four new operating segments align with the Company’s reporting units at which level goodwill has been assigned and historically tested for impairment.

Seasonal changes and weather conditions typically affect the Company’s Performance Materials and Refining Services segments. In particular, the Company’s Performance Materials segment generally experiences lower sales and profit in the first and fourth quarters of the year because highway striping projects typically occur during warmer weather months. Additionally, the Company’s Refining Services segment 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 second quarters of the year, which can adversely affect the Company’s liquidity and cash flows. Because of this seasonality associated with certain of the Company’s segments, 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.

Basis of Presentation

The condensed consolidated financial statements included herein are unaudited. Certain information and footnote disclosures normally included in annual financial statements prepared in accordance with accounting principles generally accepted in the United States (“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 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 related notes included in the Company’s Annual Report on Form 10-K for the year ended December 31, 2018. Other than the update to our lease accounting policies described in Note 12, 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 February 2016, the Financial Accounting Standards Board (“FASB”) issued guidance (with subsequent targeted amendments) that modifies the accounting for leases. Under the new guidance, a lessee recognizes right-of-use lease assets and lease liabilities for most leases (including those classified under existing GAAP as operating leases, which based on previous standards are not reflected on the balance sheet), but recognizes expenses in a manner that is generally consistent with existing practices. The new guidance also requires companies to provide expanded disclosures regarding leasing arrangements. For public companies, the new guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those years. The new guidance must be adopted using a modified retrospective transition method.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The Company adopted the new lease guidance effective January 1, 2019 as required using the modified retrospective transition method and applied the provisions of the guidance at the effective date with a cumulative-effect adjustment to the opening balance of retained earnings without adjusting the comparative periods presented. The new guidance provides practical expedients and allows for certain policy elections with regard to the Company's lease population. The Company has elected the short term lease accounting policy and will not record right-of-use lease assets or lease liabilities for leases with an initial term of twelve months or less. Additionally, the Company has elected to utilize the portfolio approach to apply incremental borrowing rates to its leases. The Company has elected the package of practical expedients which provides the Company with the ability to bypass reassessment of the following for leases existing at the date of adoption: (1) whether any existing contracts are, or contain, leases; (2) the lease classification for any existing leases; and (3) initial direct costs for any existing leases. The Company also elected the land easement practical expedient to carry forward existing accounting treatment on existing land easements.

Adoption of the new lease guidance resulted in the recognition of right-of-use lease assets of \$60,726, which included \$57,832 of right-of-use lease assets related to lease commitments and \$2,895 related to the reclassification of favorable lease contracts, and lease liabilities of \$58,929. The new guidance had no impact on the Company's operating results or liquidity upon adoption. Disclosures related to the Company's leases are included in Note 12 to these condensed consolidated financial statements.

In February 2018, the FASB issued guidance which permits entities to make a one-time election to reclassify the residual ("stranded") income tax effects included in accumulated other comprehensive income ("AOCI") to beginning retained earnings as a result of tax reform legislation enacted by the U.S. government on December 22, 2017, namely the Tax Cuts and Jobs Act of 2017 ("TCJA"). The standard is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. Prior to the enactment of the tax reform legislation on December 22, 2017, the Company had amounts recorded in AOCI related to its domestic pension, postretirement and supplementary benefit plans and cash flow hedging relationships that were based on pre-enactment tax rates, which were included in AOCI at the adoption date of the new guidance. The Company adopted the new guidance effective January 1, 2019 as required, and elected to reclassify the income tax effects stranded in AOCI related to the change in the U.S. federal corporate income tax rate from the TCJA of \$1,874 from AOCI to beginning retained earnings. There were no other income tax effects related to the application of the TCJA that were included in this reclassification. The Company's accounting policy for releasing income tax effects from AOCI is based on individual units of account.

In June 2018, the FASB issued guidance which conforms the accounting for the issuance of all share-based payments using the same accounting model. Previously, the accounting for share-based payments to non-employees was covered under a different framework than those made to employees. Under the new guidance, awards to both employees and non-employees essentially follow the same model, with small variations related to determining the term assumption when valuing a non-employee award as well as a different expense attribution model for non-employee awards. The new guidance is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. The Company adopted the new guidance on January 1, 2019 as required, with no material impact on its consolidated financial statements upon adoption.

Accounting Standards Not Yet Adopted

In August 2018, the FASB issued guidance which modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The guidance eliminates certain disclosure requirements, including the amounts in accumulated other comprehensive income expected to be recognized as components of net periodic benefit cost over the next fiscal year and the effects of a one-percentage point change in assumed health care cost trend rates. The guidance also requires additional disclosure of the reasons for significant gains and losses related to changes in the benefit obligation for the period. The guidance is effective for fiscal years ending after December 15, 2020 with early adoption permitted, and is required to be applied on a retrospective basis to all periods presented. The Company will modify its benefit plan disclosures in accordance with the new guidance upon adoption, and the Company believes that the new guidance will not have a material impact on its consolidated financial statements.

In August 2018, the FASB issued guidance which modifies certain disclosure requirements over fair value measurements. The guidance is effective for fiscal years beginning after December 15, 2019, including all interim periods within that fiscal year. The Company believes that the new guidance will not have a material impact on its 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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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 Securities and Exchange Commission ("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. The Company will apply the guidance to its goodwill impairment tests upon the required adoption date or earlier as permitted.

In June 2016, the FASB issued guidance (with subsequent targeted amendments) that affects loans, trade receivables and any other financial assets that have the contractual right to receive cash. Under the new guidance, an entity is required to recognize expected credit losses rather than incurred losses for financial assets. The new guidance is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal years. The Company believes that the new guidance will not have a material impact on its consolidated financial statements.

3. Revenue from Contracts with Customers:

Disaggregated Revenue

The Company's primary means of disaggregating revenues is by reportable segments, which can be found in Note 18 to these condensed consolidated financial statements.

The Company's portfolio of products are integrated into a variety of end uses, which are described in the table below.

Key End Uses	Key Products
Industrial & process chemicals	<ul style="list-style-type: none"> • Silicate precursors for the tire industry • Glass beads, or microspheres, for metal finishing end uses
Fuels & emission control	<ul style="list-style-type: none"> • Refinery catalysts • Emission control catalysts • Catalyst recycling services • Silicate for catalyst manufacturing
Packaging & engineered plastics	<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 • Sulfur derivatives for nylon production
Highway safety & construction	<ul style="list-style-type: none"> • Reflective markings for roadways and airports • Silica gels for surface coatings
Consumer products	<ul style="list-style-type: none"> • Silica gels for edible oil and beer clarification • Precipitated silicas, silicates and zeolites for the dentifrice and dishwasher and laundry detergent applications
Natural resources	<ul style="list-style-type: none"> • Silicates for drilling muds • Hollow glass beads, or microspheres, for oil well cements • Silicates and alum for water treatment mining • Bleaching aids for paper

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following tables disaggregate the Company's sales, by segment and end use, for the three and nine months ended September 30, 2019 and 2018:

Three months ended September 30, 2019					
	Refining Services	Catalysts	Performance Materials	Performance Chemicals	Total
Industrial & process chemicals	\$ 20,180	\$ 47	\$ 12,225	\$ 54,696	\$ 87,148
Fuels & emission control ⁽¹⁾	70,048	—	—	—	70,048
Packaging & engineered plastics	12,197	25,565	16,886	12,048	66,696
Highway safety & construction ⁽¹⁾	—	—	82,502	20,800	103,302
Consumer products	—	—	—	64,849	64,849
Natural resources	15,910	—	3,521	15,556	34,987
Total segment sales	118,335	25,612	115,134	167,949	427,030
Eliminations	(813)	(47)	(18)	(2,351)	(3,229)
Total	\$ 117,522	\$ 25,565	\$ 115,116	\$ 165,598	\$ 423,801

Nine months ended September 30, 2019					
	Refining Services	Catalysts	Performance Materials	Performance Chemicals	Total
Industrial & process chemicals	\$ 60,485	\$ 109	\$ 38,037	\$ 175,009	\$ 273,640
Fuels & emission control ⁽¹⁾	191,243	—	—	—	191,243
Packaging & engineered plastics	38,953	62,226	51,863	41,121	194,163
Highway safety & construction ⁽¹⁾	—	—	195,119	65,036	260,155
Consumer products	—	—	—	198,798	198,798
Natural resources	50,788	—	10,076	46,275	107,139
Total segment sales	341,469	62,335	295,095	526,239	1,225,138
Eliminations	(2,595)	(109)	(170)	(7,567)	(10,441)
Total	\$ 338,874	\$ 62,226	\$ 294,925	\$ 518,672	\$ 1,214,697

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

Three months ended September 30, 2018					
	Refining Services	Catalysts	Performance Materials	Performance Chemicals	Total
Industrial & process chemicals	\$ 21,027	\$ —	\$ 11,263	\$ 55,589	\$ 87,879
Fuels & emission control ⁽¹⁾	66,095	—	—	—	66,095
Packaging & engineered plastics	16,636	16,347	17,763	14,086	64,832
Highway safety & construction ⁽¹⁾	—	—	82,738	22,466	105,204
Consumer products	—	—	—	67,138	67,138
Natural resources	19,611	—	3,616	15,443	38,670
Total segment sales	123,369	16,347	115,380	174,722	429,818
Eliminations	(833)	—	119	(1,901)	(2,615)
Total	\$ 122,536	\$ 16,347	\$ 115,499	\$ 172,821	\$ 427,203

Nine months ended September 30, 2018					
	Refining Services	Catalysts	Performance Materials	Performance Chemicals	Total
Industrial & process chemicals	\$ 55,347	\$ 54	\$ 38,070	\$ 186,886	\$ 280,357
Fuels & emission control ⁽¹⁾	182,304	—	—	—	182,304
Packaging & engineered plastics	45,032	50,113	57,247	40,375	192,767
Highway safety & construction ⁽¹⁾	—	—	198,165	64,930	263,095
Consumer products	—	—	—	209,256	209,256
Natural resources	53,471	—	11,178	46,999	111,648
Total segment sales	336,154	50,167	304,660	548,446	1,239,427
Eliminations	(2,456)	(54)	(214)	(8,590)	(11,314)
Total	\$ 333,698	\$ 50,113	\$ 304,446	\$ 539,856	\$ 1,228,113

⁽¹⁾ As described in Note 1, the Company experiences seasonal sales fluctuations to customers in the fuels & emission control and highway safety & construction end uses.

Contract Assets and Liabilities

A contract asset is a right to consideration in exchange for goods that the Company has transferred to a customer when that right is conditional on something other than the passage of time. A contract liability exists when the Company receives consideration in advance of performance obligations. The Company has not recorded any contract assets on its condensed consolidated balance sheets as of September 30, 2019 and December 31, 2018, and no contract liabilities existed as of December 31, 2018.

The Company recognized a \$9,000 contract liability associated with the sale of a portion of its sulfate salts product line, of which \$7,965 of deferred revenue remained as of September 30, 2019. The Company recognized revenue of \$1,035 related to this contract liability during the three and nine months ended September 30, 2019. Refer to Note 6 of these condensed consolidated financial statements for additional information related to the sale of the product line.

4. 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 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.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

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 September 30, 2019 and December 31, 2018, and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value.

	September 30, 2019	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts (Note 14)	\$ 40,125	\$ —	\$ 40,125	\$ —
Restoration plan assets	4,238	4,238	—	—
Total	\$ 44,363	\$ 4,238	\$ 40,125	\$ —
Liabilities:				
Derivative contracts (Note 14)	\$ 4,130	\$ —	\$ 4,130	\$ —
	December 31, 2018	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Derivative contracts (Note 14)	\$ 20,768	\$ —	\$ 20,768	\$ —
Restoration plan assets	4,244	4,244	—	—
Total	\$ 25,012	\$ 4,244	\$ 20,768	\$ —
Liabilities:				
Derivative contracts (Note 14)	\$ 2,026	\$ —	\$ 2,026	\$ —

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

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 16 to these condensed consolidated financial statements regarding defined supplementary retirement plans. The Company's restoration plan assets are included in other long-term assets on its condensed consolidated balance sheets. Gains and losses related to these investments are included in other expense, net in the Company's condensed consolidated statements of income. Unrealized gains and losses associated with the underlying stock and fixed income mutual funds were immaterial as of September 30, 2019 and December 31, 2018, respectively.

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, natural gas swaps and cross-currency 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 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.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

5. Accumulated Other Comprehensive Income:

The following tables present the tax effects of each component of other comprehensive income for the three and nine months ended September 30, 2019 and 2018:

	Three months ended September 30,					
	2019			2018		
	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 of net gains and (losses)	\$ (10)	\$ 4	\$ (6)	\$ (50)	\$ 13	\$ (37)
Amortization of prior service cost	(63)	10	(53)	(19)	4	(15)
Benefit plans, net	(73)	14	(59)	(69)	17	(52)
Net (loss) gain from hedging activities	46	(11)	35	494	(124)	370
Foreign currency translation ⁽¹⁾	(10,020)	(3,852)	(13,872)	3,391	1,795	5,186
Other comprehensive income (loss)	<u>\$ (10,047)</u>	<u>\$ (3,849)</u>	<u>\$ (13,896)</u>	<u>\$ 3,816</u>	<u>\$ 1,688</u>	<u>\$ 5,504</u>

	Nine months ended September 30,					
	2019			2018		
	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 of net gains and (losses)	\$ (26)	\$ 8	\$ (18)	\$ 1,798	\$ (449)	\$ 1,349
Amortization of prior service cost	(128)	26	(102)	(58)	14	(44)
Benefit plans, net	(154)	34	(120)	1,740	(435)	1,305
Net (loss) gain from hedging activities	(3,579)	895	(2,684)	4,143	(1,037)	3,106
Foreign currency translation ⁽¹⁾	4,731	(5,351)	(620)	(16,442)	806	(15,636)
Other comprehensive income (loss)	<u>\$ 998</u>	<u>\$ (4,422)</u>	<u>\$ (3,424)</u>	<u>\$ (10,559)</u>	<u>\$ (666)</u>	<u>\$ (11,225)</u>

⁽¹⁾ The income tax benefit or expense included in other comprehensive income is attributed to the portion of foreign currency translation associated with the Company's cross-currency interest rate swaps, for which the tax effect is based on the applicable U.S. deferred income tax rate. See Note 14 to these condensed consolidated financial statements for information regarding the Company's cross-currency interest rate swaps.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following table presents the changes in accumulated other comprehensive income (loss), net of tax, by component for the nine months ended September 30, 2019 and 2018:

	Defined benefit and other postretirement plans	Net gain (loss) from hedging activities	Foreign currency translation	Total
December 31, 2018	\$ (546)	\$ 637	\$ (39,195)	\$ (39,104)
Other comprehensive loss before reclassifications	(27)	(3,163)	(665)	(3,855)
Amounts reclassified from accumulated other comprehensive income ⁽¹⁾	(93)	479	—	386
Net current period other comprehensive loss	(120)	(2,684)	(665)	(3,469)
Tax Cuts and Jobs Act, reclassification from AOCI to retained earnings	1,684	190	—	1,874
September 30, 2019	<u>\$ 1,018</u>	<u>\$ (1,857)</u>	<u>\$ (39,860)</u>	<u>\$ (40,699)</u>
December 31, 2017	\$ 7,412	\$ 967	\$ (4,068)	\$ 4,311
Other comprehensive income (loss) before reclassifications	1,360	2,906	(16,363)	(12,097)
Amounts reclassified from accumulated other comprehensive income ⁽¹⁾	(55)	200	—	145
Net current period other comprehensive income (loss)	1,305	3,106	(16,363)	(11,952)
September 30, 2018	<u>\$ 8,717</u>	<u>\$ 4,073</u>	<u>\$ (20,431)</u>	<u>\$ (7,641)</u>

⁽¹⁾ See the following table for details about these reclassifications. Amounts in parentheses indicate debits.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following table presents the reclassifications out of accumulated other comprehensive income for the three and nine months ended September 30, 2019 and 2018:

Details about Accumulated Other Comprehensive Income Components	Amounts Reclassified from Accumulated Other Comprehensive Income(1)				Affected Line Item where Income is Presented
	Three months ended September 30,		Nine months ended September 30,		
	2019	2018	2019	2018	
Amortization of defined benefit and other postretirement items:					
Prior service credit (cost)	\$ 32	\$ 40	\$ 97	\$ 79	Other income (expense) ⁽²⁾
Actuarial gains (losses)	8	(2)	26	(5)	Other income (expense) ⁽²⁾
	40	38	123	74	Total before tax
	(10)	(13)	(30)	(19)	Tax expense
	<u>\$ 30</u>	<u>\$ 25</u>	<u>\$ 93</u>	<u>\$ 55</u>	Net of tax
Gains and losses on cash flow hedges:					
Interest rate caps	\$ (157)	\$ (71)	\$ (449)	\$ (164)	Interest expense
Natural gas swaps	(291)	(30)	(187)	(101)	Cost of goods sold
	(448)	(101)	(636)	(265)	Total before tax
	111	24	157	65	Tax benefit
	<u>\$ (337)</u>	<u>\$ (77)</u>	<u>\$ (479)</u>	<u>\$ (200)</u>	Net of tax
Total reclassifications for the period	<u>\$ (307)</u>	<u>\$ (52)</u>	<u>\$ (386)</u>	<u>\$ (145)</u>	Net of tax

(1) Amounts in parentheses indicate debits to profit/loss.

(2) These accumulated other comprehensive income (loss) components are components of net periodic pension and other postretirement cost (see Note 16 to these condensed consolidated financial statements for additional details).

6. Sale of Product Line:

On June 28, 2019, the Company completed the sale of a portion of its sulfate salts product line within its Performance Chemicals segment for \$28,000 and recorded a pre-tax gain on sale of \$11,362. The transaction was recorded as an asset sale, with the gain on disposition included in the other operating expense, net line item in the Company's condensed consolidated statement of income for the nine months ended September 30, 2019 (see Note 8 to these condensed consolidated financial statements for additional details). At the time of disposition, the carrying value of the Company's net working capital related to this non-core product line was \$4,215. In addition to the net working capital sold as part of the transaction, the Company also derecognized \$3,423 of property, plant and equipment related to the product line and allocated \$9,000 of the consideration received to a liability for deferred revenue.

Concurrent with the product line sale, the Company entered into a tolling arrangement with the buyer in which the Company will use its existing manufacturing facilities for the product line to manufacture the product for the buyer, the majority of which runs until June 2021. The Company deferred \$9,000 of the \$28,000 consideration received as a liability, to be recognized as the Company executes its performance obligations over the term of the contractual agreement with the buyer. Additionally, the Company concluded that an embedded lease arrangement exists as a result of the combination of the sale and tolling agreements. Given the ability of the buyer to control substantially all of the output of the facilities and the existence of bargain purchase options on the manufacturing assets, the Company determined that the buyer is effectively leasing the assets from the Company and derecognized the associated property, plant and equipment under a sales-type leasing arrangement. The gain on the sale of fixed assets is included as part of the Company's overall gain on sale related to the transaction, with the Company's net investment in the leased assets having been settled as part of the consideration received in the transaction with no additional future cash flows to be recognized on the lease.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

7. Goodwill:

The change in the carrying amount of goodwill for the nine months ended September 30, 2019 is summarized as follows:

	Refining Services	Catalysts	Performance Materials	Performance Chemicals	Total
Balance as of December 31, 2018	\$ 311,892	\$ 77,759	\$ 274,947	\$ 590,331	\$ 1,254,929
Foreign exchange impact	—	(844)	458	(3,247)	(3,633)
Balance as of September 30, 2019	<u>\$ 311,892</u>	<u>\$ 76,915</u>	<u>\$ 275,405</u>	<u>\$ 587,084</u>	<u>\$ 1,251,296</u>

8. Other Operating Expense, Net:

A summary of other operating expense, net is as follows:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Amortization expense	\$ 8,607	\$ 8,711	\$ 25,907	\$ 26,404
Transaction and other related costs	2,930	215	3,938	827
Net (gain) loss on asset disposals ⁽¹⁾	1,136	5,202	(7,697)	11,106
Insurance recoveries ⁽²⁾	—	—	—	(1,557)
Environmental related costs	1,174	39	2,501	526
Other, net	1,948	2,334	3,704	4,382
	<u>\$ 15,795</u>	<u>\$ 16,501</u>	<u>\$ 28,353</u>	<u>\$ 41,688</u>

⁽¹⁾ During the nine months ended September 30, 2019, the Company recognized a gain of \$11,362 related to the sale of a product line. Refer to Note 6 of these condensed consolidated financial statements for additional details.

⁽²⁾ During the nine months ended September 30, 2018, the Company recognized \$2,500 of insurance recoveries in its condensed consolidated statements of income related to the Company's claim for losses sustained during Hurricane Harvey in August 2017. For the nine months ended September 30, 2018, \$1,557 was recorded as a gain in other operating expense, net, as reimbursement of expenses, \$207 was recorded as a gain in net loss on asset disposals within other operating expense, net, for the Company's previously recognized property losses, and \$736 represented recoveries in excess of the Company's property losses which was recorded as a non-operating gain in other expense, net, in the Company's condensed consolidated statements of income.

9. Inventories, Net:

Inventories, net, are classified and valued as follows:

	September 30, 2019	December 31, 2018
Finished products and work in process	\$ 206,419	\$ 206,188
Raw materials	53,347	58,560
	<u>\$ 259,766</u>	<u>\$ 264,748</u>
Valued at lower of cost or market:		
LIFO basis	\$ 155,089	\$ 160,863
Valued at lower of cost and net realizable value:		
FIFO or average cost basis	104,677	103,885
	<u>\$ 259,766</u>	<u>\$ 264,748</u>

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

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 September 30, 2019 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%
Asociacion para el Estudio de las Tecnologias de Equipamiento de Carreteras, S.A. ("Aetec")	Spain	20%

Following is summarized information of the combined investments⁽¹⁾:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Sales	\$ 121,471	\$ 74,088	\$ 279,503	\$ 271,562
Gross profit	48,416	24,495	102,966	100,686
Operating income	37,958	14,594	74,217	72,257
Net income	37,852	14,545	75,002	72,204

⁽¹⁾ Summarized information of the combined investments is presented at 100%; the Company's share of the net assets and net income of affiliates is calculated based on the percent ownership specified in the table above.

The Company's investments in affiliated companies balance as of September 30, 2019 and December 31, 2018 includes net purchase accounting fair value adjustments of \$252,190 and \$258,066, respectively, related to the series of transactions consummated on May 4, 2016 to reorganize and combine the businesses of PQ Holdings Inc. and Eco Services Operations LLC, 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 \$1,658 and \$5,875 of amortization expense related to purchase accounting fair value adjustments for the three and nine months ended September 30, 2019, respectively. Consolidated equity in net income from affiliates is net of \$1,658 and \$4,975 of amortization expense related to purchase accounting fair value adjustments for the three and nine months ended September 30, 2018, respectively.

11. Property, Plant and Equipment:

A summary of property, plant and equipment, at cost, and related accumulated depreciation is as follows:

	September 30, 2019	December 31, 2018
Land	\$ 189,234	\$ 190,772
Buildings	219,380	212,284
Machinery and equipment	1,162,273	1,125,117
Construction in progress	111,984	102,185
	1,682,871	1,630,358
Less: accumulated depreciation	(504,392)	(421,379)
	<u>\$ 1,178,479</u>	<u>\$ 1,208,979</u>

Depreciation expense was \$31,554 and \$30,626 for the three months ended September 30, 2019 and 2018, respectively. Depreciation expense was \$97,088 and \$99,491 for the nine months ended September 30, 2019 and 2018, respectively.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

12. Leases:

The Company has operating and finance lease agreements with remaining lease terms as of September 30, 2019 of up to 30 years, including leases of land, buildings, railcars, vehicles, manufacturing equipment and general office equipment. Some leases include options to terminate or extend for one or more years. These options are incorporated in the Company's lease term when it is reasonably certain that the option will be exercised. Some leases include options to purchase, which the Company assesses under the guidance to determine if these leases should be classified as finance lease agreements.

When the Company enters into an arrangement, at inception, the Company determines if the arrangement contains a lease and whether that lease meets the classification criteria of a finance or operating lease. Some of the Company's lease arrangements contain lease components (e.g. minimum rent payments) and non-lease components (e.g. maintenance). The Company accounts for the lease and non-lease components based on the estimated standalone price of each component. Certain of the Company's lease agreements include rental payments that are adjusted periodically for an index or rate and these are initially measured using the index or rate in effect at the commencement date. Variable lease expense is recognized in the period in which the obligation for those payments is incurred. The Company's lease agreements do not contain any material residual value guarantees or material restrictive covenants.

The Company recognizes a right-of-use lease asset and lease liability at the lease commencement date based on the present value of the remaining lease payments over the lease term using the Company's incremental borrowing rate. The Company is required to use the rate of interest that it would have to pay to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment. When the Company is unable to readily determine the discount rate implicit in the lease agreement, the Company utilizes its incremental borrowing rate over the relevant lease term. Short-term leases, which have an initial term of twelve months or less, are not recorded on the Company's balance sheet.

Lease expense for operating leases is recognized on a straight-line basis over the lease term. Operating lease costs of \$4,858 and \$14,217 are included in cost of goods sold and in selling, general and administrative expenses on the condensed consolidated statements of income for the three and nine months ended September 30, 2019, respectively.

Lease expense for financing leases is bifurcated into two components, with the amortization expense component of the right-of-use asset recognized on a straight-line basis and the interest expense component recognized using the effective interest method over the lease term. The amortization expense component of the right-of-use lease asset is included in cost of goods sold and in selling, general and administrative expenses and the interest expense component is included in interest expense, net on the condensed consolidated statements of income. Finance lease, short-term lease and variable lease costs for the three and nine months ended September 30, 2019 were not material. Lease income is not material to the results of operations for the three and nine months ended September 30, 2019.

The table below presents the operating and finance right-of-use lease assets and lease liabilities recognized on the condensed consolidated balance sheet as of September 30, 2019:

	Classification	September 30, 2019
Assets		
Operating lease assets	Right-of-use lease assets	\$ 54,238
Finance lease assets	Property, plant and equipment, net	1,582
Total leased assets		<u>\$ 55,820</u>
Liabilities		
Current:		
Operating lease liabilities	Operating lease liabilities—current	\$ 14,095
Finance lease liabilities	Accrued liabilities	176
Noncurrent:		
Operating lease liabilities	Operating lease liabilities—noncurrent	38,473
Finance lease liabilities	Other long-term liabilities	364
Total lease liabilities		<u>\$ 53,108</u>

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The Company's weighted average remaining lease term and weighted average discount rate for operating leases as of September 30, 2019 are as follows:

	September 30, 2019
Weighted average remaining lease term (in years):	
Operating leases	5.86
Finance leases	2.90
Weighted average discount rate:	
Operating leases	5.74 %
Finance leases	4.67 %

Maturities of lease liabilities as of September 30, 2019 are as follows:

	Operating Leases	Finance Leases
Remainder of 2019	\$ 16,522	\$ 47
2020	13,198	201
2021	9,816	201
2022	7,256	123
2023	4,767	3
Thereafter	11,395	—
Total lease payments	62,954	575
Less: Interest	(10,386)	(35)
Total lease liabilities⁽¹⁾	\$ 52,568	\$ 540

⁽¹⁾ Refer to the above table regarding the Company's right-of-use lease assets and lease liabilities for the presentation of the lease liabilities in the Company's condensed consolidated balance sheet at September 30, 2019.

At December 31, 2018, future minimum payments under non-cancelable operating leases under previous lease guidance was as follows:

Year	Amount
2019	\$ 18,457
2020	14,344
2021	11,432
2022	8,354
2023	6,198
Thereafter	17,477
	\$ 76,262

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following table presents other information related to our operating and finance leases and the impact on the Company's condensed consolidated statement of cash flows:

	Nine months ended September 30, 2019
Cash paid for amounts included in the measurement of lease liabilities:	
Payments on operating leases included in operating cash flows	\$ 12,158
Interest payments under finance lease obligations included in operating cash flows	29
Principal payments under finance lease obligations included in financing cash flows	169
Right-of-use assets obtained in exchange for new lease liabilities (non-cash):	
Operating leases	5,148
Finance leases	—

13. Long-term Debt:

The summary of long-term debt is as follows:

	September 30, 2019	December 31, 2018
Term Loan Facility	\$ 1,057,497	\$ 1,157,498
6.75% Senior Secured Notes due 2022	625,000	625,000
5.75% Senior Unsecured Notes due 2025	295,000	300,000
ABL Facility	—	—
Other	65,778	65,925
Total debt	2,043,275	2,148,423
Original issue discount	(15,331)	(18,584)
Deferred financing costs	(13,017)	(15,882)
Total debt, net of original issue discount and deferred financing costs	2,014,927	2,113,957
Less: current portion	(8,210)	(7,237)
Total long-term debt, excluding current portion	\$ 2,006,717	\$ 2,106,720

The fair value of a financial instrument is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants. As of September 30, 2019 and December 31, 2018, the fair value of the term loan facility and senior secured and unsecured notes was \$2,009,555 and \$2,010,023, respectively. The fair value is classified as Level 2 based upon the fair value hierarchy (see Note 4 to these condensed consolidated financial statements for further information on fair value measurements).

Term Loan Facility

During the quarter ended September 30, 2019, the Company prepaid \$100,000 of outstanding principal balance on the Term Loan Facility. The Company wrote off \$502 of previously unamortized deferred financing costs and original issue discount of \$1,181 as debt extinguishment costs related to the Term Loan Facility for the three months ended September 30, 2019.

14. Financial Instruments:

The Company uses (1) interest rate related derivative instruments to manage its exposure to changes in interest rates on its variable-rate debt instruments, (2) commodity derivatives to manage its exposure to commodity price fluctuations, and (3) foreign currency related derivative instruments to manage its foreign currency exposure to its net investments in certain foreign operations. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates, commodity prices and foreign currency, 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

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

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 the Company's derivative instruments 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, in the Company's consolidated balance sheet. As the derivatives are designated and qualify as cash flow hedges, the gains or losses on the natural gas swaps are recorded in stockholders' equity as a component of other comprehensive income (loss) ("OCI"), net of tax. Reclassifications of the gains and losses on natural gas hedges into earnings are recorded in production costs and subsequently charged to cost of goods sold in the condensed consolidated statements of income in the period in which the associated inventory is sold. As of September 30, 2019, the Company's natural gas swaps had a remaining notional quantity of 3.3 million MMBTU to mitigate commodity price volatility through December 2021.

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. Changes in interest rates will not affect the market value of such debt but will affect 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 debt obligations through interest rate cap agreements. The Company records these agreements at fair value as assets or liabilities in its consolidated balance sheet. As the derivatives are designated and qualify as cash flow hedges, the gains or losses on the interest rate cap agreements are recorded in stockholders' equity as a component of OCI, net of tax. Reclassifications of the gains and losses on the interest rate cap agreements into earnings are recorded as part of interest expense in the condensed consolidated statements of income as the Company makes its interest payments on the hedged portion of its senior secured credit facilities. 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 cap rate currently in effect at September 30, 2019 is 3.00%. In November 2018, the Company entered into additional interest rate cap agreements to mitigate interest rate volatility from July 2020 through July 2022, with a cap rate of 3.50% on \$500,000 of notional variable-rate debt.

Use of Derivative Financial Instruments to Manage Foreign Currency Risk. The Company is exposed to risks related to its net investments in foreign operations due to fluctuations in foreign currency exchange rates, particularly between the United States dollar and the Euro. In February 2018, the Company entered into multiple cross-currency interest rate swap arrangements with an aggregate notional amount of €280,000 (\$306,345 as of September 30, 2019) to hedge this exposure on the net investments of certain of its Euro-denominated subsidiaries. The Company records these swap agreements at fair value as assets or liabilities in its consolidated balance sheet. As the derivatives are designated and qualify as net investment hedges, changes in the fair value of the swaps attributable to changes in the spot exchange rates are recognized in cumulative translation adjustment ("CTA") within OCI and are held there until the hedged net investments are sold or substantially liquidated. Upon such sale or liquidation, the amount recognized in CTA is reclassified to earnings and reported in the same line item as the gain or loss on the liquidation of the net investments. Changes in the fair value of the swaps attributable to the cross-currency basis spread are excluded from the assessment of hedge effectiveness and are recorded in current period earnings.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The fair values of derivative instruments held as of September 30, 2019 and December 31, 2018 are shown below:

	Balance sheet location	September 30, 2019	December 31, 2018
Derivative assets:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Prepaid and other current assets	\$ —	\$ 21
Interest rate caps	Prepaid and other current assets	—	1,358
Interest rate caps	Other long-term assets	—	546
		—	1,925
Derivatives designated as net investment hedges:			
Cross-currency interest rate swaps	Prepaid and other current assets	7,517	5,499
Cross-currency interest rate swaps	Other long-term assets	32,608	13,344
		40,125	18,843
Total derivative assets		<u>\$ 40,125</u>	<u>\$ 20,768</u>
Derivative liabilities:			
Derivatives designated as cash flow hedges:			
Natural gas swaps	Accrued liabilities	\$ 626	\$ 36
Natural gas swaps	Other long-term liabilities	302	148
Interest rate caps	Other long-term liabilities	3,202	1,842
Total derivative liabilities		<u>\$ 4,130</u>	<u>\$ 2,026</u>

The following tables show the effect of the Company's derivative instruments designated as cash flow hedges on AOCI for the three and nine months ended September 30, 2019 and 2018:

		Three months ended September 30,			
		2019		2018	
	Location of gain (loss) reclassified from AOCI into income	Amount of gain (loss) recognized in OCI on derivatives	Amount of gain (loss) reclassified from AOCI into income	Amount of gain (loss) recognized in OCI on derivatives	Amount of gain (loss) reclassified from AOCI into income
Interest rate caps	Interest (expense) income	\$ (216)	\$ (157)	\$ (93)	\$ (71)
Natural gas swaps	Cost of goods sold	(185)	(291)	(300)	(30)
		<u>\$ (401)</u>	<u>\$ (448)</u>	<u>\$ (393)</u>	<u>\$ (101)</u>

		Nine months ended September 30,			
		2019		2018	
	Location of gain (loss) reclassified from AOCI into income	Amount of gain (loss) recognized in OCI on derivatives	Amount of gain (loss) reclassified from AOCI into income	Amount of gain (loss) recognized in OCI on derivatives	Amount of gain (loss) reclassified from AOCI into income
Interest rate caps	Interest (expense) income	\$ (3,264)	\$ (449)	\$ (3,396)	\$ (164)
Natural gas swaps	Cost of goods sold	(951)	(187)	(482)	(101)
		<u>\$ (4,215)</u>	<u>\$ (636)</u>	<u>\$ (3,878)</u>	<u>\$ (265)</u>

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following tables show the effect of the Company's cash flow hedge accounting on the condensed consolidated statements of income for the three and nine months ended September 30, 2019 and 2018:

	Location and amount of gain (loss) recognized in income on cash flow hedging relationships			
	Three months ended September 30,			
	2019		2018	
	Cost of goods sold	Interest (expense) income	Cost of goods sold	Interest (expense) income
Total amounts of income and expense line items presented in the statement of income in which the effects of cash flow hedges are recorded	\$ (310,904)	\$ (27,697)	\$ (319,703)	\$ (28,238)
The effects of cash flow hedging:				
Gain (loss) on cash flow hedging relationships:				
Interest contracts:				
Amount of gain (loss) reclassified from AOCI into income	—	(157)	—	(71)
Commodity contracts:				
Amount of gain (loss) reclassified from AOCI into income	(291)	—	(30)	—

	Location and amount of gain (loss) recognized in income on cash flow hedging relationships			
	Nine months ended September 30,			
	2019		2018	
	Cost of goods sold	Interest (expense) income	Cost of goods sold	Interest (expense) income
Total amounts of income and expense line items presented in the statement of income in which the effects of cash flow hedges are recorded	(905,395)	(84,855)	(934,088)	(84,622)
The effects of cash flow hedging:				
Gain (loss) on cash flow hedging relationships:				
Interest contracts:				
Amount of gain (loss) reclassified from AOCI into income	—	(449)	—	(164)
Commodity contracts:				
Amount of gain (loss) reclassified from AOCI into income	(187)	—	(101)	—

The amount of unrealized losses in AOCI related to the Company's cash flow hedges that is expected to be reclassified to the condensed consolidated statement of income over the next twelve months is \$1,431 as of September 30, 2019.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The following tables show the effect of the Company's net investment hedges on AOCI and the condensed consolidated statements of income for the three and nine months ended September 30, 2019 and 2018:

	Amount of gain (loss) recognized in OCI on derivative		Location of gain (loss) reclassified from AOCI into income	Amount of gain (loss) reclassified from AOCI into income		Location of gain (loss) recognized in income on derivative (amount excluded from effectiveness testing)	Amount of gain (loss) recognized in income on derivative (amount excluded from effectiveness testing)	
	Three months ended September 30,			Three months ended September 30,			Three months ended September 30,	
	2019	2018		2019	2018		2019	2018
Cross-currency interest rate swaps	\$ 15,342	\$ 1,138	Gain (loss) on sale of subsidiary	\$ —	\$ —	Interest (expense) income	\$ 2,395	\$ 2,271

	Amount of gain (loss) recognized in OCI on derivative		Location of gain (loss) reclassified from AOCI into income	Amount of gain (loss) reclassified from AOCI into income		Location of gain (loss) recognized in income on derivative (amount excluded from effectiveness testing)	Amount of gain (loss) recognized in income on derivative (amount excluded from effectiveness testing)	
	Nine months ended September 30,			Nine months ended September 30,			Nine months ended September 30,	
	2019	2018		2019	2018		2019	2018
Cross-currency interest rate swaps	\$ 21,282	\$ 8,799	Gain (loss) on sale of subsidiary	\$ —	\$ —	Interest (expense) income	\$ 6,888	\$ 5,662

15. Income Taxes:

The effective income tax rate for the three months ended September 30, 2019 was 38.4% compared to 37.0% for the three months ended September 30, 2018. The effective income tax rate for the nine months ended September 30, 2019 was 39.3% compared to 40.9% for the nine months ended September 30, 2018. The Company's effective income tax rate has fluctuated primarily because of changes in income mix (including the effect of loss companies), the impact of including foreign earnings in U.S. taxable income and changes in foreign exchange gains and losses, which create permanent differences in certain jurisdictions.

The difference between the U.S. federal statutory income tax rate and the Company's effective income tax rate for the nine months ended September 30, 2019 was mainly due to the tax effect of permanent differences related to foreign currency exchange gain or loss, inclusion of foreign earnings in U.S. taxable income, pre-tax losses with no associated tax benefit, the discrete tax effects of the Company's sale of a non-core product line and state taxes.

The difference between the U.S. federal statutory income tax rate and the Company's effective income tax rate for the nine months ended September 30, 2018 was mainly due to the tax effect of permanent differences related to foreign currency exchange gain or loss, inclusion of foreign earnings in the U.S. as a result of recently enacted tax law, pre-tax losses with no associated tax benefit, discrete impacts of opening balance sheet adjustments related to the Sovitec acquisition and state taxes.

The TCJA enacted certain provisions that became effective on January 1, 2018. These provisions include, but are not limited to, the new Global Intangible Low-Taxed Income ("GILTI") tax rules. Due to the complexity of the new GILTI tax, the Company is continuing to evaluate the GILTI provision of the TCJA and its impact on the financial statements, which remains uncertain. Per guidance issued by the FASB, the Company is permitted to make an accounting policy election to either (1) treat the taxes incurred as a result of the GILTI provision as a current-period expense when incurred or (2) factor such amounts into its measurement of deferred taxes. The Company has elected to treat any tax expense incurred as a result of GILTI as a current-period expense. Additionally, in regards to GILTI's impact in assessing the ability to realize deferred tax assets, the Company has made a policy election to use the tax law ordering approach.

With respect to operating results for the three and nine months ended September 30, 2019, the Company has continued to incorporate an estimate of the GILTI income inclusion when estimating annual effective tax rate used for GAAP purposes. The Company expects this amount to be included in its 2019 U.S. taxable income. However, the estimated 2019 GILTI income inclusion may change materially as the Company continues to evaluate future legislative or administrative guidance that is put forth, any updates to assumptions and figures used for the current estimate, or as a result of future changes to the Company's current structure and business.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

16. 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 (benefit) are as follows:

Defined Benefit Pension Plans

	U.S.		Foreign	
	Three months ended September 30,		Three months ended September 30,	
	2019	2018	2019	2018
Service cost	\$ 251	\$ 243	\$ 780	\$ 933
Interest cost	2,653	2,395	801	(601)
Expected return on plan assets	(2,912)	(3,165)	(782)	453
Amortization of net loss	—	—	1	13
Amortization of prior service cost	—	—	6	—
Net periodic expense (benefit)	\$ (8)	\$ (527)	\$ 806	\$ 798

	U.S.		Foreign	
	Nine months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Service cost	\$ 751	\$ 776	\$ 2,464	\$ 2,665
Interest cost	7,958	7,137	2,458	2,512
Expected return on plan assets	(8,733)	(9,515)	(2,375)	(2,494)
Amortization of net loss	—	—	1	38
Amortization of prior service cost	—	—	18	—
Curtailement gain recognized	—	(576)	—	—
Net periodic expense (benefit)	\$ (24)	\$ (2,178)	\$ 2,566	\$ 2,721

Supplemental Retirement Plans

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Interest cost	\$ 121	\$ 110	\$ 364	\$ 330
Net periodic expense	\$ 121	\$ 110	\$ 364	\$ 330

Other Postretirement Benefit Plans

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Service cost	\$ 3	\$ 3	\$ 10	\$ 12
Interest cost	38	43	114	108
Amortization of prior service credit	(32)	(40)	(97)	(79)
Amortization of net gain	(9)	(11)	(27)	(33)
Net periodic expense (benefit)	\$ —	\$ (5)	\$ —	\$ 8

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

17. 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 comply 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. While management believes that the liabilities resulting from such lawsuits and claims are not probable or reasonably estimable, certain accruals have been reflected in the Company's condensed consolidated financial statements. When these matters are ultimately concluded and determined, the Company believes that there will be no material adverse effect on its consolidated financial position, results of operations or liquidity.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

18. Reportable Segments:

Summarized financial information for the Company’s reportable segments is shown in the following table:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Sales:				
Refining Services	\$ 118,335	\$ 123,369	\$ 341,469	\$ 336,154
Catalysts ⁽¹⁾	25,612	16,347	62,335	50,167
Performance Materials	115,134	115,380	295,095	304,660
Performance Chemicals	167,949	174,722	526,239	548,446
Eliminations ⁽²⁾	(3,229)	(2,615)	(10,441)	(11,314)
Total	\$ 423,801	\$ 427,203	\$ 1,214,697	\$ 1,228,113
Segment Adjusted EBITDA:⁽³⁾				
Refining Services	\$ 51,166	\$ 49,559	\$ 133,721	\$ 126,368
Catalysts ⁽⁴⁾	31,638	15,751	79,372	62,227
Performance Materials	25,769	21,255	65,505	61,880
Performance Chemicals	36,804	41,832	120,642	131,748
Total Segment Adjusted EBITDA⁽⁵⁾	\$ 145,377	\$ 128,397	\$ 399,240	\$ 382,223

(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 \$54,414 and \$32,297 for the three months ended September 30, 2019 and 2018, respectively. The proportionate share of sales is \$123,016 and \$120,159 for the nine months ended September 30, 2019 and 2018, respectively.

(2) The Company eliminates intersegment sales when reconciling to the Company’s condensed consolidated statements of income.

(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 Adjusted EBITDA from the Zeolyst Joint Venture included in the Catalysts segment is \$22,628 for the three months ended September 30, 2019, which includes \$17,248 of equity in net income plus \$1,658 of amortization of investment in affiliate step-up and \$3,722 of joint venture depreciation, amortization and interest. The Adjusted EBITDA from the Zeolyst Joint Venture included in the Catalysts segment is \$10,513 for the three months ended September 30, 2018, which includes \$5,563 of equity in net income plus \$1,658 of amortization of investment in affiliate step-up and \$3,292 of joint venture depreciation, amortization and interest.

The Adjusted EBITDA from the Zeolyst Joint Venture included in the Catalysts segment is \$48,621 for the nine months ended September 30, 2019, which includes \$31,548 of equity in net income plus \$5,875 of amortization of investment in affiliate step-up and \$11,198 of joint venture depreciation, amortization and interest. The Adjusted EBITDA from the Zeolyst Joint Venture included in the Catalysts segment is \$45,194 for the nine months ended September 30, 2018, which includes \$31,005 of equity in net income plus \$4,975 of amortization of investment in affiliate step-up and \$9,214 of joint venture depreciation, amortization and interest.

(5) Total Segment Adjusted EBITDA differs from the Company’s consolidated Adjusted EBITDA due to unallocated corporate expenses.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

A reconciliation of net income attributable to PQ Group Holdings to Segment Adjusted EBITDA is as follows:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Reconciliation of net income attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA				
Net income attributable to PQ Group Holdings Inc.	\$ 26,713	\$ 14,185	\$ 60,438	\$ 30,181
Provision for income taxes	16,718	8,470	39,472	21,590
Interest expense, net	27,697	28,238	84,855	84,622
Depreciation and amortization	44,246	43,827	135,230	139,298
Segment EBITDA	115,374	94,720	319,995	275,691
Unallocated corporate expenses	7,693	10,276	28,062	27,322
Joint venture depreciation, amortization and interest	3,722	3,292	11,198	9,214
Amortization of investment in affiliate step-up	1,658	1,658	5,875	4,975
Amortization of inventory step-up	—	—	—	1,603
Debt extinguishment costs	1,767	864	1,767	6,743
Net (gain) loss on asset disposals	1,136	5,202	(7,697)	11,106
Foreign currency exchange loss	4,457	3,527	5,380	15,347
LIFO expense	534	856	10,814	5,903
Transaction and other related costs	670	210	1,725	895
Equity-based compensation	4,806	4,252	13,576	11,879
Restructuring, integration and business optimization expenses	717	2,178	1,436	5,662
Defined benefit pension plan cost	834	112	2,379	260
Other	2,009	1,250	4,730	5,623
Segment Adjusted EBITDA	<u>\$ 145,377</u>	<u>\$ 128,397</u>	<u>\$ 399,240</u>	<u>\$ 382,223</u>

19. Stock-Based Compensation:

The Company is authorized to issue shares for common stock awards to employees, directors and affiliates of the Company in connection with the PQ Group Holdings Inc. 2017 Omnibus Incentive Plan (the “2017 Plan”). During the nine months ended September 30, 2019, the Company granted 1,245,628 restricted stock units and 550,676 performance stock units at target under the 2017 Plan as part of its equity incentive compensation program. Each restricted stock unit provides the recipient with the right to receive a share of common stock subject to graded vesting terms based on service, which for the awards granted during the nine months ended September 30, 2019, requires approximately one year of service for members of the Company’s board of directors and approximately three years of service for employees.

The performance stock units granted during the nine months ended September 30, 2019 provide the recipients with the right to receive shares of common stock dependent on the achievement of two Company-specific financial performance targets and the provision of service through the vesting date. Achievement of the metrics is measured based on the average levels of achievement across the three-year period from January 1, 2019 through December 31, 2021. Depending on the Company’s performance against the pre-determined thresholds for achievement, each performance stock unit award holder is eligible to earn a percentage of the target number of shares granted to the holder, ranging from zero to 200%. The performance stock units, to the extent earned, will vest on the date the Company’s compensation and governance committee certifies the achievement of the performance metrics for the three-year period ending December 31, 2021, which will occur no later than March 1, 2022.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The value of the restricted stock units granted during the nine months ended September 30, 2019 was based on the average of the high and low trading prices of the Company's common stock on the NYSE on the preceding trading day, in accordance with the Company's policy for valuing such awards. Compensation expense related to the restricted stock units is recognized on a straight-line basis over the respective vesting period. The value of the performance stock units granted during the nine months ended September 30, 2019 was measured on the same basis as that of the restricted stock units, and based on the target number of shares granted; because the performance vesting conditions affect the ability of the recipients to vest in the awards, they are not factored into the fair value measure of the award. Compensation expense related to the performance stock units is recognized ratably over the requisite service period, and the Company must assess the probability that the performance conditions will be met each reporting period, and the level at which they are estimated to be attained. Should the probability assessment change during a given reporting period, the total compensation cost (both recognized and unrecognized) will be adjusted to reflect the revised assessment.

The following table summarizes the activity for the Company's restricted stock units and performance stock units for the nine months ended September 30, 2019:

	Restricted Stock Units		Performance Stock Units	
	Number of Units	Weighted Average Grant Date Fair Value (per share)	Number of Units	Weighted Average Grant Date Fair Value (per share)
Nonvested as of December 31, 2018	998,786	\$ 16.83	—	\$ —
Granted	1,245,628	\$ 15.42	550,676	\$ 15.41
Vested	(148,551)	\$ 15.90	—	\$ —
Forfeited	(20,837)	\$ 16.00	—	\$ —
Nonvested as of September 30, 2019	2,075,026	\$ 16.06	550,676	\$ 15.41

Total stock-based compensation expense for all of the Company's equity incentive awards was \$4,806 and \$4,252 for the three months ended September 30, 2019 and 2018, respectively, and \$13,576 and \$11,879 for the nine months ended September 30, 2019 and 2018, respectively. The income tax benefit recognized in the condensed consolidated statements of income was \$1,187 and \$1,051 for the three months ended September 30, 2019 and 2018, respectively, and \$3,353 and \$2,935 for the nine months ended September 30, 2019 and 2018, respectively. With the new grants of restricted stock units and performance stock units during the nine months ended September 30, 2019, unrecognized compensation cost at September 30, 2019 related to nonvested awards was \$22,434 and \$6,906 for restricted stock units and performance stock units, respectively. The weighted-average period over which these costs are expected to be recognized at September 30, 2019 is 1.72 years for the restricted stock units and 2.41 years for the performance stock units.

At September 30, 2019, 3,841,617 shares of common stock were available for issuance under the 2017 Plan, after giving effect to the new grants as well as other minor activity during the nine months ended September 30, 2019. Activity related to the Company's stock options and restricted stock awards was not material for the nine months ended September 30, 2019.

20. 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. The weighted average number of common shares outstanding during the period for the computation of basic earnings per share excludes restricted stock awards that have legally been issued but are nonvested during the period, as the sale of these shares is prohibited pending satisfaction of certain vesting conditions by the award recipients in order to earn the rights to the shares.

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, if dilutive. Potential common shares reflect (1) unvested restricted stock awards and restricted stock units with service vesting conditions, (2) performance stock units with vesting conditions considered probable of achievement and (3) options to purchase common stock, all of which have been included in the diluted earnings per share calculation using the treasury stock method.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

The reconciliation from basic to diluted weighted average shares outstanding is as follows:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Weighted average shares outstanding – Basic	134,511,819	133,336,352	134,213,571	133,237,653
Dilutive effect of unvested common shares and restricted stock units with service conditions, performance stock units considered probable of vesting and assumed stock option exercises and conversions	1,137,891	1,239,810	1,091,799	985,975
Weighted average shares outstanding – Diluted	<u>135,649,710</u>	<u>134,576,162</u>	<u>135,305,370</u>	<u>134,223,628</u>

Basic and diluted earnings per share are calculated as follows:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Numerator:				
Net income attributable to PQ Group Holdings Inc.	\$ 26,713	\$ 14,185	\$ 60,438	\$ 30,181
Denominator:				
Weighted average shares outstanding – Basic	134,511,819	133,336,352	134,213,571	133,237,653
Weighted average shares outstanding – Diluted	135,649,710	134,576,162	135,305,370	134,223,628
Net income per share:				
Basic income per share	\$ 0.20	\$ 0.11	\$ 0.45	\$ 0.23
Diluted income per share	<u>\$ 0.20</u>	<u>\$ 0.11</u>	<u>\$ 0.45</u>	<u>\$ 0.22</u>

The table below presents the details of the Company's weighted average equity-based awards outstanding during each respective period that were excluded from the calculation of diluted earnings per share:

	Three months ended September 30,		Nine months ended September 30,	
	2019	2018	2019	2018
Restricted stock awards with performance only targets not yet achieved	1,537,572	1,709,463	1,601,474	1,719,775
Stock options with performance only targets not yet achieved	578,564	586,253	583,204	586,253
Anti-dilutive restricted stock awards, restricted stock units and performance stock units	—	—	—	18,076
Anti-dilutive stock options	863,063	760,766	863,063	668,596

Restricted stock awards and stock options with performance only vesting conditions were not included in the dilution calculation, as the performance targets have not been achieved nor were probable of achievement as of the end of the respective periods. On a weighted average basis, options to purchase 621,747 shares of common stock at \$16.97 per share for the three and nine months ended September 30, 2019 and 2018, 241,316 shares of common stock at \$17.50 per share for the three and nine months ended September 30, 2019 and 139,019 and 46,849 shares of common stock at \$17.50 per share for the three and nine months ended September 30, 2018, respectively, were excluded from the computation of diluted earnings per share for the respective periods, because the combination of the options' exercise price and remaining unamortized stock-based compensation expense was greater than the average market price of the common shares. The 621,747 stock options expire on October 2, 2027, while the 241,316 stock options expire on August 9, 2028. All of the options were outstanding as of September 30, 2019. Anti-dilutive awards are not included in the dilution calculation, as their inclusion would have the effect of increasing diluted income per share.

PQ GROUP HOLDINGS INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except share and per share amounts)
(unaudited)

21. Supplemental Cash Flow Information:

The following table presents supplemental cash flow information for the Company:

	Nine months ended September 30,	
	2019	2018
Cash paid during the period for:		
Income taxes, net of refunds	\$ 13,261	\$ 16,121
Interest ⁽¹⁾	82,349	83,612
Non-cash investing activity ⁽²⁾ :		
Capital expenditures acquired on account but unpaid as of the period end	13,265	10,624

⁽¹⁾ Excludes capitalized interest for the periods presented, as well as \$8,435 and \$4,279 of net interest proceeds on swaps designated as net investment hedges for the nine months ended September 30, 2019 and 2018, respectively, all of which is included within cash flows from investing activities in the Company's condensed consolidated statements of cash flows.

⁽²⁾ For the supplemental non-cash information on lease liabilities arising from obtaining right-of-use lease assets, see Note 12 to these condensed consolidated financial statements for additional details.

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the condensed consolidated balance sheets as of September 30, 2019 and 2018 to the total of the same amounts shown in the condensed consolidated statements of cash flows for the nine months then ended:

	September 30,	
	2019	2018
Cash and cash equivalents	\$ 78,510	\$ 56,684
Restricted cash included in prepaid and other current assets	1,745	1,333
Total cash, cash equivalents and restricted cash shown in the condensed consolidated statements of cash flows	<u>\$ 80,255</u>	<u>\$ 58,017</u>

22. Subsequent Events:

In October 2019, the Company settled all of its cross-currency interest rate swap arrangements (the "February 2018 swaps") and concurrently entered into new cross-currency interest rate swap arrangements (the "October 2019 swaps") with the same notional amount of €280,000 (\$311,379) and same maturity of February 2023. Consistent with the February 2018 swaps, the October 2019 swaps are designed to enable the Company to effectively convert a portion of its fixed-rate U.S. dollar-denominated debt obligations under the Term Loan Facility into a Euro-denominated equivalent. The October 2019 swaps have been designated and qualify as net investment hedges of the Company's foreign currency exchange rate exposure on the net investments of certain of its Euro-denominated subsidiaries. The settlement of the February 2018 swaps resulted in cash proceeds to the Company of \$38,070, which the Company plans to use for additional debt repayment on the Company's Term Loan Facility.

Other than the settlement of the February 2018 swaps and concurrent execution of the October 2019 swaps, the Company has evaluated subsequent events since the balance sheet date and determined that there are no additional items to disclose.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS.

Unless the context requires otherwise, references in this report to "PQ Group Holdings," "the company," "we," "us" or "our" refer to PQ Group Holdings Inc. and its consolidated subsidiaries.

Forward-looking Statements

This periodic report on Form 10-Q ("Form 10-Q") includes statements that express our opinions, expectations, beliefs, plans, objectives, assumptions or projections regarding future events or future results and therefore are, or may be deemed to be, "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 existing cash, cash equivalents and cash flow 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. These forward-looking statements are subject to a number of risks, uncertainties and assumptions. 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 herein 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;
- tariffs and trade disputes;
- legal and regulatory compliance;
- significant developments relating to the U.S. administration, U.S. courts' or the United Kingdom's referendum on membership in the European Union;
- 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 segment;
- reductions in highway safety spending or taxes earmarked for highway safety spending;
- seasonal fluctuations in demand for some of our products;
- retention of certain key personnel;
- realization of our growth projects;
- potential product liability claims;
- existing and potential future government regulation;
- the extensive environmental, health and safety regulations to which we are subject;
- disruption of production and distribution of our products;
- risk of loss beyond our available insurance coverage;
- product quality;

- successful integration of acquisitions;
- 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 set forth in Part I, “Item 1A. Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2018.

The forward-looking statements included herein 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 Form 10-Q to conform these statements to actual results or to changes in our expectations.

Overview

We are a leading integrated and innovative global provider of specialty catalysts, materials and chemicals, and services. We support customers globally through our strategically located network of manufacturing facilities. We believe that our products, which are predominantly inorganic, and services contribute to improving the sustainability of the environment.

We conduct operations through four reporting segments: (1) Refining Services, (2) Catalysts (including our 50% interest in the Zeolyst Joint Venture), (3) Performance Materials, and (4) Performance Chemicals.

Refining Services: We are the leading provider of sulfuric acid recycling services to North American refineries for the production of alkylate, an essential gasoline component for lowering vapor pressure and increasing octane to meet stringent gasoline specifications and fuel efficiency standards. We are also a leading North American producer of virgin sulfuric acid for water treatment, mining, and industrial applications.

Catalysts: We are a global supplier of finished silica catalysts and catalyst supports necessary to produce high strength and high stiffness plastics used in packaging films, bottles, containers, and other molded applications. We are also a leading global supplier of zeolites used for catalysts that remove nitric oxide from diesel engine emissions as well as sulfur from fuels during the refining process.

Performance Materials: We are an industry leader in North America, Europe, and South America in transportation safety. Our products are used to delineate roads and runways with highly reflective markings, improving safety by enhancing visibility at night and in poor weather. Our microspheres also serve as functional additives in industrial applications, including polymers and plastics, and in abrasive applications for metal surfaces.

Performance Chemicals: We are a leading global supplier of silicate and derivative products which serve as an environmentally friendly substitute for materials used in a variety of applications. These include end uses such as matting agents in surface coatings, clarifying agents for edible oils and beverages, additives into paints and coatings, and in cosmetics to improve feel attributes.

Effective March 1, 2019, we changed the structure of our internal organization to create the four independent businesses described above in order to promote increased visibility to business unit performance, optimize our product portfolio and create efficiencies. Previously, we had two reportable segments, namely the Environmental Catalysts and Services segment and the Performance Materials and Chemicals segment. Beginning with the quarter ended March 31, 2019, the segment results and disclosures included in our consolidated financial statements reflect the new segment structure for all periods presented. The changes to our segment structure affect only the manner in which the results of our reportable segments were previously reported; there are no changes to our consolidated balance sheet, statement of income or cash flows for the prior periods.

Key Performance Indicators

Adjusted EBITDA and Adjusted Net Income

Adjusted EBITDA and adjusted net income are financial measures that are not prepared in accordance with accounting principles generally accepted in the United States (“GAAP”) and that we use to evaluate our operating performance, for business planning purposes and to measure our performance relative to that of our competitors. Adjusted EBITDA and adjusted net income are presented as key performance indicators as we believe these financial measures 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, (ii) the impact of certain non-cash, nonrecurring or other items included in net income (loss) and EBITDA that we do not consider indicative of our ongoing operating performance, and (iii) depreciation, amortization and interest of our 50% share of the Zeolyst Joint Venture. Adjusted net income consists of net income (loss) attributable to PQ Group Holdings adjusted for (i) non-operating income or expense and (ii) the impact of certain non-cash, nonrecurring or other items included in net income (loss) that we do not consider indicative of our ongoing operating performance. We believe that these non-GAAP financial measures provide investors with 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.

You should not consider adjusted EBITDA and adjusted net income in isolation or as alternatives to the presentation of our financial results in accordance with GAAP. The presentation of our adjusted EBITDA and adjusted net income financial measures may differ from similar measures reported by other companies and may not be comparable to other similarly titled measures. In evaluating adjusted EBITDA and adjusted net income, 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 and adjusted net income should not be construed as an inference that our future results will be unaffected by unusual or nonrecurring items. Reconciliations of adjusted EBITDA and adjusted net income to GAAP net income (loss) are included in the results of operations discussion that follows for each of the respective periods.

Key Factors and Trends Affecting Operating Results and Financial Condition

Sales

Our Refining Services and Catalysts segments’ sales have grown primarily due to expansion into applications including emission control catalysts, polymer catalysts, and refining catalysts, as well as continued supply share gains. Sales in our Refining Services and Catalysts segments are made on both a purchase order basis and pursuant to long-term contracts.

Historically, our Performance Materials and Performance Chemicals segments have experienced relatively stable demand throughout economic cycles due to the diverse consumer and industrial end uses that our products serve. Expansions into new applications, including personal care and consumer cleaning, as well as share gains in existing end uses, have added to our sales growth. Product sales from our Performance Chemicals segment are made on both a purchase order basis and pursuant to long-term contracts. In the Performance Materials segment, 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 segment 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 for our Refining Services segment include spent sulfuric acid, sulfur, sodium silicates, acids, bases, and certain metals. The primary raw materials used in the manufacture of products in our Performance Materials, Performance Chemicals and Catalysts segments include soda ash, industrial sand, aluminum trihydrate, sodium hydroxide, and cullet.

Most of our Refining Services contracts feature take-or-pay volume protection and/or price adjustments for commodity inputs, labor, the Chemical Engineering Index (U.S. chemical plant construction cost index) and natural gas. Spent acid for our Refining Services segment is supplied by customers for a nominal charge as part of their contracts. Over 80% of our Refining Services segment sales for the year ended December 31, 2018 were under contracts featuring 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.

For the year ended December 31, 2018, approximately 40% of sales with our largest sodium silicate customers in North America were 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. Freight expenses are generally passed through directly to customers.

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 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.

Seasonality

Seasonal changes and weather conditions typically affect our Performance Materials and Refining Services segments. In particular, our Performance Materials segment generally experiences lower sales and profit in the first and fourth quarters of the year because highway striping projects typically occur during warmer weather months. Additionally, our Refining Services segment 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 second quarters of the year, which can adversely affect our liquidity and cash flows. Because of this seasonality associated with certain of our segments, 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.

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 40% of our sales for the nine months ended September 30, 2019 and the year ended December 31, 2018 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.

Results of Operations

Three Months Ended September 30, 2019 Compared to the Three Months Ended September 30, 2018

Highlights

The following is a summary of our financial performance for the three months ended September 30, 2019 compared with the three months ended September 30, 2018.

Sales

- Sales decreased \$3.4 million to \$423.8 million. The decrease in sales was primarily due to lower sales volumes and the unfavorable effects of foreign currency translation of \$5.2 million, partially offset by higher average customer prices and favorable mix.

Gross Profit

- Gross profit increased \$5.4 million to \$112.9 million. The increase in gross profit was primarily due to favorable pricing, which was partially offset by higher manufacturing costs and lower sales volumes.

Operating Income

- Operating income increased by \$8.7 million to \$57.6 million. The increase in operating income was primarily due to an increase in gross profit for the three months ended September 30, 2019.

Equity in Net Income of Affiliated Companies

- Equity in net income of affiliated companies for the three months ended September 30, 2019 was \$17.3 million, compared to \$5.6 million for the three months ended September 30, 2018. The increase of \$11.7 million was due to higher earnings generated by our Zeolyst Joint Venture for the three months ended September 30, 2019.

The following is our unaudited condensed consolidated statements of income and a summary of financial results for the three months ended September 30, 2019 and 2018:

	Three months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Sales	\$ 423.8	\$ 427.2	\$ (3.4)	(0.8)%
Cost of goods sold	310.9	319.7	(8.8)	(2.8)%
Gross profit	112.9	107.5	5.4	5.0%
Gross profit margin	26.6%	25.2%		
Selling, general and administrative expenses	39.5	42.1	(2.6)	(6.2)%
Other operating expense, net	15.7	16.5	(0.8)	(4.8)%
Operating income	57.6	48.9	8.7	17.8%
Operating income margin	13.6%	11.4%		
Equity in net (income) from affiliated companies	(17.3)	(5.6)	(11.7)	208.9%
Interest expense, net	27.7	28.2	(0.5)	(1.8)%
Debt extinguishment costs	1.8	0.9	0.9	100.0%
Other expense, net	1.9	2.5	(0.6)	(24.0)%
Income before income taxes and noncontrolling interest	43.5	22.9	20.6	90.0%
Provision for income taxes	16.7	8.5	8.2	96.5%
Effective tax rate	38.4%	37.0%		
Net income	26.8	14.4	12.4	86.1%
Less: Net income attributable to the noncontrolling interest	0.1	0.2	(0.1)	(50.0)%
Net income attributable to PQ Group Holdings Inc.	\$ 26.7	\$ 14.2	\$ 12.5	88.0%

Sales

	Three months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Sales:				
Refining Services	\$ 118.3	\$ 123.4	\$ (5.1)	(4.1)%
Catalysts	25.6	16.3	9.3	57.1%
Performance Materials	115.1	115.4	(0.3)	(0.3)%
Performance Chemicals	167.9	174.7	(6.8)	(3.9)%
Eliminations	(3.1)	(2.6)	(0.5)	
Total sales	\$ 423.8	\$ 427.2	\$ (3.4)	(0.8)%

Refining Services: Sales in Refining Services for the three months ended September 30, 2019 were \$118.3 million, a decrease of \$5.1 million, or 4.1%, compared to sales of \$123.4 million for the three months ended September 30, 2018. The decrease in sales was primarily due to lower sulfur pass-through costs of \$3.4 million.

Catalysts: Sales in Catalysts for the three months ended September 30, 2019 were \$25.6 million, an increase of \$9.3 million, or 57.1%, compared to sales of \$16.3 million for the three months ended September 30, 2018. The increase in sales was primarily due to an increase in volumes of \$7.9 million and higher average selling prices and favorable customer mix of \$1.6 million.

The increase in sales was due to the timing of customer order patterns for our methyl methacrylate catalyst and continued growth in polyolefin catalysts.

Performance Materials: Sales in Performance Materials for the three months ended September 30, 2019 were \$115.1 million, a decrease of \$0.3 million, or 0.3%, compared to sales of \$115.4 million for the three months ended September 30, 2018. The decrease in sales was primarily due to lower volumes of \$6.9 million and the unfavorable effects of foreign currency translation of \$2.1 million, which was offset by higher average selling price and favorable customer mix of \$8.7 million.

The decrease in sales volumes was a result of lower highway safety sales in North America and European demand for engineered glass products. This was offset by higher average selling prices for highway safety products sold in North America.

Performance Chemicals: Sales in Performance Chemicals for the three months ended September 30, 2019 were \$167.9 million, a decrease of \$6.8 million, or 3.9%, compared to sales of \$174.7 million for the three months ended September 30, 2018. The decrease in sales was primarily due to lower sales volumes of \$7.1 million and the unfavorable effects of foreign currency translation of \$3.1 million, which was partially offset by higher average selling price and favorable sales mix of \$3.4 million.

The decrease in sales was a result of lower volumes of product sold to the consumer products and packaging and engineered plastics end markets. The decrease in volumes was partially offset by higher pricing to cover raw material cost increases. The unfavorable effects of foreign currency translation was driven by the stronger U.S. dollar.

Gross Profit

Gross profit for the three months ended September 30, 2019 was \$112.9 million, an increase of \$5.4 million, or 5.0%, compared with \$107.5 million for the three months ended September 30, 2018. The increase in gross profit was due to favorable customer pricing of \$18.7 million, which was partially offset by lower volumes of \$4.2 million, unfavorable manufacturing costs of \$7.1 million and the unfavorable effects of foreign currency translation of \$1.2 million.

Favorable customer pricing was a result of a roll-off of a below-market contract in our regenerated sulfuric acid product line and higher average selling prices in North America for our highway safety products. The decrease in volumes was due to a decline in sulfuric acid sales and lower sales to the consumer products industry. The unfavorable change in manufacturing costs was driven by higher-cost products being sold in our Catalysts product group, the timing of plant maintenance projects and increased transportation costs. The unfavorable effects of foreign currency were driven by the stronger U.S. dollar.

Selling, General and Administrative Expenses

Selling, general and administrative expenses for the three months ended September 30, 2019 were \$39.5 million, a decrease of \$2.6 million compared with \$42.1 million for the three months ended September 30, 2018. The decrease in selling, general and administrative expenses was due to lower compensation-related expenses.

Other Operating Expense, Net

Other operating expense, net for the three months ended September 30, 2019 was \$15.7 million, a decrease of \$0.8 million, compared with \$16.5 million for the three months ended September 30, 2018. The decrease in other operating expense, net was due to a decrease in asset disposals, which typically occurs as a result of our recurring plant maintenance projects offset by higher transaction costs.

Equity in Net Income of Affiliated Companies

Equity in net income of affiliated companies for the three months ended September 30, 2019 was \$17.3 million, compared to \$5.6 million for the three months ended September 30, 2018. The increase was primarily due to \$11.7 million of higher earnings from our Zeolyst Joint Venture during the three months ended September 30, 2019 as compared to the three months ended September 30, 2018. The increase in earnings from our Zeolyst Joint Venture was due to timing of sales of hydrocracking catalysts and an acceleration of specialty catalyst orders.

Interest Expense, Net

Interest expense, net for the three months ended September 30, 2019 was \$27.7 million, a decrease of \$0.5 million, as compared with \$28.2 million for the three months ended September 30, 2018. The decrease in interest expense, net is due to lower outstanding balances on our variable rate debt during the three months ended September 30, 2019 as compared to the three months ended September 30, 2018.

Debt Extinguishment Costs

Debt extinguishment costs for the three months ended September 30, 2019 and 2018 were \$1.8 million and \$0.9 million, respectively. During the quarter ended September 30, 2019, the Company prepaid \$100.0 million of outstanding principal balance on the Term Loan Facility. The Company wrote off \$0.5 million of previously unamortized deferred financing costs and original issue discount of \$1.2 million as debt extinguishment costs for the three months ended September 30, 2019.

During the quarter ended September 30, 2018, the Company prepaid \$45.0 million of outstanding principal balance on the Term Loan Facility. The Company wrote off \$0.3 million of previously unamortized deferred financing costs and original issue discount of \$0.6 million as debt extinguishment costs for the three months ended September 30, 2018.

Other Expense, Net

Other expense, net for the three months ended September 30, 2019 was expense of \$1.9 million, a decrease of \$0.6 million, as compared with an expense of \$2.5 million for the three months ended September 30, 2018. The change in other expense, net was generally consistent with the prior period.

Provision for Income Taxes

The provision for income taxes for the three months ended September 30, 2019 was \$16.7 million compared to a \$8.5 million provision for the three months ended September 30, 2018. The effective income tax rate for the three months ended September 30, 2019 was 38.4% compared to 37.0% for the three months ended September 30, 2018.

The Company's effective income tax rate fluctuates based primarily on changes in income mix (including the effect of loss companies), the impact of including foreign earnings in U.S. taxable income and changes in foreign exchange gains and losses, which create permanent differences in certain jurisdictions.

The difference between the U.S. federal statutory income tax rate and the Company's effective income tax rate for the three months ended September 30, 2019 was mainly due to the tax effect of permanent differences related to foreign currency exchange gain or loss, the inclusion of foreign earnings in U.S. taxable income, pre-tax losses with no associated tax benefit and state taxes.

Net Income Attributable to PQ Group Holdings

For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net income attributable to PQ Group Holdings was \$26.7 million for the three months ended September 30, 2019 compared with net income of \$14.2 million for the three months ended September 30, 2018.

Adjusted EBITDA

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

	Three months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Segment Adjusted EBITDA: ⁽¹⁾				
Refining Services	\$ 51.2	\$ 49.6	\$ 1.6	3.2 %
Catalysts ⁽²⁾	31.6	15.7	15.9	101.3 %
Performance Materials	25.8	21.3	4.5	21.1 %
Performance Chemicals	36.8	41.8	(5.0)	(12.0)%
Total Segment Adjusted EBITDA ⁽³⁾	145.4	128.4	17.0	13.2 %
Unallocated corporate expenses	(7.7)	(10.3)	2.6	(25.2)%
Total Adjusted EBITDA	\$ 137.7	\$ 118.1	\$ 19.6	16.6 %

⁽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 Adjusted EBITDA from our Zeolyst Joint Venture included in the Catalysts segment is \$22.6 million for the three months ended September 30, 2019, which includes \$17.2 million of equity in net income, excluding \$1.7 million of amortization of investment in affiliate step-up plus \$3.7 million of joint venture depreciation, amortization and interest. The Adjusted EBITDA from our Zeolyst Joint Venture included in the Catalysts segment is \$10.5 million for the three months ended September 30, 2018, which includes \$5.6 million of equity in net income, excluding \$1.7 million of amortization of investment in affiliate step-up plus \$3.3 million of joint venture depreciation, amortization and interest.
- (3) Our total Segment Adjusted EBITDA differs from our total consolidated Adjusted EBITDA due to unallocated corporate expenses.

Refining Services: Adjusted EBITDA for the three months ended September 30, 2019 was \$51.2 million, an increase of \$1.6 million, or 3.2%, compared with \$49.6 million for the three months ended September 30, 2018. The increase in Adjusted EBITDA was a result of higher average selling price from customer mix.

Catalysts: Adjusted EBITDA for the three months ended September 30, 2019 was \$31.6 million, an increase of \$15.9 million, or 101.3%, compared with \$15.7 million for the three months ended September 30, 2018. The increase in Adjusted EBITDA was primarily a result of increased sales of our hydrocracking catalysts, specialty catalysts and methyl methacrylate catalyst.

Performance Materials: Adjusted EBITDA for the three months ended September 30, 2019 was \$25.8 million, an increase of \$4.5 million, or 21.1%, compared with \$21.3 million for the three months ended September 30, 2018. The increase in Adjusted EBITDA was a result of favorable pricing in North America, which was partially offset by increased manufacturing costs.

Performance Chemicals: Adjusted EBITDA for the three months ended September 30, 2019 was \$36.8 million, a decrease of \$5.0 million, or 12.0%, compared with \$41.8 million for the three months ended September 30, 2018. The decrease in Adjusted EBITDA was due to lower volumes of product sold to the consumer products and packaging and engineered plastics industries and the strengthening of the U.S. dollar.

A reconciliation of net income attributable to PQ Group Holdings to Segment Adjusted EBITDA is as follows:

	Three months ended September 30,	
	2019	2018
(in millions)		
Reconciliation of net income attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA		
Net income attributable to PQ Group Holdings Inc.	\$ 26.7	\$ 14.2
Provision for income taxes	16.7	8.5
Interest expense, net	27.7	28.2
Depreciation and amortization	44.2	43.8
EBITDA	115.3	94.7
Joint venture depreciation, amortization and interest ^(a)	3.7	3.3
Amortization of investment in affiliate step-up ^(b)	1.7	1.7
Debt extinguishment costs	1.8	0.9
Net loss on asset disposals ^(c)	1.1	5.2
Foreign currency exchange loss ^(d)	4.5	3.5
LIFO expense ^(e)	0.5	0.9
Transaction and other related costs ^(f)	0.7	0.2
Equity-based compensation	4.8	4.3
Restructuring, integration and business optimization expenses ^(g)	0.7	2.2
Defined benefit pension plan cost ^(h)	0.8	0.1
Other ⁽ⁱ⁾	2.1	1.1
Adjusted EBITDA	137.7	118.1
Unallocated corporate expenses	7.7	10.3
Segment Adjusted EBITDA	\$ 145.4	\$ 128.4

- ^(a) We use Adjusted EBITDA as a performance measure to evaluate our financial results. Because our Catalysts 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 combination of the businesses of PQ Holdings Inc. and Eco Services Operations LLC in May 2016 (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 fixed assets and intangible assets, including customer relationships and technical know-how.
- ^(c) 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.
- ^(d) Reflects the exclusion of the foreign currency transaction gains and losses in the statements of income which primarily relates to the non-permanent intercompany debt denominated in local currency translated to U.S. dollars.
- ^(e) Represents non-cash adjustments to the Company's LIFO reserves for certain inventories in the U.S. that are valued using the LIFO method, which we believe provides a means of comparison to other companies that may not use the same basis of accounting for inventories.
- ^(f) Relates to certain transaction costs, including debt financing, due diligence and other costs related to transactions that are completed, pending or abandoned, that we believe are not representative of our ongoing business operations.
- ^(g) Includes the impact of restructuring, integration and business optimization expenses which are incremental costs that are not representative of our ongoing business operations.

- (h) Represents adjustments for defined benefit pension plan costs in our statements of income. 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.
- (i) Other costs consist of certain expenses that are not core to our ongoing business operations, 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. Included in this line-item are rounding discrepancies that may arise from rounding from dollars (in thousands) to dollars (in millions).

Adjusted Net Income

Summarized adjusted net income information is shown below in the following table:

	Three months ended September 30,	
	2019	2018
(in millions)		
Reconciliation of net income attributable to PQ Group Holdings Inc. to Adjusted Net Income⁽¹⁾⁽²⁾		
Net income attributable to PQ Group Holdings Inc.	\$ 26.7	\$ 14.2
Amortization of investment in affiliate step-up ^(b)	1.1	0.9
Debt extinguishment costs	1.2	0.2
Net loss on asset disposals ^(c)	0.8	2.9
Foreign currency exchange loss ^(d)	3.9	4.0
LIFO expense ^(e)	0.4	0.3
Transaction and other related costs ^(f)	0.4	0.1
Equity-based compensation	3.2	2.2
Restructuring, integration and business optimization expenses ^(g)	0.5	1.2
Defined benefit pension plan cost (benefit) ^(h)	0.5	0.1
Other ⁽ⁱ⁾	1.4	0.4
Adjusted Net Income, including non-cash GILTI tax	\$ 40.1	\$ 26.5
Impact of non-cash GILTI tax ⁽³⁾	8.2	11.4
Impact of tax reform ⁽⁴⁾	—	(2.5)
Adjusted Net Income	\$ 48.3	\$ 35.4

(1) We define adjusted net income as net income attributable to PQ Group Holdings adjusted for non-operating income or expense and the impact of certain non-cash or other items that are included in net income that we do not consider indicative of our ongoing operating performance. Adjusted net income 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. Adjusted net income may not be comparable with net income or adjusted net income as defined by other companies.

(2) Refer to the Adjusted EBITDA notes above for more information with respect to each adjustment.

- (3) Amount represents the impact to tax expense in net income before non-controlling interest and the related adjustments to net income associated with the Global Intangible Low Taxed Income (“GILTI”) provisions of the Tax Cuts and Jobs Act of 2017 (“TCJA”). Beginning January 1, 2018, GILTI results in taxation of “excess of foreign earnings,” which is defined as amounts greater than a 10% rate of return on applicable foreign tangible asset basis. The Company is required to record incremental tax provision impact with respect to GILTI as a result of having historical U.S. net operating loss (“NOL”) amounts to offset the GILTI taxable income inclusion. This NOL utilization precludes us from recognizing foreign tax credits (“FTCs”) which would otherwise help offset the tax impacts of GILTI. No FTCs will be recognized with respect to GILTI until our cumulative NOL balance has been exhausted. Because the GILTI provision does not impact our cash taxes (given available U.S. NOLs), and given that we expect to recognize FTCs to offset GILTI impacts once the NOLs are exhausted, we do not view this item as a component of core operations.
- (4) Represents the provisional adjustment for the impact of the TCJA recorded in net income.

The adjustments to net income attributable to PQ Group Holdings Inc. are shown net of applicable tax rates as determined by the calculation of our quarterly tax provision under interim financial reporting for the three months ended September 30, 2019 and 2018, except for the foreign currency exchange loss and the effects of our sale of a non-core product line for which the taxes are calculated as discrete items using the applicable statutory income tax rates.

Results of Operations

Nine Months Ended September 30, 2019 Compared to the Nine Months Ended September 30, 2018

Highlights

The following is a summary of our financial performance for the nine months ended September 30, 2019 compared with the nine months ended September 30, 2018.

Sales

- Sales decreased \$13.4 million to \$1,214.7 million. The decrease in sales was primarily due to lower sales volumes and the unfavorable effects of foreign currency translation of \$26.8 million, partially offset by higher average customer prices and favorable mix.

Gross Profit

- Gross profit increased \$15.3 million to \$309.3 million. The increase in gross profit was primarily due to favorable pricing and product mix and lower depreciation expenses, which was partially offset by higher manufacturing costs and lower volumes.

Operating Income

- Operating income increased by \$31.2 million to \$157.3 million. The increase in operating income was due to a gain on the sale of a non-core product line of \$11.4 million and an increase in gross profit for the nine months ended September 30, 2019.

Equity in Net Income of Affiliated Companies

- Equity in net income of affiliated companies for the nine months ended September 30, 2019 was \$31.6 million, compared with \$31.1 million for the nine months ended September 30, 2018. The increase of \$0.5 million was due to increased earnings generated by our Zeolyst Joint Venture for the nine months ended September 30, 2019.

The following is our unaudited condensed consolidated statements of income and a summary of financial results for the nine months ended September 30, 2019 and 2018:

	Nine months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Sales	\$ 1,214.7	\$ 1,228.1	\$ (13.4)	(1.1)%
Cost of goods sold	905.4	934.1	(28.7)	(3.1)%
Gross profit	309.3	294.0	15.3	5.2 %
Gross profit margin	25.5%	23.9%		
Selling, general and administrative expenses	123.6	126.2	(2.6)	(2.1)%
Other operating expense, net	28.4	41.7	(13.3)	(31.9)%
Operating income	157.3	126.1	31.2	24.7 %
Operating income margin	13.0%	10.3%		
Equity in net (income) from affiliated companies	(31.6)	(31.1)	(0.5)	1.6 %
Interest expense, net	84.9	84.6	0.3	0.4 %
Debt extinguishment costs	1.8	6.7	(4.9)	(73.1)%
Other expense, net	1.8	13.1	(11.3)	(86.3)%
Income before income taxes and noncontrolling interest	100.4	52.8	47.6	90.2 %
Provision for income taxes	39.5	21.6	17.9	82.9 %
Effective tax rate	39.3%	40.9%		
Net income	60.9	31.2	29.7	95.2 %
Less: Net income attributable to the noncontrolling interest	0.5	1.0	(0.5)	(50.0)%
Net income attributable to PQ Group Holdings Inc.	\$ 60.4	\$ 30.2	\$ 30.2	100.0 %

Sales

	Nine months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Sales:				
Refining Services	\$ 341.5	\$ 336.2	\$ 5.3	1.6 %
Catalysts	62.3	50.2	12.1	24.1 %
Performance Materials	295.1	304.7	(9.6)	(3.2)%
Performance Chemicals	526.2	548.4	(22.2)	(4.0)%
Eliminations	(10.4)	(11.4)	1.0	
Total sales	\$ 1,214.7	\$ 1,228.1	\$ (13.4)	(1.1)%

Refining Services: Sales in Refining Services for the nine months ended September 30, 2019 were \$341.5 million, an increase of \$5.3 million, or 1.6%, compared to sales of \$336.2 million for the nine months ended September 30, 2018. The increase in sales was primarily due to favorable customer mix driving higher average selling prices of \$23.2 million, which offset lower sales volumes of \$17.9 million.

The favorable customer mix was driven by the roll-off of a below-market contract and other contract renewals in our regenerated sulfuric acid and virgin sulfuric acid product lines. The favorable customer mix more than offset a decrease in volumes due to decreased demand for virgin sulfuric acid and unexpected customer plant outages.

Catalysts: Sales in Catalysts for the nine months ended September 30, 2019 were \$62.3 million, an increase of \$12.1 million, or 24.1%, compared to sales of \$50.2 million for the nine months ended September 30, 2018. The increase in sales was primarily due to higher sales volumes of \$11.0 million and higher average selling price from product mix of \$2.5 million, which was partially offset by the unfavorable effects of foreign currency translation of \$1.4 million.

The change in sales was due to higher customer demand within our polyolefin catalysts product line, the timing of customer orders for methyl methacrylate catalyst and favorable product mix, which was offset by the unfavorable effects of foreign currency driven by the stronger U.S. dollar.

Performance Materials: Sales in Performance Materials for the nine months ended September 30, 2019 were \$295.1 million, a decrease of \$9.6 million, or 3.2%, compared with sales of \$304.7 million for the nine months ended September 30, 2018. The decrease in sales was primarily due to lower sales volume of \$20.4 million and the unfavorable effects of foreign currency translation of \$8.6 million, which was partially offset by higher average selling price and favorable customer mix of \$19.4 million.

The decrease in sales volumes was a result of unfavorable weather conditions in North America as well as lower European demand for engineered glass materials. The unfavorable effects of foreign currency translation was due to the stronger U.S. dollar as compared with the Euro. This was partially offset by higher average selling prices for products sold in North and Latin America.

Performance Chemicals: Sales in Performance Chemicals for the nine months ended September 30, 2019 were \$526.2 million, a decrease of \$22.2 million, or 4.0%, compared to sales of \$548.4 million for the nine months ended September 30, 2018. The decrease in sales was primarily due to the unfavorable effects of foreign currency translation of \$17.3 million and lower sales volumes of \$19.6 million, which was partially offset by higher average selling price and favorable mix of \$14.7 million.

The decrease in sales was a result of lower volumes sold to the consumer products and industrial and process chemicals industries and the unfavorable effects of foreign currency translation driven by the stronger U.S. dollar, which was partially offset by higher pricing to cover raw material cost increases.

Gross Profit

Gross profit for the nine months ended September 30, 2019 was \$309.3 million, an increase of \$15.3 million, or 5.2%, compared with \$294.0 million for the nine months ended September 30, 2018. The increase in gross profit was due to favorable customer pricing of \$59.8 million, favorable product mix of \$6.0 million and lower depreciation expense of \$2.6 million, which was partially offset by unfavorable manufacturing costs of \$25.8 million, lower volumes of \$20.6 million and the unfavorable effects of foreign currency translation of \$6.7 million.

Favorable customer pricing was a result of contract renewals and improved product mix. The unfavorable change in manufacturing costs was driven by increased production and transportation costs. The decrease in volumes was due to unplanned customer plant outages, lower virgin sulfuric acid demand and lower sales to the consumer products industry. The unfavorable effects of foreign currency were driven by the stronger U.S. dollar.

Selling, General and Administrative Expenses

Selling, general and administrative expenses for the nine months ended September 30, 2019 was \$123.6 million, a decrease of \$2.6 million as compared to \$126.2 million for the nine months ended September 30, 2018. The decrease in selling, general and administrative expenses was due to lower research and development expenditures.

Other Operating Expense, Net

Other operating expense, net for the nine months ended September 30, 2019 was \$28.4 million, a decrease of \$13.3 million, compared with \$41.7 million for the nine months ended September 30, 2018. The decrease in other operating expense, net was due to a \$11.4 million gain on disposition of assets related to a non-core product line and a decrease in asset disposals, which typically occur as a result of our recurring plant maintenance projects. During the nine months ended September 30, 2018, we recognized insurance recovery proceeds totaling \$2.5 million related to losses sustained as a result of Hurricane Harvey in August 2017 (of which \$1.6 million was recorded in other operating expense, net), and which claim was fully settled by the end of 2018.

Equity in Net Income of Affiliated Companies

Equity in net income of affiliated companies for the nine months ended September 30, 2019 was \$31.6 million, compared to \$31.1 million for the nine months ended September 30, 2018. The increase was primarily due to \$0.5 million of higher earnings from our Zeolyst Joint Venture during the nine months ended September 30, 2019.

Interest Expense, Net

Interest expense, net for the nine months ended September 30, 2019 was \$84.9 million, an increase of \$0.3 million, as compared with \$84.6 million for the nine months ended September 30, 2018. The increase in interest expense was due to higher interest rates on our variable rate debt.

Debt Extinguishment Costs

Debt extinguishment costs for the nine months ended September 30, 2019 and 2018 were \$1.8 million and \$6.7 million, respectively. During the nine months ended September 30, 2019, the Company prepaid \$100.0 million of outstanding principal balance on the Term Loan Facility. The Company wrote off \$0.5 million of previously unamortized deferred financing costs and original issue discount of \$1.2 million as debt extinguishment costs for the three months ended September 30, 2019.

On February 8, 2018, we refinanced our existing senior secured term loan facility with a new \$1,267.0 million senior secured term loan facility to reduce the applicable interest rates. We recorded \$2.1 million of new creditor and third-party financing fees as debt extinguishment costs for the nine months ended September 30, 2018. In addition, previously unamortized deferred financing costs of \$1.4 million and original issue discount of \$2.4 million associated with the existing senior secured term loan facility were written off as debt extinguishment costs for the nine months ended September 30, 2018.

During the nine months ended September 30, 2018, the Company prepaid \$45.0 million of outstanding principal balance on the Term Loan Facility. The Company wrote off \$0.9 million of previously unamortized deferred financing costs and original issue discount as debt extinguishment costs for the nine months ended September 30, 2018.

Other Expense, Net

Other expense, net for the nine months ended September 30, 2019 was an expense of \$1.8 million, a decrease of \$11.3 million, as compared with an expense of \$13.1 million for the nine months ended September 30, 2018. The change in other expense, net primarily consisted of a decrease of \$10.0 million related to foreign currency losses mainly driven by the February 8, 2018 refinancing of our Euro-denominated term loan and the non-permanent intercompany debt denominated in local currency and translated to U.S. dollars.

Provision for Income Taxes

The provision for income taxes for the nine months ended September 30, 2019 was \$39.5 million compared to a \$21.6 million provision for the nine months ended September 30, 2018. The effective income tax rate for the nine months ended September 30, 2019 was 39.3% compared to 40.9% for the nine months ended September 30, 2018.

The Company's effective income tax rate fluctuates based primarily on changes in income mix (including the effect of loss companies), the impact of including foreign earnings in U.S. taxable income and changes in foreign exchange gains and losses, which create permanent differences in certain jurisdictions.

The difference between the U.S. federal statutory income tax rate and the Company's effective income tax rate for the nine months ended September 30, 2019 was mainly due to the tax effect of permanent differences related to foreign currency exchange gain or loss, the inclusion of foreign earnings in U.S. taxable income, pre-tax losses with no associated tax benefit, the discrete tax effects of our sale of a non-core product line and state taxes.

Net Income Attributable to PQ Group Holdings

For the foregoing reasons and after the effect of the non-controlling interest in earnings of subsidiaries for each period presented, net income attributable to PQ Group Holdings was \$60.4 million for the nine months ended September 30, 2019 compared with net income of \$30.2 million for the nine months ended September 30, 2018.

Adjusted EBITDA

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

	Nine months ended September 30,		Change	
	2019	2018	\$	%
	(in millions, except percentages)			
Segment Adjusted EBITDA: ⁽¹⁾				
Refining Services	\$ 133.7	\$ 126.4	\$ 7.3	5.8 %
Catalysts ⁽²⁾	79.4	62.2	17.2	27.7 %
Performance Materials	65.5	61.9	3.6	5.8 %
Performance Chemicals	120.6	131.7	(11.1)	(8.4)%
Total Segment Adjusted EBITDA ⁽³⁾	399.2	382.2	17.0	4.4 %
Unallocated corporate expenses	(28.0)	(27.3)	(0.7)	2.6 %
Total Adjusted EBITDA	\$ 371.2	\$ 354.9	\$ 16.3	4.6 %

- (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 Adjusted EBITDA from our Zeolyst Joint Venture included in the Catalysts segment is \$48.6 million for the nine months ended September 30, 2019, which includes \$31.5 million of equity in net income, excluding \$5.9 million of amortization of investment in affiliate step-up plus \$11.2 million of joint venture depreciation, amortization and interest. The Adjusted EBITDA from our Zeolyst Joint Venture included in the Catalysts segment is \$45.2 million for the nine months ended September 30, 2018, which includes \$31.0 million of equity in net income, excluding \$5.0 million of amortization of investment in affiliate step-up plus \$9.2 million of joint venture depreciation, amortization and interest.
- (3) Our total Segment Adjusted EBITDA differs from our total consolidated Adjusted EBITDA due to unallocated corporate expenses.

Refining Services: Adjusted EBITDA for the nine months ended September 30, 2019 was \$133.7 million, an increase of \$7.3 million, or 5.8%, compared with \$126.4 million for the nine months ended September 30, 2018. The increase in Adjusted EBITDA was driven by customer mix due to the roll-off of a below-market contract and other contract renewals, partially offset by lower volumes from unplanned customer plant outages and the timing of insurance recovery proceeds recognized during the nine months ended September 30, 2018.

Catalysts: Adjusted EBITDA for the nine months ended September 30, 2019 was \$79.4 million, an increase of \$17.2 million, or 27.7%, compared with \$62.2 million for the nine months ended September 30, 2018. The increase in Adjusted EBITDA was a result of higher customer demand for our hydrocracking, specialty and polyolefin catalysts and the timing of customer orders for our methyl methacrylate catalyst product line, which was partially offset by lower emission control demand.

Performance Materials: Adjusted EBITDA for the nine months ended September 30, 2019 was \$65.5 million, an increase of \$3.6 million, or 5.8%, compared with \$61.9 million for the nine months ended September 30, 2018. The increase in Adjusted EBITDA was a result of improved pricing and product mix, which was offset by lower volumes due to unfavorable weather conditions in North America and higher manufacturing costs.

Performance Chemicals: Adjusted EBITDA for the nine months ended September 30, 2019 was \$120.6 million, a decrease of \$11.1 million, or 8.4%, compared with \$131.7 million for the nine months ended September 30, 2018. The decrease in Adjusted EBITDA was due to lower volumes of product sold to the consumer products and industrial and process chemicals industries and the strengthening of the U.S. dollar, which was partially offset by favorable product mix.

A reconciliation of net income attributable to PQ Group Holdings to Segment Adjusted EBITDA is as follows:

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Reconciliation of net income attributable to PQ Group Holdings Inc. to Segment Adjusted EBITDA		
Net income attributable to PQ Group Holdings Inc.	\$ 60.4	\$ 30.2
Provision for income taxes	39.5	21.6
Interest expense, net	84.9	84.6
Depreciation and amortization	135.2	139.3
EBITDA	320.0	275.7
Joint venture depreciation, amortization and interest ^(a)	11.2	9.2
Amortization of investment in affiliate step-up ^(b)	5.9	5.0
Amortization of inventory step-up ^(c)	—	1.6
Debt extinguishment costs	1.8	6.7
Net (gain) loss on asset disposals ^(d)	(7.7)	11.1
Foreign currency exchange loss ^(e)	5.4	15.3
LIFO expense ^(f)	10.8	5.9
Transaction and other related costs ^(g)	1.7	0.9
Equity-based compensation	13.6	11.9
Restructuring, integration and business optimization expenses ^(h)	1.4	5.7
Defined benefit pension plan cost ⁽ⁱ⁾	2.4	0.3
Other ^(j)	4.7	5.6
Adjusted EBITDA	371.2	354.9
Unallocated corporate expenses	28.0	27.3
Segment Adjusted EBITDA	\$ 399.2	\$ 382.2

^(a) We use Adjusted EBITDA as a performance measure to evaluate our financial results. Because our Catalysts 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 fixed assets and intangible assets, including customer relationships and technical know-how.

^(c) As a result of the Sovitec acquisition there was a step-up in the fair value of inventory, which is amortized through cost of goods sold in the statements of income.

^(d) 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. During the nine months ended September 30, 2019, net (gain) loss on asset disposals reflects the gain related to the sale of a non-core product line.

^(e) Reflects the exclusion of the foreign currency transaction gains and losses in the statements of income primarily related to the non-permanent intercompany debt denominated in local currency translated to U.S. dollars during 2019 and primarily related to the Euro denominated term loan (which was settled as part of the February 2018 term loan refinancing) and the non-permanent intercompany debt denominated in local currency translated to U.S. dollars during 2018.

^(f) Represents non-cash adjustments to the Company's LIFO reserves for certain inventories in the U.S. that are valued using the LIFO method, which we believe provides a means of comparison to other companies that may not use the same basis of accounting for inventories.

^(g) Relates to certain transaction costs, including debt financing, due diligence and other costs related to transactions that are completed, pending or abandoned, that we believe are not representative of our ongoing business operations.

- (h) Includes the impact of restructuring, integration and business optimization expenses which are incremental costs that are not representative of our ongoing business operations.
- (i) Represents adjustments for defined benefit pension plan costs in our statements of income. 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, 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. Included in this line-item are rounding discrepancies that may arise from rounding from dollars (in thousands) to dollars (in millions).

Adjusted Net Income

Summarized adjusted net income information is shown below in the following table:

	Nine months ended September 30,	
	2019	2018
(in millions)		
Reconciliation of net income attributable to PQ Group Holdings Inc. to Adjusted Net Income⁽¹⁾⁽²⁾		
Net income attributable to PQ Group Holdings Inc.	\$ 60.4	\$ 30.2
Amortization of investment in affiliate step-up ^(b)	3.8	3.1
Amortization of inventory step-up ^(c)	—	1.0
Debt extinguishment costs	1.2	4.3
Net (gain) loss on asset disposals ^(d)	(6.1)	6.9
Foreign currency exchange loss ^(e)	6.0	12.0
LIFO expense ^(f)	7.0	3.6
Transaction and other related costs ^(g)	1.1	0.6
Equity-based compensation	8.8	7.3
Restructuring, integration and business optimization expenses ^(h)	0.9	3.5
Defined benefit pension plan cost ⁽ⁱ⁾	1.6	0.2
Other ^(j)	3.2	3.3
Adjusted Net Income, including non-cash GILTI tax	<u>\$ 87.9</u>	<u>\$ 76.0</u>
Impact of non-cash GILTI tax ⁽³⁾	19.3	19.0
Impact of tax reform ⁽⁴⁾	—	(1.5)
Adjusted Net Income	<u>\$ 107.2</u>	<u>\$ 93.5</u>

(1) We define adjusted net income as net income attributable to PQ Group Holdings adjusted for non-operating income or expense and the impact of certain non-cash or other items that are included in net income that we do not consider indicative of our ongoing operating performance. Adjusted net income 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. Adjusted net income may not be comparable with net income or adjusted net income as defined by other companies.

(2) Refer to the Adjusted EBITDA notes above for more information with respect to each adjustment.

- (3) Amount represents the impact to tax expense in net income before non-controlling interest and the related adjustments to net income associated with the GILTI provisions of the TCJA. Beginning January 1, 2018, GILTI results in taxation of “excess of foreign earnings,” which is defined as amounts greater than a 10% rate of return on applicable foreign tangible asset basis. The Company is required to record incremental tax provision impact with respect to GILTI as a result of having historical U.S. NOL amounts to offset the GILTI taxable income inclusion. This NOL utilization precludes us from recognizing FTCs which would otherwise help offset the tax impacts of GILTI. No FTCs will be recognized with respect to GILTI until our cumulative NOL balance has been exhausted. Because the GILTI provision does not impact our cash taxes (given available U.S. NOLs), and given that we expect to recognize FTCs to offset GILTI impacts once the NOLs are exhausted, we do not view this item as a component of core operations.
- (4) Represents the provisional adjustment for the impact of the TCJA recorded in net income.

The adjustments to net income attributable to PQ Group Holdings Inc. are shown net of applicable tax rates of 34.9% and 38.2% for the nine months ended September 30, 2019 and 2018, respectively, except for the foreign currency exchange loss and the effects of our sale of a non-core product line for which the taxes are calculated as discrete items using the applicable statutory income tax rates.

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 of funds. 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 of business, which include spending on maintenance and health, safety and environmental initiatives as well as growth, which includes spending to drive organic sales growth and cost savings initiatives.

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 September 30, 2019, we had cash and cash equivalents of \$78.5 million and availability of \$170.1 million under our asset based lending revolving credit facility, after giving effect to \$20.0 million of outstanding letters of credit and \$0.0 million of revolving credit facility borrowings, for a total available liquidity of \$248.6 million. As of September 30, 2019, we were in compliance with all covenants under our debt agreements.

Included in our cash and cash equivalents balance as of September 30, 2019 was \$39.2 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. Depending on domestic and foreign cash balances, we have certain flexibility to repatriate funds in order to meet those needs. Specifically, we have an intercompany loan structure in place with several of our foreign subsidiaries that allows us to repatriate foreign cash in a tax efficient manner from those subsidiaries. In certain cases, the repatriation of foreign cash under previous U.S. tax law had generally been subject to U.S. income taxes at the time of cash distribution. Due to the enactment of the TCJA in December 2017, future overseas earnings repatriation will generally no longer be subject to U.S. federal income taxes at the time of cash distribution. However, future foreign earnings may still be taxed for state income tax purposes, as well as subject to certain foreign withholding tax obligations, when cash amounts are distributed back to the U.S.

As of September 30, 2019, our total indebtedness was \$2,043.3 million, with up to \$170.1 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 paid for the nine months ended September 30, 2019 and 2018 was approximately \$82.3 million and \$83.6 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 \$10.7 million on interest expense. We hedge the interest rate fluctuations on debt obligations through interest rate cap agreements. As of September 30, 2019, we had interest rate caps on \$1.0 billion of notional variable debt with a cap rate of 3.0%.

Cash Flow

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Net cash provided by (used in):		
Operating activities	\$ 181.9	\$ 166.0
Investing activities	(54.7)	(95.8)
Financing activities	(103.2)	(77.8)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(3.4)	(1.6)
Net change in cash, cash equivalents and restricted cash	20.6	(9.2)
Cash, cash equivalents and restricted cash at beginning of period	59.7	67.2
Cash, cash equivalents and restricted cash at end of period	\$ 80.3	\$ 58.0

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Net income	\$ 60.9	\$ 31.2
Non-cash and non-working capital related activities ⁽¹⁾	149.7	190.4
Changes in working capital	(21.5)	(43.1)
Other operating activities	(7.2)	(12.5)
Net cash provided by operating activities	\$ 181.9	\$ 166.0

⁽¹⁾ Includes depreciation, amortization, charges related to purchase accounting fair value adjustments, amortization of deferred financing costs and original issue discount, debt extinguishment costs, foreign currency exchange gains and losses, deferred income tax provision (benefit), net (gains) losses on asset disposals, stock compensation expense, net interest proceeds on swaps designated as net investment hedges (which is reflected below in net cash used in investing activities) and equity in net income and dividends received from affiliated companies.

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Working capital changes that provided (used) cash:		
Receivables	\$ (22.5)	\$ (43.1)
Inventories	(1.8)	8.8
Prepays and other current assets	0.3	(1.6)
Accounts payable	(4.1)	(7.6)
Accrued liabilities	6.6	0.4
	\$ (21.5)	\$ (43.1)

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Purchases of property, plant and equipment	\$ (91.7)	\$ (95.3)
Investment in affiliated companies	—	(5.0)
Business combinations, net of cash acquired	—	(1.0)
Net interest proceeds on swaps designated as net investment hedges	8.4	4.3
Proceeds from sale of product line	28.0	—
Other, net	0.6	1.2
Net cash used in investing activities	<u>\$ (54.7)</u>	<u>\$ (95.8)</u>

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Net revolving credit facilities borrowings	\$ 1.3	\$ (23.5)
Net cash repayments on debt obligations	(105.8)	(53.0)
Other financing activities	1.3	(1.3)
Net cash used in financing activities	<u>\$ (103.2)</u>	<u>\$ (77.8)</u>

Net cash provided by operating activities was \$181.9 million for the nine months ended September 30, 2019, compared to \$166.0 million provided for the nine months ended September 30, 2018. Cash generated by net income plus non-cash and non-working capital related activities was lower during the nine months ended September 30, 2019 by \$11.2 million compared to the same period in the prior year. The change in working capital during the nine months ended September 30, 2019 was favorable compared to the nine months ended September 30, 2018. Cash used to fund working capital was \$21.5 million and \$43.1 million for the nine months ended September 30, 2019 and 2018, respectively.

The decrease in cash generated by net income plus non-cash and non-working capital related activities of \$11.2 million as compared to the prior year period was primarily due to lower dividends received from affiliated companies and net interest income on our cross-currency swaps.

The increase in cash from working capital of \$21.6 million as compared to the prior year was primarily due to favorable changes in accounts receivable, prepaid and other current assets, accounts payable and accrued liabilities, which was partially offset by unfavorable changes in inventory.

The favorable change in accounts receivable was due to Refining Services timing of customer payments and lower highway safety product group sales in our Performance Materials product group. The favorable change in accrued liabilities was primarily due to the timing of various expenses. The favorable change in accounts payable was a result of timing of vendor payments. The unfavorable change in inventory was due to an inventory build to support anticipated future sales.

Net cash used in investing activities was \$54.7 million for the nine months ended September 30, 2019, compared to cash used of \$95.8 million during the same period in 2018. Cash used in investing activities primarily consisted of utilizing \$91.7 million and \$95.3 million to fund capital expenditures during the nine months ended September 30, 2019 and 2018, respectively. During the nine months ended September 30, 2019, we received proceeds of \$28.0 million related to the sale of a non-core product line and received \$8.4 million in interest proceeds related to our cross-currency swaps.

Net cash used in financing activities was \$103.2 million for the nine months ended September 30, 2019, compared to net cash used of \$77.8 million during the same period in 2018. Net cash used in financing activities was primarily driven by \$100.0 million in long-term debt repayments on our Term Loan Facility offset by \$1.3 million of net borrowings under our revolving credit facilities made through the nine months ended September 30, 2019. Net cash used by financing activities for the nine months ended September 30, 2018 was mainly due to \$23.5 million of net borrowings under our revolving credit facility partially offset by the net impact of the term loan refinancing (including debt issuance costs).

Debt

	September 30, 2019	December 31, 2018
	(in millions)	
Term Loan Facility	\$ 1,057.5	\$ 1,157.5
6.75% Senior Secured Notes due 2022	625.0	625.0
5.75% Senior Unsecured Notes due 2025	295.0	300.0
ABL Facility	—	—
Other	65.8	65.9
Total debt	2,043.3	2,148.4
Original issue discount	(15.4)	(18.6)
Deferred financing costs	(13.0)	(15.9)
Total debt, net of original issue discount and deferred financing costs	2,014.9	2,114.0
Less: current portion	(8.2)	(7.2)
Total long-term debt, excluding current portion	<u>\$ 2,006.7</u>	<u>\$ 2,106.8</u>

As of September 30, 2019, our total debt was \$2,043.3 million, including \$14.0 million of other foreign debt and \$51.8 million of notes payable for the New Market Tax Credit financing and excluding the original issue discount of \$15.4 million and deferred financing fees of \$13.0 million for our senior secured credit facilities and notes. Our net debt as of September 30, 2019 was \$1,964.8 million, including cash and cash equivalents of \$78.5 million. On August 7, 2019, we prepaid \$100.0 million of outstanding principal balance on the Term Loan Facility. We may seek, subject to market conditions and other factors, opportunities to repurchase, refinance or otherwise reprice our debt.

Capital Expenditures

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

	Nine months ended September 30,	
	2019	2018
	(in millions)	
Maintenance capital expenditures	\$ 58.1	\$ 61.8
Growth capital expenditures	21.9	22.8
Total capital expenditures	<u>\$ 80.0</u>	<u>\$ 84.6</u>

Capital expenditures remained at a level sufficient for required maintenance and certain expansion growth initiatives during these periods. Maintenance capital expenditures are lower in the nine months ended September 30, 2019 as compared to the nine months ended September 30, 2018 due to fewer plant maintenance projects incurred during the period. Growth capital expenditures are lower in the nine months ended September 30, 2019 as compared to the nine months ended September 30, 2018 due to decreased spending to expand capacity at our production facilities.

Pension Funding

We paid \$8.9 million and \$6.4 million in cash contributions into our defined benefit pension plans and other post-retirement plans during the nine months ended September 30, 2019 and 2018, respectively. The net periodic pension expense was \$2.7 million and \$0.3 million for those same periods, respectively.

Off-Balance Sheet Arrangements

We had \$20.0 million of outstanding letters of credit on our ABL Facility as of September 30, 2019.

Contractual Obligations

Information related to our contractual obligations at December 31, 2018 can be found in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on March 1, 2019, which we refer to as our Annual Report on Form 10-K. During the nine months ended September 30, 2019, there have been no significant changes to our contractual obligations as disclosed in our Annual Report on Form 10-K.

Critical Accounting Policies and Estimates

We prepare our condensed consolidated financial statements in conformity with GAAP and our significant accounting policies are described in Note 2 to our audited consolidated financial statements included in our Annual Report on Form 10-K. 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 evaluate our critical accounting estimates, assumptions and judgments on an ongoing basis.

There has been no material change in our critical accounting policies and use of estimates from those described in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” included in our Annual Report on Form 10-K.

Accounting Standards Not Yet Adopted

See Note 2 to our unaudited condensed consolidated financial statements for a discussion of recently issued accounting standards and their effect on us.

ITEM 3. 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.

There have been no material changes in the foreign exchange risk, interest rate risk, commodity risk or credit risk discussed in Item 7A., “Quantitative and Qualitative Disclosures about Market Risk,” included in our Annual Report on Form 10-K.

ITEM 4. CONTROLS AND PROCEDURES.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of September 30, 2019, the end of the period covered by this Quarterly Report on Form 10-Q.

The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (“Exchange Act”), means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at a reasonable assurance level.

Changes in Internal Control Over Financial Reporting

No changes in our internal control over financial reporting occurred during the quarter ended September 30, 2019 that materially affected, or which are reasonably likely to materially affect, our internal control over financial reporting.

PART II—OTHER INFORMATION**ITEM 1. 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.

ITEM 1A. RISK FACTORS.

There has been no material change from the risk factors described in our Annual Report on Form 10-K.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS.*Tax Withholdings*

The following table contains information about shares of common stock delivered to the Company by employees to satisfy income tax withholding obligations of the employees in connection with the vesting of restricted stock units and restricted stock awards during the third quarter of 2019:

	Total Number of Shares of Common Stock Purchased	Average Price Paid per Share of Common Stock	Total Number of Shares of Common Stock Purchased as Part of Publicly Announced Plans or Programs	Maximum Number (or Dollar Value) of Shares of Common Stock that May Yet Be Purchased Under the Plans or Programs
July 1, 2019—July 31, 2019	11,445	\$ 15.97	N/A	N/A
August 1, 2019—August 31, 2019	46,441	\$ 15.36	N/A	N/A
September 1, 2019—September 30, 2019	—	—	N/A	N/A
	<u>57,886</u>			

ITEM 6. EXHIBITS.

The following exhibits are being filed or furnished as part of this Quarterly Report on Form 10-Q:

Exhibit No.	Description
31.1	Certification of Chief Executive Officer of PQ Group Holdings Inc. pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2	Certification of Chief Financial Officer of PQ Group Holdings Inc. pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1	Certification of Chief Executive Officer of PQ Group Holdings Inc. pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2	Certification of Chief Financial Officer of PQ Group Holdings Inc. pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101	The following materials from the Quarterly Report on Form 10-Q of PQ Group Holdings Inc. for the quarter ended September 30, 2019, formatted in Inline XBRL: (i) Condensed Consolidated Statements of Income, (ii) Condensed Consolidated Statements of Comprehensive Income, (iii) Condensed Consolidated Balance Sheets, (iv) Condensed Consolidated Statements of Stockholders' Equity, (v) Condensed Consolidated Statements of Cash Flows, (vi) Notes to Condensed Consolidated Financial Statements and (vii) document and entity information, tagged as blocks of text and including detailed tags
104	The cover page from the Quarterly Report on Form 10-Q of PQ Group Holdings Inc. for the quarter ended September 30, 2019, formatted in Inline XBRL and included as Exhibit 101

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

PQ GROUP HOLDINGS INC.

Date: November 5, 2019

By: /s/ MICHAEL CREWS

Michael Crews

Executive Vice President and Chief Financial Officer

(Duly Authorized Officer and Principal Financial and Accounting Officer)

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO SECTION 302 OF THE
SARBANES-OXLEY ACT OF 2002**

I, Belgacem Chariag, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PQ Group Holdings Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 5, 2019

/s/ BELGACEM CHARIAG

Belgacem Chariag

Chief Executive Officer, President and Director

(Principal Executive Officer)

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO SECTION 302 OF THE
SARBANES-OXLEY ACT OF 2002**

I, Michael Crews, certify that:

1. I have reviewed this quarterly report on Form 10-Q of PQ Group Holdings Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 5, 2019

/s/ MICHAEL CREWS

Michael Crews

Executive Vice President and Chief Financial Officer
(Principal Financial Officer)

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the quarterly report of PQ Group Holdings Inc. (the "Company") on Form 10-Q for the quarterly period ended September 30, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Belgacem Chariag, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934;
and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 5, 2019

/s/ BELGACEM CHARIAG

Belgacem Chariag

Chief Executive Officer, President and Director

(Principal Executive Officer)

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the quarterly report of PQ Group Holdings Inc. (the "Company") on Form 10-Q for the quarterly period ended September 30, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Michael Crews, Executive Vice President and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934;
and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 5, 2019

/s/ MICHAEL CREWS

Michael Crews

Executive Vice President and Chief Financial Officer

(Principal Financial Officer)