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

FORM 10-K

[X] ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 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 001-12019

QUAKER CHEMICAL CORPORATION
(Exact name of Registrant as specified in its charter)

A Pennsylvania Corporation	**No. 23-0993790**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
901 E. Hector Street, Conshohocken, Pennsylvania	**19428-2380**
(Address of principal executive offices)	**(Zip Code)**

Registrant’s telephone number, including area code: (610) 832-4000

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $1 par value	KWR	New York Stock Exchange

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

None

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒No ☐

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐No ☒

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 emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒	Accelerated filer ☐
Non-accelerated filer ☐	Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the Registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided 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 Act). Yes ☐No ☒

State the aggregate market value of the voting and non-voting common equity held by non-affiliates by reference to the price at which the common equity was last sold as of the last business day of the Registrant’s most recently completed second fiscal quarter. (The aggregate market value is computed by reference to the last reported sale on the New York Stock Exchange on June 30, 2019): $2,671,540,476

Indicate the number of shares outstanding of each of the Registrant’s classes of common stock, as of the latest practicable date: 17,732,818 shares of Common Stock, $1.00 Par Value, as of February 29, 2020.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant’s definitive Proxy Statement relating to the 2020 Annual Meeting of Shareholders are incorporated by reference into Part III.

QUAKER CHEMICAL CORPORATION
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PART I

As used in this Annual Report on Form 10-K (the "Report"), the terms "Quaker", "Quaker Houghton", the "Company", "we", and "our" refer to Quaker Chemical Corporation (doing business as Quaker Houghton), its subsidiaries, and associated companies, unless the context otherwise requires. As used in this Report, the term Legacy Quaker refers to the Company prior to the closing of its combination with Houghton International, Inc. ("Houghton") (herein referred to as the "Combination") on August 1, 2019. Throughout the Report, all figures presented, unless otherwise stated, reflect the results of operations of Legacy Quaker for the years ended, and as of, December 31, 2017 and 2018, and the first seven months of 2019, and includes the results of operations of Houghton, and therefore the combined company, Quaker Houghton, for the last five months of 2019, and as of December 31, 2019.

Item 1. *Business.*

Houghton Combination

On August 1, 2019, the Company completed the Combination and acquired all of the issued and outstanding shares of Houghton from Gulf Houghton Lubricants, Ltd. ("Gulf") and certain other selling shareholders in exchange for a combination of cash and shares of the Company's common stock in accordance with the share purchase agreement dated April 4, 2017 (the "Share Purchase Agreement"). Houghton is a leading global provider of specialty chemicals and technical services for metalworking and other industrial applications, and, the combination with Quaker creates a leading global supplier of industrial process fluids. The shares were bought for an aggregate purchase consideration consisting of: (i) $170.8 million in cash; (ii) the issuance of approximately 4.3 million shares of the Company's common stock, $1.00 par value per share, comprising approximately 24.5% of the common stock outstanding upon the closing of the Combination; and (iii) the Company's refinancing of Houghton's net indebtedness as of the closing of the Combination of approximately $702.6 million.

The Combination was subject to certain regulatory and shareholder approvals. At a shareholder meeting held during 2017, the Company's shareholders approved the issuance of new shares of the Company's common stock at closing of the Combination. Also in 2017, the Company received regulatory approvals for the Combination from China and Australia. The Company received regulatory approval from the European Commission ("EC") during the second quarter of 2019 and the U.S. Federal Trade Commission ("FTC") in July 2019. The approvals from the FTC and the EC required the concurrent divestiture of certain steel and aluminum related product lines of Houghton, which were sold by Houghton on August 1, 2019 for approximately $37 million in cash. The final remedy agreed with the EC and the FTC was consistent with the Company's previous expectation that the total divested product lines would be approximately 3% of the combined company's net sales.

General Description

The Company was organized in 1918 and incorporated as a Pennsylvania business corporation in 1930. Quaker Houghton develops, produces, and markets a broad range of formulated specialty chemical products and offers chemical management services ("Fluidcare") for various industrial and manufacturing applications throughout its four segments: Americas; Europe, Middle East and Africa ("EMEA"); Asia/Pacific; and Global Specialty Businesses. The Combination increased the Company's addressable metalworking, metals and industrial end markets, which include steel, aluminum, aerospace, defense, transportation-original equipment manufacturer ("OEM"), transportation-components, offshore sub-sea energy, architectural aluminum, construction, tube and pipe, can and container, mining, specialty coatings and specialty greases. The Combination also strengthened the product portfolio of the combined Company. The major product lines of Quaker Houghton include metal removal fluids, cleaning fluids, corrosion inhibitors, metal drawing and forming fluids, die cast mold releases, heat treatment and quenchants, metal forging fluids, hydraulic fluids, specialty greases, offshore sub-sea energy control fluids, rolling lubricants, rod and wire drawing fluids and surface treatment chemicals. The following are the respective contributions to consolidated net sales of each product line based on the Company's current major product line segmentation, representing approximately 10% or more of consolidated net sales for any of the past three years:

	2019	2018	2017
Rolling lubricants	21.9 %	25.5 %	26.7 %
Metal removal fluids	19.9 %	15.4 %	15.1 %
Hydraulic fluids	13.0 %	13.0 %	13.7 %

Other Acquisition Activity

On October 1, 2019, the Company completed its acquisition of the operating divisions of Norman Hay plc ("Norman Hay"), a private U.K. company that provides specialty chemicals, operating equipment, and services to industrial end markets. The original purchase price was 80.0 million GBP, on a cash-free and debt-free basis, subject to routine and customary post-closing adjustments related to working capital and net indebtedness levels. The Company expects to finalize its post-closing adjustments for the Norman Hay acquisition in the first half of 2020. Cash paid for Norman Hay in the fourth quarter of 2019 was approximately $95.3 million, net of cash acquired.

Sales Revenue

A substantial portion of the Company's sales worldwide are made directly through its own employees and its Fluidcare programs, with the balance being handled through distributors and agents. The Company's employees visit the plants of customers regularly, work on site, and, through training and experience, identify production needs which can be resolved or otherwise addressed either by utilizing the Company's existing products or by applying new formulations developed in its laboratories.

The Company recognizes revenue in an amount that reflects the consideration to which the Company expects to be entitled in exchange for the goods or services transferred to its customers. To do this, the Company applies a five-step model that requires the Company to: (i) identify the contract with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when, or as, the Company satisfies a performance obligation.

As part of the Company's Fluidcare programs, certain third-party product sales to customers are managed by the Company. Where the Company acts as principal, revenues are recognized on a gross reporting basis at the selling price negotiated with its customers. Where the Company acts as an agent, such revenue is recorded using the net reporting method and generally reflects the administrative fee earned by the Company for ordering the goods. The Company transferred third-party products under arrangements resulting in net reporting of $48.0 million, $47.1 million and $44.5 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Competition

The specialty chemical industry comprises a number of companies similar in size to the Company, as well as companies larger and smaller than Quaker Houghton. The Company cannot readily determine its precise position in every industry it serves. However, the Company estimates it holds a leading global position in the market for industrial process fluids including significant global positions in the markets for process fluids in portions of the automotive and industrial markets, and a leading position in the market for process fluids to produce sheet steel and aluminum. The offerings of many of our competitors differ from those of Quaker Houghton. For example, some offer a broad portfolio of fluids, including general lubricants, while others have more specialized product ranges. All competitors provide different levels of technical services to individual customers. Competition in the industry is based primarily on the ability to supply products that meet the needs of the customer and provide technical services and laboratory assistance to the customer, and to a lesser extent on price.

Major Customers and Markets

In 2019, Quaker Houghton's five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) accounted for approximately 12% of consolidated net sales, with its largest customer accounting for approximately 6% of consolidated net sales. A significant portion of the Company's revenues are realized from the sale of process fluids and services to manufacturers of steel, aluminum, automobiles, aircraft, industrial equipment, and durable goods, and, therefore, Quaker Houghton is subject to the same business cycles as those experienced by these manufacturers and their customers. The Company's financial performance is generally correlated to the volume of global production within the industries it serves, rather than discretely related to the financial performance of its customers. Furthermore, steel and aluminum customers typically have limited manufacturing locations compared to metalworking customers and generally use higher volumes of products at a single location.

Raw Materials

Quaker Houghton uses over 1,000 raw materials, including mineral oils, animal fats, vegetable oils, ethylene, solvents, surfactant agents, various chemical compounds that act as additives to our base formulations, and a wide variety of other organic and inorganic compounds, along with various derivatives of the foregoing. The price of mineral oil and its derivatives can be affected by the price of crude oil and industry refining capacity. Animal fat and vegetable oil prices, as well as the prices of other raw materials, are impacted by their own unique supply and demand factors, as well as by biodiesel consumption which is also affected by the price of crude oil. Accordingly, significant fluctuations in the price of crude oil could have a material impact on the cost of these raw materials. In addition, many of the raw materials used by Quaker Houghton are commodity chemicals which can experience significant price volatility. Accordingly, the Company's earnings could be affected by market changes in raw material prices. Reference is made to the disclosure contained in Item 7A of this Report.

Patents and Trademarks

Quaker Houghton has a limited number of patents and patent applications, including patents issued, applied for, or acquired in the United States and in various foreign countries, some of which may prove to be material to its business, and the earliest of which expires in 2021. Instead, the Company relies principally on its proprietary formulae and the application of its skills and experience to meet customer needs. Quaker Houghton products are identified by trademarks that are registered throughout its marketing area.

Research and Development—Laboratories

Quaker Houghton research and development laboratories are directed primarily toward applied research and development since the nature of the Company's business requires continual modification and improvement of formulations to provide specialty chemicals to satisfy customer requirements. The Company maintains quality control laboratory facilities in each of its manufacturing locations. In addition, the Company maintains approximately thirty separate laboratory facilities worldwide that, in addition to quality control, are devoted to applied research and development. If problems are encountered which cannot be resolved by local laboratories, they would be referred to one of our ten principal laboratories in Conshohocken, Pennsylvania; Valley Forge, Pennsylvania; Aurora, Illinois; Santa Fe Springs, California; Uithoorn, the Netherlands; Coventry, United Kingdom; Dortmund, Germany; Barcelona, Spain; Turin, Italy or Qingpu, China.

Research and development costs are expensed as incurred. Research and development expenses during the years ended December 31, 2019, 2018 and 2017 were $32.1 million, $24.5 million and $23.9 million, respectively.

Regulatory Matters

In order to facilitate compliance with applicable federal, state, and local statutes and regulations relating to occupational health and safety and protection of the environment, the Company has an ongoing program of site assessment for the purpose of identifying capital expenditures or other actions that may be necessary to comply with such requirements. The program includes periodic inspections of each facility by the Company and/or independent experts, as well as ongoing inspections and training by on-site personnel. Such inspections address operational matters, record keeping, reporting requirements and capital improvements. Capital expenditures directed solely or primarily to regulatory compliance amounted to approximately $4.4 million, $1.5 million and $1.6 million during the years ended December 31, 2019, 2018 and 2017, respectively.

Number of Employees

On December 31, 2019, Quaker Houghton had approximately 4,500 full-time employees globally of whom approximately 1,100 were employed by the parent company and its U.S. subsidiaries, and approximately 3,400 were employed by its non-U.S. subsidiaries. Associated companies of Quaker Houghton (in which it owns 50% or less and has significant influence) employed approximately 600 people on December 31, 2019.

Company Segmentation

The Company's operating segments, which are consistent with its reportable segments, reflect the structure of the Company's internal organization, the method by which the Company's resources are allocated and the manner by which the Company and the chief operating decision maker assess performance. During the third quarter of 2019 and in connection with the Combination, the Company reorganized its executive management team to align with its new business structure, which reflects the method by which the Company assesses its performance and allocates its resources. The Company's new reportable segments are: (i) Americas; (ii) EMEA; (iii) Asia/Pacific; and (iv) Global Specialty Businesses. See Note 4 of Notes to Consolidated Financial Statements in Item 8 of this Report, incorporated herein by this reference.

Non-U.S. Activities

Since significant revenues and earnings are generated by non-U.S. operations, the Company's financial results are affected by currency fluctuations, particularly between the U.S. dollar and the euro, the British pound sterling, the Brazilian real, the Mexican peso, the Chinese renminbi and the Indian rupee, and the impact of those currency fluctuations on the underlying economies. Incorporated by reference is (i) the foreign exchange risk information contained in Item 7A of this Report, (ii) the geographic information in Note 4 of Notes to Consolidated Financial Statements included in Item 8 of this Report, and (iii) information regarding risks attendant to foreign operations included in Item 1A of this Report.

Quaker Houghton on the Internet

Financial results, news and other information about Quaker Houghton can be accessed from the Company's website at https://www.quakerhoughton.com. This site includes important information on the Company's locations, products and services, financial reports, news releases and career opportunities. The Company's periodic and current reports on Forms 10-K, 10-Q, 8-K, and other filings, including exhibits and supplemental schedules filed therewith, and amendments to those reports, filed with the Securities and Exchange Commission ("SEC") are available on the Company's website, free of charge, as soon as reasonably practicable after they are electronically filed with or furnished to the SEC. Information contained on, or that may be accessed through, the Company's website is not incorporated by reference in this Report and, accordingly, you should not consider that information part of this Report.

Factors that May Affect Our Future Results

(Cautionary Statements under the Private Securities Litigation Reform Act of 1995)

Certain information included in this Report and other materials filed or to be filed by Quaker Chemical Corporation with the SEC (as well as information included in oral statements or other written statements made or to be made by us) contain or may contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These statements can be identified by the fact that they do not relate strictly to historical or current facts. We have based these forward-looking statements on our current expectations about future events. These forward-looking statements include statements with respect to our beliefs, plans, objectives, goals, expectations, anticipations, intentions, financial condition, results of operations, future performance, and business, including:

- the potential benefits of the Combination;
- our current and future results and plans; and
- statements that include the words "may," "could," "should," "would," "believe," "expect," "anticipate," "estimate," "intend," "plan" or similar expressions.

Such statements include information relating to current and future business activities, operational matters, capital spending, and financing sources. From time to time, forward-looking statements are also included in the Company's other periodic reports on Forms 10-K, 10-Q and 8-K, press releases, and other materials released to, or statements made to, the public.

Any or all of the forward-looking statements in this Report, in the Company's Annual Report to Shareholders for 2019 and in any other public statements we make may turn out to be wrong. This can occur as a result of inaccurate assumptions or as a consequence of known or unknown risks and uncertainties. Many factors discussed in this Report will be important in determining our future performance. Consequently, actual results may differ materially from those that might be anticipated from our forward-looking statements.

We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise. However, any further disclosures made on related subjects in the Company's subsequent reports on Forms 10-K, 10-Q, 8-K and other related filings should be consulted. A major risk is that demand for the Company's products and services is largely derived from the demand for our customers' products, which subjects the Company to uncertainties related to downturns in a customer's business and unanticipated customer production shutdowns. Other major risks and uncertainties include, but are not limited to, significant increases in raw material costs, customer financial stability, worldwide economic and political conditions, the impact of widespread public health crises, including the recent spread of coronavirus, foreign currency fluctuations, significant changes in applicable tax rates and regulations, future terrorist attacks and other acts of violence, each of which is discussed in greater detail in Item 1A of this Report. Furthermore, the Company is subject to the same business cycles as those experienced by steel, automobile, aircraft, industrial equipment, and durable goods manufacturers. Other factors could also adversely affect us, including those related to the Combination and other acquisitions and the integration of the combined company as well as other acquired businesses. Our forward-looking statements are subject to risks, uncertainties and assumptions about the Company and its operations that are subject to change based on various important factors, some of which are beyond our control. These risks, uncertainties, and possible inaccurate assumptions relevant to our business could cause our actual results to differ materially from expected and historical results.

Therefore, we caution you not to place undue reliance on our forward-looking statements. For more information regarding these risks and uncertainties as well as certain additional risks that we face, refer to the Risk Factors section in Item 1A of this Report, and in our quarterly and other reports filed from time to time with the SEC. This discussion is provided as permitted by the Private Securities Litigation Reform Act of 1995.

Item 1A. *Risk Factors.*

Changes to the industries and markets that we serve could have a material adverse effect on our liquidity, financial position and results of operations.

As a leader in industrial process fluids, the Company is subject to the same business cycles as those experienced by steel, automobile, aircraft, industrial equipment, aerospace, aluminum and durable goods manufacturers. Because demand for our products and services is largely derived from the global demand for our customers' products, we are subject to uncertainties related to downturns in our customers' businesses and unanticipated shutdowns or curtailments of our customers' production. We have limited ability to adjust our costs contemporaneously with changes in sales; thus, a significant downturn in sales due to reductions in global production within the industries we serve and/or weak end-user markets could have a material adverse effect on our liquidity, financial position and results of operations.

Changes in competition in the industries and markets we serve could have a material adverse effect on our liquidity, financial position and results of operations.

The specialty chemical industry is highly competitive, and a number of companies with significant financial resources and/or customer relationships compete with us to provide similar products and services. Some competitors may be positioned to offer more favorable pricing and service terms, potentially resulting in reduced profitability and/or a loss of market share for us. In addition, our competitors could potentially consolidate their businesses to gain scale to better position their product offerings, which could have a negative impact on our profitability and market share. Competition in the industry has historically been based primarily on the ability to provide products that meet the needs of the customer and render technical services and laboratory assistance to the customer and, to a lesser extent, on price. Factors critical to our business include successfully differentiating our offerings from those of our competitors, operating efficiently and profitably as a globally integrated business, and increasing market share and customer penetration through internally developed business programs and strategic acquisitions. Further, in connection with obtaining regulatory approval of the Combination, we divested certain of Houghton's products and related assets to a competitor, which they may use to compete with us in certain areas where we continue to sell those products. If we are unsuccessful with differentiating ourselves, it could have a material adverse effect on our liquidity, financial position and results of operations.

Inability to obtain sufficient price increases or contract concessions to offset increases in the costs of raw materials could result in a loss of sales, gross profit, and/or market share and could have a material adverse effect on our liquidity, financial position and results of operations. Conversely, an inability to implement timely price decreases to compensate for changes in raw material costs could also result in a loss of sales, gross profit, and/or market share and could have a material adverse effect on our liquidity, financial position and results of operations.

Quaker Houghton uses over 1,000 different raw materials, including mineral oils, animal fats, vegetable oils, ethylene, solvents, surfactant agents, various chemical compounds that act as additives to our base formulations, and a wide variety of other organic and inorganic compounds, along with various derivatives of the foregoing. The price of mineral oils and their derivatives can be affected by the price of crude oil and industry refining capacity. Animal fat and vegetable oil prices, as well as the prices of other raw materials, are impacted by their own unique supply and demand factors, as well as by biodiesel consumption which is also affected by the price of crude oil. Accordingly, significant fluctuations in the price of crude oil in the past have had and are expected to continue to have a material impact on the cost of our raw materials. In addition, many of the raw materials we use are commodity chemicals, which can experience significant price volatility.

Although we have been successful in the past in recovering a substantial amount of raw material cost increases while retaining our customers, there can be no assurance that we will be able to continue to offset higher raw material costs or retain customers in the future. Conversely, there can be no assurance that we can continue to maintain our margins if raw material costs decline more rapidly than we expected. A significant change in margin or the loss of customers due to pricing actions could result in a material adverse effect on our liquidity, financial position, and results of operations.

Lack of availability of raw materials and issues associated with sourcing from certain single suppliers and some suppliers in volatile economic environments could have a material adverse effect on our liquidity, financial position, and results of operations.

The specialty chemical industry periodically experiences tightness of supply for certain raw materials. In addition, in some cases, we source from a single supplier and/or suppliers in economies that have experienced political or economic instability. Any significant disruption in supply could affect our ability to obtain raw materials, or increase the cost of such raw materials, which could have a material adverse effect on our liquidity, financial position and results of operations. In addition, certain raw materials that we use are subject to various regulatory laws, and a change in our ability to legally use such raw materials may impact the products or services we are able to offer, which could negatively affect our ability to compete and could adversely affect our liquidity, financial position and results of operations.

Loss of a significant manufacturing facility could have a material adverse effect on our liquidity, financial position and results of operations.

We have manufacturing facilities located throughout the world. If one of our facilities is forced to shut down or curtail operations, because of damage or other factors, we may not be able to timely supply our customers. This could result in a loss of sales over an extended period, or permanently. The Company does take steps to mitigate against this risk, including business continuity and contingency planning and procuring property and casualty insurance (including business interruption insurance). Nevertheless, the loss of production in any one region over an extended period of time could have a material adverse effect on our liquidity, financial position and results of operations.

Loss of a significant customer, bankruptcy of a major customer, or the closure of or significant reduction in production at a customer site could have a material adverse effect on our liquidity, financial position and results of operations.

During 2019, the Company's top five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) together account for approximately 12% of our consolidated net sales, with the largest customer accounting for approximately 6% of our consolidated net sales. The loss of a significant customer could have a material adverse effect on our liquidity, financial position and results of operations. Also, a significant portion of our revenues is derived from sales to customers in the steel, aerospace, aluminum and automotive industries; where bankruptcies have occurred in the past and where companies have periodically experienced financial difficulties. If a significant customer experiences financial difficulties or files for bankruptcy protection, we may be unable to collect on our receivables, and customer manufacturing sites may be closed or contracts voided. The bankruptcy of a major customer could therefore have a material adverse effect on our liquidity, financial position and results of operations. Also, some of our customers, primarily in the steel, aluminum and aerospace industries, often have fewer manufacturing locations compared to other metalworking customers and generally use higher volumes of products at a single location. The loss, closure or significant reduction in production of one or more of these locations or other major sites of a significant customer, such as the current production slowdown of the Boeing 737 Max aircraft, could have a material adverse effect on our business.

Changes in tax laws could result in fluctuations in our effective tax rate and have a material effect on our liquidity, financial position and results of operation.

We pay income taxes in the U.S. and various foreign jurisdictions; with our U.S. and international tax liabilities being subject to the allocation of our income among these different jurisdictions. Our effective tax rate is derived from a combination of local tax rates and tax attributes applicable to our operations, in the various countries, states and other jurisdictions in which we operate. Our effective tax rate and respective tax liabilities could, therefore, be materially affected by changes in the mix of earnings in countries with differing statutory tax rates, changes in tax rates, expiration or lapses of tax credits or incentives, changes in uncertain tax positions, changes in the valuation of deferred tax assets and liabilities, or changes in tax laws, including matters such as transfer pricing. One recent example is the impact of the U.S. Tax Cuts and Jobs Act, adopted in the U.S. in 2017 ("U.S. Tax Reform"). We have made various interpretations and assumptions with regard to uncertainties and ambiguities in the application of certain provisions of U.S. Tax Reform, which could turn out to be incorrect. In addition, we are regularly under audit by tax authorities, and the final decisions of such audits could materially affect our current tax estimates and tax positions. Any of these factors, or similar tax-related risks, could cause our effective tax rate and tax-related payments to significantly differ from previous periods and current or future expectations, which could have a material effect on our liquidity, financial position and results of operations.

The global nature of our operations subjects us to political and economic risks that could adversely affect our business, liquidity, financial position and results of operations.

A significant portion of our revenues and earnings are generated by non-U.S. operations. Risks inherent in our global operations include: instability in economic and political conditions in certain countries; changes in a country's political situation; trade protection measures, including import and export controls and trade embargoes; longer customer payment cycles; different payment practices such as the use of bankers acceptance drafts or other similar credit instruments; licensing and other legal requirements; the difficulties of staffing and managing dispersed international operations; less protective foreign intellectual property laws; legal systems that may be less developed and predictable than those in the United States; limitations on ownership or participation in local enterprises; the potential for expropriation or nationalization of enterprises; the impact of widespread public health crises; and complex and dynamic local tax regulations. Also, the Company could be adversely impacted by changes in the perceived or actual global economic climate, such as from global or regional recessions, uncertainty resulting from the United Kingdom's ("U.K.") exit from the European Union ("EU"), existing or future trade restrictions or imposed tariffs, and heightened U.S. or global stock market volatility and potential changes in access to capital markets.

The current global geopolitical and trade environment creates the potential for increased escalation of domestic and international tariffs and retaliatory trade policies. Further changes in U.S. trade policy and additional retaliatory actions by U.S. trade partners could result in a worsening of economic conditions. If we are unable to successfully manage these and other risks associated with our international businesses, the risks could have a material adverse effect on our business, results of operations or financial condition.

Additionally, the U.K.'s exit (commonly referred to as Brexit) from the EU could cause disruptions to, and create uncertainty surrounding, our business in the U.K. and EU, including affecting our relationships with our existing and future customers, suppliers and employees. As a result, Brexit could have an adverse effect on our future business, financial results and operations. The political

and economic instability created by Brexit has caused and may continue to cause significant volatility in global financial markets and uncertainty regarding the regulation of data protection in the U.K., both during the transitional period and subsequently thereafter. Brexit could also disrupt the free movement of goods, services, and people between the U.K., the EU, and elsewhere. Brexit could lead to legal uncertainty and potentially divergent national laws and regulations as the U.K. determines which EU laws to replace or replicate. Further, uncertainty around these and related issues could lead to adverse effects on the economy of the U.K. and the other economies in which we operate. There can be no assurance that any or all of these events will not have a material adverse effect on our business operations, results of operations and financial condition.

The scope of our international operations subjects us to risks from currency fluctuations that could adversely affect our liquidity, financial position and results of operations.

Significant revenues and earnings are generated by our non-U.S. operations, and so our financial results are affected by currency fluctuations, particularly between the U.S. dollar and the euro, the Brazilian real, the Mexican peso, the Chinese renminbi, and the Indian rupee, and the impact of those currency fluctuations on the underlying economies. During the past three years, sales by non-U.S. subsidiaries accounted for approximately 60% to 65% of our consolidated net sales. Generally, all of our non-U.S. subsidiaries use their local currency as their functional currency. We generally do not use financial instruments that expose us to significant risk involving foreign currency transactions; however, the relative size of our non-U.S. activities has a significant impact on reported operating results and our net assets. Therefore, as exchange rates change, our results can be materially affected. Incorporated by reference is the foreign exchange risk information contained in Item 7A of this Report and the geographic information in Note 4 of Notes to Consolidated Financial Statements included in Item 8 of this Report.

Also, we occasionally source inventory in a different country than that of the intended sale. This practice can give rise to foreign exchange risk. We seek to mitigate this risk through local sourcing of raw materials in the majority of our locations.

Pending and future legal proceedings, including environmental matters, could have a material adverse effect on our liquidity, financial position, and results of operations, as well as our reputation in the markets it serves.

The Company and its subsidiaries are routinely party to proceedings, cases, and requests for information from, and negotiations with, various claimants and federal and state agencies relating to various matters, including environmental matters. Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report describes certain information concerning pending asbestos-related litigation against an inactive subsidiary, amounts accrued associated with certain environmental, non-capital remediation costs and other potential commitments or contingencies, which is incorporated herein by reference. An adverse result in one or more pending or on-going matters or any potential future matter of a similar nature could materially and adversely affect our liquidity, financial position, and results of operations, as well as our reputation in the markets we serve.

Failure to comply with the complex global regulatory environment in which we operate could have an adverse impact on our reputation and/or a material adverse effect on our liquidity, financial position and results of operations.

Changes in the regulatory environment in which we operate, particularly, but not limited to, the United States, Mexico, Brazil, China, India, Southeast Asia, the U.K. and the EU, could lead to heightened regulatory compliance costs and scrutiny, could adversely impact our ability to continue selling certain products in our U.S. or foreign markets, and/or could otherwise increase the cost of doing business. While we seek to mitigate these risks, including by receiving Responsible Care certification, on-going employee training and administering a comprehensive environmental, health and safety program, there is no guarantee these actions will prevent all potential regulatory compliance issues. For instance, failure to comply with the EU's Registration, Evaluation, Authorization and Restriction of Chemicals ("REACH") or other similar laws and regulations, could result in our inability to sell certain non-compliant products, or we could incur fines, ongoing monitoring obligations or other future business consequences, which could have a material adverse effect on our liquidity, financial position and results of operations. Additionally, we are subject to the U.S. Foreign Corrupt Practices Act (the "FCPA"), the U.K. Bribery Act and other anti-bribery, anti-corruption and anti-money laundering laws in jurisdictions around the world. The FCPA, the U.K. Bribery Act and similar laws generally prohibit companies, as well as their officers, directors, employees and third-party intermediaries, business partners and agents, from making improper payments or providing other improper things of value to government officials or other persons. While we have policies and procedures and internal controls designed to address compliance with such laws, we cannot assure you that our employees and third-party intermediaries, business partners and agents, will not take, or be alleged to have taken actions, in violation of such policies and laws, for which we may be ultimately held responsible. Detecting, investigating and resolving actual or alleged violations can be extensive and require a significant diversion of time, resources and attention from senior management. Any violation of the FCPA, the U.K. Bribery Act or other applicable anti-bribery, anti-corruption and anti-money laundering laws could result in whistleblower complaints, adverse media coverage, investigations, loss of export privileges, and criminal or civil sanctions, penalties and fines, any of which could adversely affect our business and financial condition.

Uncertainty related to environmental regulation and industry standards, as well as physical risks of climate change, could impact our results of operations and financial position.

Increased public awareness and concern regarding global climate change and other environmental risks may result in more extensive international, regional and/or federal requirements or industry standards to reduce or mitigate global warming and other environmental risks and these regulations could mandate even more restrictive standards or industry standards than the voluntary goals that we have established or require changes to be adopted on a more accelerated time frame. There continues to be a lack of consistent climate legislation, which creates economic and regulatory uncertainty. In addition, the physical risks of climate change may impact the availability and costs of materials and natural resources, sources and supply of energy, product demand and manufacturing. If environmental laws or regulations or industry standards are either changed or adopted and impose significant operational restrictions and compliance requirements upon us or our products, or our operations are disrupted due to physical impacts of climate change, our business, capital expenditures, results of operations, financial condition and competitive position could be negatively impacted.

Potential product, service or other related liability claims could have a material adverse effect on our liquidity, financial position and results of operations.

The development, manufacture and sale of specialty chemical products and other related services involve inherent exposure to potential product liability claims, service level claims, product recalls and related adverse publicity. Any of these potential product or service risks could also result in substantial and unexpected expenditures and affect customer confidence in our products and services, which could have a material adverse effect on our liquidity, financial position and results of operations.

In addition, our business is subject to hazards associated with the manufacture, handling, storage, and transportation of chemical materials and products. These potential hazards could cause personal injury and loss of life, severe damage to, or destruction of, property or equipment and environmental contamination or other environmental damage, which could have an adverse effect on our business, financial condition or results of operations. In addition, the occurrence of disruptions, shutdowns or other material operating problems at our facilities or those of our customers due to any of these risks could adversely affect our reputation and have a material adverse effect on our operations as a whole, including our results of operations and cash flows, both during and after the period of operational difficulties. Although we maintain product and other general liability insurance, there can be no assurance that the types or levels of coverage maintained are adequate to cover these potential risks. In addition, we may not be able to continue to maintain our existing insurance coverage or obtain comparable or additional insurance coverage at a reasonable cost, if at all, in the event a significant product or service claim arises.

We may be unable to adequately protect our proprietary rights and trade brands, which may limit our ability to compete in our markets and could adversely affect our liquidity, financial position and results of operations.

We have a limited number of patents and patent applications, including patents issued, applied for, or acquired in the United States and in various foreign countries, some of which may prove to be material to our business. However, we rely principally on our proprietary formulae and the application of our skills and experience to meet customer needs. Also, our products are identified by trademarks that are registered throughout our marketing area. Despite our efforts to protect our proprietary information through patent and trademark filings, through the use of appropriate trade secret protections, and through the inability of certain products to be effectively replicated by others, it is possible that competitors or other unauthorized third parties may obtain, copy, use, disclose or replicate our technologies, products, and processes. In addition, the laws and/or judicial systems of foreign countries in which we design, manufacture, market and sell our products may afford little or no effective protection of our proprietary technology or trade brands. Also, security over our global information technology structure is subject to increasing risks associated with cyber-crime and other related cyber-security threats. These potential risks to our proprietary information and trade brands could subject us to increased competition and negatively impact our liquidity, financial position and results of operations.

We may not be able to timely develop, manufacture and gain market acceptance of new and enhanced products required to maintain or expand our business, which could adversely affect our liquidity, financial position and results of operations.

We believe that our continued success depends on our ability to continuously develop and manufacture new products and product enhancements on a timely and cost-effective basis in response to customer demands for higher performance process chemicals and other product offerings. An example of such evolving customer demands and industry trends is the movement towards light weight and/or electric vehicles. Our competitors may develop new products or enhancements to their products that offer performance, features and lower prices that may render our products less competitive or obsolete, and, as a consequence, we may lose business and/or significant market share. The development and commercialization of new products requires significant expenditures over an extended period of time, and some products that we seek to develop may never become profitable. In addition, we may not be able to develop and introduce products incorporating new technologies in a timely manner that will satisfy our customers’ future needs or achieve market acceptance.

We may not be able to profitably operate our consolidated company as anticipated after the Combination if we do not properly address our integration and consolidation risks. An inability to appropriately capitalize on growth, including organic growth, leveraging prior acquisitions, or integrating future acquisitions, could adversely affect our liquidity, financial position and results of operations.

The Combination presents the Company with significant integration and consolidation risks, and we may be unable to profitably operate the consolidated company, or may fail to achieve expected cost synergies or expand our combined business into new markets and geographies given the following risks, among others:

- diversion of management time and focus from operating our business to address challenges that may arise in integrating Houghton;
- transition of operations and customers of Houghton to the combined business;
- failure to realize anticipated operational or financial synergies;
- implementation or remediation of controls, procedures, and policies at Houghton;
- the need to integrate operations across different cultures and languages and to address the particular economic, currency, political, and regulatory risks associated with specific countries; and
- possible liabilities for activities of Houghton before the acquisition, such as possible violations of laws, commercial disputes, tax liabilities, and other known and unknown liabilities that may not be sufficiently protected against in the Share Purchase Agreement.

In addition to the Combination, we have completed multiple acquisitions over the past several years, including Norman Hay in 2019, and we continue to grow organically through increased end-market growth, incremental market share gains, and extending previously acquired technologies through existing channels. The success of our growth depends on our ability to successfully integrate these acquisitions and any future acquisitions, including, but not limited to our ability to:

- successfully execute the integration or consolidation of the acquired or additional business into existing processes and operations;
- develop or modify financial reporting, information systems and other related financial tools to ensure overall financial integrity and adequacy of internal control procedures;
- identify and take advantage of potential synergies, including cost reduction opportunities, while maintaining legacy business and other related attributes; and
- further penetrate existing, and expand into new, markets with the product capabilities acquired in acquisitions.

Despite our best efforts, we may fail to obtain the benefits we anticipate from the Combination or may not create the appropriate infrastructure to support such additional growth from organic or acquired businesses, which could have a material adverse effect on our liquidity, financial position and results of operations.

Impairment evaluations of goodwill, intangible assets, investments or other long-lived assets could result in a reduction in our recorded asset values, which could have a material adverse effect on our financial position and results of operation.

We perform reviews of goodwill and indefinite-lived intangible assets on an annual basis, or more frequently if triggering events indicate a possible impairment. We test goodwill at the reporting unit level by comparing the carrying value of the net assets of the reporting unit, including goodwill, to the reporting unit's fair value. Similarly, we test indefinite-lived intangible assets by comparing the fair value of the assets to their carrying values. If the carrying values of goodwill or indefinite-lived intangible assets exceed their fair value, the goodwill or indefinite-lived intangible assets may be considered impaired. In addition, we perform a review of a definite-lived intangible asset or other long-lived asset when changes in circumstances or events indicate a possible impairment. If any impairment or related charge is warranted, then our financial position and results of operations could be materially affected.

We could be subject to indemnity claims and liable for other payments relating to properties or businesses we have divested.

In connection with the sale of certain properties and businesses, we have agreed to indemnify the purchasers of such properties for certain types of matters, such as certain breaches of representations and warranties, taxes and certain environmental matters. With respect to environmental matters, the discovery of contamination arising from properties that we have divested may expose us to indemnity obligations under the sale agreements with the buyers of such properties or cleanup obligations and other damages under applicable environmental laws. We may not have insurance coverage for such indemnity obligations or cash flows to make such indemnity or other payments. Further, we cannot predict the nature of and the amount of any indemnity or other obligations we may have to the applicable purchaser. Such payments may be costly and may adversely affect our financial condition and results of operations.

The issuance of common stock to Gulf in the Combination provided it with an almost 24.5% ownership interest in the Company, and therefore, there is a risk that depending on the intentions of Gulf with respect to its common stock ownership and the timing of such decisions, a significant amount of the Company's common stock could be made available for sale in one or more transactions. In addition, Gulf also has the contractual ability to nominate certain directors of the Company, which may enable Gulf to influence the direction of our business and significant corporate decisions.

As a result of the issuance, Gulf became our largest shareholder. Pursuant to the terms of the shareholders agreement it has entered into with the Company, for two years following the closing on August 1, 2019, Gulf is restricted from acquiring additional shares of Quaker Houghton common stock, subject to certain exceptions. Subject to certain restrictions over timing and amount, Gulf is permitted to make available for sale a certain number of shares of common stock. Given the number of shares currently held by Gulf, if it were to make available for sale a portion of its shares, that portion could represent a significant amount of common stock of the Company being sold, which could have an adverse impact on the Company's stock price.

In addition, Gulf has substantial influence over matters submitted to a vote of our shareholders, including the election of directors, amendment of our organizational documents, acquisitions or other business combinations involving the Company, and potentially the ability to prevent extraordinary transactions such as a takeover attempt or business combination. The concentration of ownership of our shares held by Gulf may make some future actions more difficult without its support. Gulf will, however, be bound by the shareholders agreement it has entered into with the Company, which among other provisions requires that for so long as any of Gulf's designees are on the Quaker Houghton Board of Directors (the "Board"), and for six months thereafter, Gulf will vote all Quaker Houghton shares consistent with the recommendations of the Board for each director nominee as reflected in each proxy statement of the Company, including in support of any Quaker Houghton directors nominated for election or re-election to the Board (except as would conflict with Gulf's rights to designees on the Board) and Gulf will not, without obtaining the prior written consent of the Board, vote with, tender into or publicly support any hostile takeover activity or tender offer targeting Quaker Houghton and not supported by a majority of the Board or Quaker Houghton's independent directors. Notwithstanding this, the interests of Gulf may conflict with our interests or the interests of our other shareholders, though we are not aware of any such existing conflicts of interest at this time.

Our business depends on attracting and retaining qualified management and other key personnel.

Due to the specialized and technical nature of our business, our future performance is dependent on our ability to attract, develop and retain qualified management, commercial, technical, and other key personnel. Competition for such personnel is intense, and we may be unable to continue to attract or retain such personnel. In an effort to mitigate such risks, the Company utilizes retention bonuses, offers competitive pay and maintains continuous succession planning, but there can be no assurance that these mitigating factors will be adequate to attract or retain qualified management or other key personnel. In addition, no assurance can be given that after the Combination, Quaker Houghton will continue to be able to attract or retain key management personnel and other key employees to the same extent that Quaker and Houghton had previously been able to attract or retain their own employees. Failure to retain key employees could diminish the benefits of the Combination and subject the Company to integration risks, which could have an adverse effect on our operations.

We are subject to stringent labor and employment laws in certain jurisdictions in which we operate, and our relationship with our employees could deteriorate, which could adversely impact our operations.

A majority of our full-time employees are employed outside the U.S. In certain jurisdictions where we operate, labor and employment laws grant significant job protection to certain employees, including rights on termination of employment. In addition, in certain countries where we operate, our employees are members of unions or are represented by works councils. We are often required to consult with and seek the consent or advice of these unions and/or works councils. These regulations and laws, coupled with the requirement to seek consent or consult with the relevant unions or works councils, could have a significant impact on our flexibility in managing costs and responding to market changes.

Failure to comply with any material provision of our New Credit Facility or other debt agreements could have a material adverse effect on our liquidity, financial position and results of operations.

We significantly increased our level of indebtedness upon closing of the Combination and execution of the New Credit Facility (defined in Item 7 of this Report) which requires the Company to comply with certain provisions and covenants, and, while we do not currently anticipate the New Credit Facility provisions and covenants to be overly restrictive, they could become more difficult to comply with as business or financial conditions change. We will also be subject to interest rate risk due to the variable interest rates within the New Credit Facility and, if interest rates rise significantly, these interest costs could increase as well.

Our New Credit Facility contains covenants that impose certain restrictions, including limitations on investments, acquisitions and liens, as well as default provisions customary for facilities of its type. The New Credit Facility contains affirmative and negative covenants, financial covenants and events of default that are customary for agreements of this nature, including without limitation restrictions on (a) the incurrence of additional indebtedness by the Company or certain of its subsidiaries, (b) investments in and acquisitions of other businesses, lines of business and divisions by the Company or certain of its subsidiaries, (c) the making of dividends or capital stock purchases by the Company or certain of its subsidiaries and (d) dispositions of assets by the Company or certain of its subsidiaries. Dividends and share repurchases are permitted in annual amounts not exceeding the greater of $50 million

annually and 20% of consolidated EBITDA (earnings before interest, taxes, depreciation and amortization) if there is no default under the New Credit Facility and also certain other amounts if the net leverage ratio is less than 2.0 to 1.0. Financial covenants contained in the New Credit Facility include a consolidated interest coverage test and a consolidated net leverage test. Customary events of default in the New Credit Facility include without limitation defaults for non-payment, breach of representations and warranties, non-performance of covenants, cross-defaults, insolvency, and a change of control of the Company in certain circumstances. If we are unable to comply with the financial and other provisions of the New Credit Facility, we could become in default. The occurrence of an event of default under the New Credit Facility could result in all loans and other obligations becoming immediately due and payable and the facility being terminated. In addition, deterioration in the Company's results of operations or financial position could significantly increase borrowing costs.

Changes to the LIBOR calculation method or the replacement of LIBOR may have adverse consequences for the Company that cannot yet reasonably be predicted.

The Company's New Credit Facility permits interest on swing line loans to be calculated based on LIBOR. The LIBOR benchmark has been subject of national, international, and other regulatory guidance and proposals for reform. On July 27, 2017, the U.K. Financial Conduct Authority announced that it will no longer require banks to submit rates for the calculation of LIBOR after 2021. The expected discontinuation of LIBOR after 2021 and the transition away from LIBOR presents various risks and challenges, including with respect to our borrowings and hedging arrangements that rely on the LIBOR benchmark. Further, the overall financial market may be disrupted as a result of the phase-out or replacement of LIBOR. Various parties are working on industry wide and company specific transition plans as it relates to derivatives and cash markets exposed to LIBOR. The U.S. Federal Reserve, in conjunction with the Alternative Reference Rates Committee, a steering committee comprised of large U.S. financial institutions, is considering replacing LIBOR with the Secured Overnight Financing Rate ("SOFR"), a new index calculated by short-term repurchase agreements, backed by Treasury securities. At this time, the future of LIBOR remains uncertain. It is not possible to predict whether SOFR will attain market traction as a LIBOR replacement or to predict any other reforms to LIBOR that may be enacted in the U.K. or elsewhere. The potential effect of the phase-out or replacement of LIBOR on the Company's financial position or results of operations cannot yet be predicted.

We have identified material weaknesses in our internal control over financial reporting that could, if not remediated, result in material misstatements in our financial statements and in the inability of our independent registered public accounting firm to provide an unqualified audit opinion, which could have a material adverse effect on us.

As a public company, we are required to comply with the SEC's rules implementing Sections 302 and 404 of the Sarbanes-Oxley Act of 2002, or the Sarbanes-Oxley Act, which require management to certify financial and other information in our quarterly and annual reports and provide an annual management report on the effectiveness of controls over financial reporting.

As discussed in Part II, Item 9A, of this Report, during the course of preparing our audited financial statements for this Report, we, in conjunction with our independent registered public accounting firm, identified certain material weaknesses as of December 31, 2019. A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis. Through the process of evaluating risks and corresponding changes to the design of existing or the implementation of new controls in light of the significant non-recurring transactions that occurred during 2019, including the Combination, we have identified certain deficiencies in our application of the principles associated with the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control—Integrated Framework (2013) that management has concluded in the aggregate constitute a material weakness. We did not effectively design and maintain controls in response to the risks of material misstatement. Specifically, changes to existing controls or the implementation of new controls have not been sufficient to respond to changes to the risks of material misstatement to financial reporting. As a result of this deficiency in design and implementation of an effective risk assessment, this material weakness contributed to certain control deficiencies that management has concluded result in the following additional material weaknesses: (i) we did not design and maintain effective controls over the review of pricing, quantity and customer data to verify that revenue recognized at certain smaller locations was complete and accurate, and (ii) we did not design and maintain effective controls over the reliability of data used to support the reasonableness of certain assumptions in the accounting for business combinations. As a result of these material weaknesses, management determined that both our disclosure controls and procedures and internal control over financial reporting were not effective as of December 31, 2019 and our independent registered public accounting firm has likewise issued an opinion indicating that we have not maintained effective internal control over financial reporting as of December 31, 2019. Notwithstanding these material weaknesses, the Company has concluded that these control deficiencies did not result in a misstatement to the related balances and disclosures for the year ended December 31, 2019. However, these control deficiencies could have resulted in misstatements of interim or annual consolidated financial statements and disclosures that could have resulted in a material misstatement that would not be prevented or detected. In light of the material weaknesses identified, we have performed additional analysis and procedures to ensure that our consolidated financial statements presented in this Report were prepared in accordance with GAAP and fairly reflected our financial position and results of operations as of and for the year ended December 31, 2019.

Management has begun the process of evaluating the material weaknesses and developing its full remediation plan. Until the remediation plan is implemented, tested and deemed effective we cannot assure you that our actions will adequately remediate the material weaknesses or that additional material weaknesses in our internal controls will not be identified in the future. Any failure to identify and correct material weaknesses in a timely manner could have a material adverse effect on the financial condition of the Company.

Our management, including our chief executive officer and chief financial officer, does not expect that our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the controls. Over time, controls may become inadequate because of changes in circumstances or deterioration in the degree of compliance with policies or procedures may occur. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and may not be detected.

Disruption of critical information systems or material breaches in the security of our systems could adversely affect our business and our customer relationships, and subject us to fines or other regulatory actions.

We rely on information technology systems to process, transmit, and store electronic information in our day-to-day operations. We also rely on our technology infrastructure, among other functions, to interact with customers and suppliers, fulfill orders and bill, collect and make payments, ship products, provide support to customers, fulfill contractual obligations and otherwise conduct business. Our information technology systems are subject to potential disruptions, including significant network or power outages, cyberattacks, computer viruses, other malicious codes, and/or unauthorized access attempts, any of which, if successful, could result in data leaks or otherwise compromise our confidential or proprietary information and disrupt our operations. Cybersecurity incidents, such as these, are becoming more sophisticated and frequent, and there can be no assurance that our protective measures will prevent security breaches that could have a significant impact on our business, reputation and financial results. In addition, security breaches could result in unauthorized disclosure of confidential information or personal data belonging to our employees, partners, customers or suppliers. We are subject to the data privacy and protection laws and regulations adopted by federal, state and foreign legislatures and governmental agencies in various countries in which we operate, including the EU General Data Protection Regulation. Therefore, a failure to monitor, maintain or protect our information technology systems and data integrity effectively or to anticipate, plan for and recover from significant disruptions to these systems could have a material adverse effect on our business, results of operations or financial condition.

Terrorist attacks, other acts of violence or war, natural disasters, widespread public health crises or other uncommon global events may affect the markets in which we operate and our profitability, which could adversely affect our liquidity, financial position and results of operations.

Terrorist attacks, other acts of violence or war, natural disasters, widespread public health crises, including the recent spread of coronavirus, or other uncommon global events may negatively affect our operations. There can be no assurance that there will not be terrorist attacks against the U.S. or other locations where we do business. Also, other uncommon global events such as earthquakes, hurricanes, fires and tsunamis cannot be predicted. Terrorist attacks, other acts of violence or armed conflicts, and natural disasters may directly impact our physical facilities and/or those of our suppliers or customers. Additional terrorist attacks or natural disasters may disrupt the global insurance and reinsurance industries with the result that we may not be able to obtain insurance at historical terms and levels, if at all, for all of our facilities. Widespread public health crises could also disrupt operations of the Company, its suppliers and customers which could have a material adverse impact on our results of operations. Beginning in early 2020, there has been an outbreak of coronavirus (COVID-19), initially in China and which has spread to other jurisdictions, including locations where the Company does business. The full extent of the outbreak, related business and travel restrictions and changes to behavior intended to reduce its spread are uncertain as of the date of the Report as this continues to evolve globally. Therefore, the full extent to which coronavirus may impact the Company's results of operations, liquidity or financial position is uncertain. This outbreak has already had a material disruption on the operations of the Company and its suppliers and customers. Management continues to monitor the impact that the COVID-19 pandemic is having on the Company, the specialty chemical industry and the economies in which the Company operates. The Company anticipates that its future results of operations, including the results for 2020, will be materially impacted by the coronavirus outbreak, but at this time does not currently expect that the impact from the coronavirus outbreak will have a material effect on the Company's liquidity or financial position. However, given the speed and frequency of continuously evolving developments with respect to this pandemic, the Company cannot reasonably estimate the magnitude of the impact to its results of operations, and, if the outbreak continues on its current trajectory, such impacts could grow and become material to its liquidity or financial position. To the extent that the Company's customers and suppliers continue to be materially and adversely impacted by the coronavirus outbreak this could reduce the availability, or result in delays, of materials or supplies to or from the Company, which in turn could materially interrupt the Company's business operations. The consequences of terrorist attacks, other acts of violence or armed conflicts, natural disasters, widespread public health crises or other uncommon global events can be unpredictable, and we may not be able to foresee or effectively plan for these events, resulting in a material adverse effect on our business, results of operations or financial condition.

Item 1B. ***Unresolved Staff Comments.***

None.

Item 2. ***Properties.***

Quaker Houghton's corporate headquarters and a laboratory facility are located in its America segment's Conshohocken, Pennsylvania location. The Company's other principal facilities in its America's segment are located in Detroit, Michigan; Middletown, Ohio; Dayton, Ohio; Strongsville, Ohio; Carrollton, Georgia; Waterloo, Ontario; Monterrey, N.L., Mexico; Rio de Janeiro, Brazil and Sao Paulo, Brazil. The Company's EMEA segment has principal facilities in Uithoorn, The Netherlands; Manchester, U.K.; Dortmund, Germany; Barcelona, Spain; Navarra, Spain; Rouen, France; Karlshamn, Sweden; Tradate, Italy; and Turin, Italy. The Company's Asia/Pacific segment operates out of its principal facilities located in Qingpu, China; Songjiang, China; Kolkata, India; Rayong, Thailand; Sydney, Australia; and Moorabbin, Australia. The Company's Global Specialty Businesses segment operates out of its principal facilities in Aurora, Illinois; Santa Fe Springs, California; Batavia, New York; and Coventry, U.K.. With the exception of the Conshohocken, Santa Fe Springs, Aurora, Karlshamn, Rayong, Coventry, and Sydney sites, which are leased, the remaining principal facilities are owned by the Company and, as of December 31, 2019, were mortgage free. Quaker Houghton also leases sales, laboratory, manufacturing, and warehouse facilities in other locations.

Quaker Houghton's principal facilities (excluding Conshohocken) consist of various manufacturing, administrative, warehouse, and laboratory buildings. Substantially all of the buildings (including Conshohocken) are of fire-resistant construction and are equipped with sprinkler systems. The Company has a program to identify needed capital improvements that are implemented as management considers necessary or desirable. Most locations have raw material storage tanks, ranging from 1 to 100 at each location with capacities ranging from 1,000 to 82,000 gallons, and processing or manufacturing vessels ranging in capacity from 8 to 19,000 gallons.

Each of Quaker's non-U.S. associated companies (in which it owns a 50% or less interest and has significant influence) owns or leases a plant and/or sales facilities in various locations, with the exception of Primex, Ltd.

Item 3. ***Legal Proceedings.***

The Company is a party to proceedings, cases, and requests for information from, and negotiations with, various claimants and Federal and state agencies relating to various matters, including environmental matters. For information concerning pending asbestos-related litigation against an inactive subsidiary, certain environmental non-capital remediation costs and other legal-related matters, reference is made to Note 26 of Notes to Consolidated Financial Statements, included in Item 8 of this Report, which is incorporated herein by this reference. The Company is a party to other litigation which management currently believes will not have a material adverse effect on the Company's results of operations, cash flow or financial condition.

Item 4. ***Mine Safety Disclosures.***

Not Applicable.

Item 4(a). ***Information about our Executive Officers.***

Set forth below is information regarding the executive officers of the Company, each of whom (with the exception of Ms. Hall and Ms. Johnson) have been employed by the Company or by Houghton for more than five years, including the respective positions and offices with the Company (or Houghton) held by each over the respective periods indicated. Each of the executive officers, with the exception of Mr. Hostetter, is appointed annually to a one-year term. Mr. Hostetter is considered an executive officer in his capacity as principal accounting officer for purposes of this Item.

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Michael F. Barry, 61 Chairman of the Board, Chief Executive Officer, President and Director	Mr. Barry, who has been employed by the Company since 1998, has served as Chairman of the Board since May 2009, in addition to his position as Chief Executive Officer and President held since October 2008. He served as interim Chief Financial Officer from October through November 2015. He served as Senior Vice President and Managing Director – North America from January 2006 to October 2008. He served as Senior Vice President and Global Industry Leader – Metalworking and Coatings from July through December 2005. He served as Vice President and Global Industry Leader – Industrial Metalworking and Coatings from January 2004 through June 2005 and Vice President and Chief Financial Officer from 1998 to August 2004.

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Joseph A. Berquist, 48 Senior Vice President, Global Specialty Businesses and Chief Strategy Officer	Mr. Berquist, who has been employed by the Company since 1997, has served as Senior Vice President, Global Specialty Businesses and Chief Strategy Officer since August 1, 2019. He served as Vice President and Managing Director – North America from April 2010 until July 31, 2019.
Jeewat Bijlani, 43 Senior Vice President, Managing Director - Americas	Mr. Bijlani has served as Senior Vice President, Managing Director - Americas since he joined the Company on August 1, 2019. Prior to joining the Company, Mr. Bijlani served as President, Americas and Global Strategic Businesses of Houghton International, Inc. from March 2015 until July 31, 2019. Prior to that role, he served as Senior Vice President M&A, Business Development and Strategic Planning to execute Houghton's growth initiatives with key customers and in business segments from December 2011 to March 2015. Prior to joining Houghton, Mr. Bijlani served as a Director in the Private Equity Group at Celerant Consulting from March 2006 to November 2011 where he led strategic and business transformation engagements in the Chemicals and Manufacturing sector.
Mary Dean Hall, 62 Senior Vice President, Chief Financial Officer and Treasurer	Ms. Hall, who has been employed by the Company since November 2015, has served as Senior Vice President, Chief Financial Officer and Treasurer since August 1, 2019. She served as Vice President, Chief Financial Officer and Treasurer from November 2015 until July 31, 2019. Prior to joining the Company, Ms. Hall served as the Vice President and Treasurer of Eastman Chemical Company from April 2009 until October 2015. Prior to that role, she held various senior-level financial positions of increasing responsibility with Eastman from 1995 through 2009, including Treasurer, Vice President and Controller, and Vice President, Finance.
Shane W. Hostetter, 38 Vice President, Finance and Chief Accounting Officer	Mr. Hostetter, who has been employed by the Company since July 2011, has served as Vice President, Finance and Chief Accounting Officer since August 1, 2019. He served as Global Controller and Principal Accounting Officer from September 2014 until July 31, 2019.
Dieter Laininger, 56 Senior Vice President, Managing Director - Asia / Pacific	Mr. Laininger, who has been employed by the Company since 1991, has served as Senior Vice Present, Managing Director – Asia / Pacific since August 1, 2019. He served as Vice President and Managing Director – Asia / Pacific from April 2018 until July 31, 2019, in addition to his role as Vice President and Managing Director - South America, a position he assumed in January 2013 and held until July 31, 2019. Mr. Laininger also served as Vice President and Global Leader – Primary Metals, a position which he assumed in June 2011 and held until July 31, 2019.
Kym Johnson, 49 Senior Vice President, Chief Human Resources Officer	Ms. Johnson has served as Senior Vice President, Chief Human Resources Officer since she joined the Company on August 1, 2019. Prior to joining the Company, Ms. Johnson served as Senior Vice President Global Human Resources of Houghton International Inc. from June 2015 until July 31, 2019. Prior to joining Houghton, she served as Vice President, Human Resources and Chief Human Resources Officer of FMC Corporation from July 2013 to October 2014. Prior to that role, she held various senior-level human resources roles with FMC from July 1992 to October 2014, including Director, Global Talent Management and HR Director, Asia Pacific.

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Dr. David Slinkman, 55 Senior Vice President, Chief Technology Officer	Dr. Slinkman has served as Senior Vice President, Chief Technology Officer since he joined the Company on August 1, 2019. Prior to joining the Company, Dr. Slinkman served as Vice President of Technology of Houghton from March 2012 through July 31, 2019. Prior to joining Houghton, Dr. Slinkman served as Global Technology Leader of Nalco Chemical Company from 2008 until 2012. Prior to that role, he held various positions with Nalco from December 1990 until 2008 including Manager, Research and Development for the finishing technologies group, which encompassed both metal working fluids and surface treatment products, and Technical Director for the paper chemicals group.
Robert T. Traub, 55 Senior Vice President, General Counsel and Corporate Secretary	Mr. Traub, who has been employed by the Company since 2000, has served as Senior Vice President, General Counsel and Corporate Secretary since August 1, 2019. He served as Vice President, General Counsel and Corporate Secretary from April 2015 until July 31, 2019. He served as the Corporation’s General Counsel from March 2012 through March 2015. He has also served as Director of Global Corporate Compliance since January 2009.
Wilbert Platzer, 58 Senior Vice President, Global Operations, Environmental Health & Safety (“EHS”) and Procurement	Mr. Platzer, who has been employed by the Company since 1995, has served as Senior Vice President, Global Operations, EHS and Procurement since August 1, 2019. He served as Vice President, Global Operations, EHS and Procurement from April 2018 until July 31, 2019. He served as Vice President and Managing Director – EMEA from January 2006 through March 2018.
Adrian Steeples, 59 Senior Vice President, Managing Director – EMEA	Mr. Steeples, who has been employed by the Company since 2010, has served as Senior Vice President, Managing Director – EMEA since August 1, 2019. He served as Vice President and Managing Director – EMEA from April 2018 until July 31, 2019. He served as Vice President and Managing Director - Asia/Pacific from July 2013 through March 2018.

PART II

Item 5. ***Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.***

The Company's common stock is listed on the New York Stock Exchange ("NYSE") under the trading symbol KWR. Our Board declared cash dividends that totaled $1.525 per share of outstanding common stock or $23.7 million during the year ended December 31, 2019 and $1.47 per share of outstanding common stock or $19.5 million during the year ended December 31, 2018. In February 2019 our Board declared a quarterly cash dividend of $0.37 per share of outstanding common stock, payable to shareholders of record in April 2019. Subsequently, our Board declared quarterly dividends of $0.385 per share of outstanding common stock in May, September and November 2019, respectively, payable to shareholders of record in July and October 2019 and January 2020, respectively. We currently expect to continue to pay comparable cash dividends on a quarterly basis in the future. Future declaration of dividends and the establishment of future record dates and payment dates are subject to the final determination of our Board, and will be based on our future financial condition, results of operations, capital requirements, capital expenditure requirements, contractual restrictions, anticipated cash needs, business prospects, provisions of applicable law and other factors our Board may deem relevant.

There are no restrictions that the Company believes are likely to materially limit the payment of future dividends. However, under the New Credit Facility there are certain restrictions, including a limit on dividends paid not to exceed the greater of $50.0 million annually and 20% of consolidated EBITDA so long as there is no default under the New Credit Facility. Reference is made to the "Liquidity and Capital Resources" disclosure contained in Item 7 of this Report.

As of February 29, 2020, there were 811 shareholders of record of the Company's common stock, its only outstanding class of equity securities. As of February 29, 2020, 17,732,818 shares of Quaker common stock were issued, outstanding and entitled to one vote per share.

Reference is made to the information in Item 12 of this Report under the caption "Equity Compensation Plans," which is incorporated herein by this reference.

The following table sets forth information concerning shares of the Company's common stock acquired by the Company during the fourth quarter of 2019 for the period covered by this report:

Issuer Purchases of Equity Securities

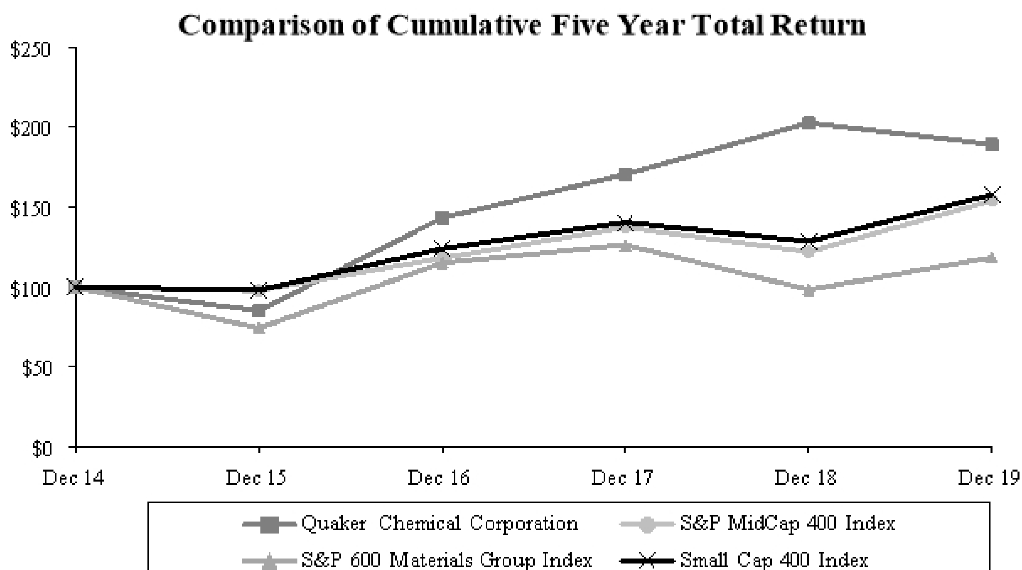
Period	(a) Total Number of Shares Purchased (1)	(b) Average Price Paid Per Share (2)	(c) Total Number of Shares Purchased as part of Publicly Announced Plans or Programs	(d) Approximate Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs (3)
October 1 - October 31, 2019	—	$ —	—	$ 86,865,026
November 1 - November 30, 2019	52	$ 157.22	—	$ 86,865,026
December 1 - December 31, 2019	—	$ —	—	$ 86,865,026
Total	52	$ 157.22	—	$ 86,865,026

(1) All of these shares were acquired from employees upon their surrender of Quaker Chemical Corporation shares in payment of the exercise price of employee stock options exercised or for the payment of taxes upon exercise of employee stock options or the vesting of restricted stock.

(2) The price paid for shares acquired from employees pursuant to employee benefit and share-based compensation plans is, in each case, based on the closing price of the Company's common stock on the date of exercise or vesting as specified by the plan pursuant to which the applicable option or restricted stock was granted.

(3) On May 6, 2015, the Board of the Company approved a share repurchase program, pursuant to which the Company is authorized to repurchase up to $100,000,000 of Quaker Chemical Corporation common stock (the "2015 Share Repurchase Program") and has no expiration date. There were no shares acquired by the Company pursuant to the 2015 Share Repurchase Program during the quarter ended December 31, 2019.

Stock Performance Graph: The following graph compares the cumulative total return (assuming reinvestment of dividends) from December 31, 2014 to December 31, 2019 for (i) Quaker's common stock, (ii) the S&P SmallCap 600 Index (the "SmallCap Index"), (iii) the S&P MidCap 400 Index (the "MidCap Index"), and (iv) the S&P 600 Materials Group Index (the "Materials Group Index"). The graph assumes the investment of $100 on December 31, 2014 in each of Quaker's common stock and the stocks comprising the SmallCap Index, the MidCap Index and the Materials Group Index, respectively. The comparison to the MidCap Index was added in 2019 as a result of the Company's increased size post-closing of the Combination.



	12/31/2014	12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019
Quaker	$ 100.00	$ 85.19	$ 143.24	$ 170.49	$ 202.72	$ 189.23
SmallCap Index	100.00	98.03	124.06	140.48	128.56	157.85
MidCap Index	100.00	97.82	118.11	137.30	122.08	154.07
Materials Group Index	100.00	74.36	115.03	126.44	98.30	118.52

Item 6. *Selected Financial Data.*

The selected historical consolidated financial data for each of the years ended December 31, 2019, 2018 and 2017, and as of December 31, 2019 and 2018 was derived from the audited consolidated financial statements included in the Report. The selected historical consolidated financial data for each of the years ended December 31, 2016 and 2015 and as of December 31, 2017, 2016 and 2015 was derived from our audited consolidated financial statements not included in the Report.

The following table sets forth selected historical consolidated financial data for the Company and its consolidated subsidiaries:

(in thousands, except dividends and per share data):	Year Ended December 31, 2019 (1)	2018 (2)	2017 (3)	2016 (4)	2015 (5)
Summary of Operations:					
Net sales	$ 1,133,503	$ 867,520	$ 820,082	$ 746,665	$ 737,555
Income before taxes and equity in net income of associated companies	28,904	83,098	60,668	84,009	70,230
Net income attributable to Quaker Chemical Corporation	31,622	59,473	20,278	61,403	51,180
Per share:					
Net income attributable to Quaker Chemical Corporation Common Shareholders - basic	$ 2.08	$ 4.46	$ 1.53	$ 4.64	$ 3.84
Net income attributable to Quaker Chemical Corporation Common Shareholders - diluted	$ 2.08	$ 4.45	$ 1.52	$ 4.63	$ 3.84
Dividends declared	1.525	1.465	1.41	1.355	1.26
Dividends paid	1.51	1.45	1.40	1.33	1.24
Financial Position					
Working capital	$ 356,038	$ 267,040	$ 251,843	$ 249,057	$ 233,517
Total assets	2,850,316	709,665	722,126	692,028	680,727
Long-term debt	882,437	35,934	61,068	65,769	81,439
Total equity	1,242,366	436,369	409,618	412,606	381,243

(1) The Company acquired Houghton on August 1, 2019 and Norman Hay on October 1, 2019, so results presented above reflect five months and three months, respectively, in the summary of operations and both are included in the December 31, 2019 financial position. Net income attributable to Quaker Chemical Corporation in 2019 includes equity income from a captive insurance company of $1.8 million after tax; a $5.3 million deferred tax benefit on an intercompany intangible asset transfer; $0.4 million tax credit related to the U.S. Tax Reform; and a $0.1 million insurance insolvency recovery; offset by $38.0 million of total Houghton combination and other acquisition-related expenses, which includes approximately $2.1 million of interest costs to maintain the bank commitment related to the Combination and approximately $0.5 million of accelerated depreciation recorded in cost of goods sold; $26.7 million of restructuring expenses; $11.7 million for the fair value step up of Houghton and Norman Hay inventory sold; $2.8 million for the non-service components of the Company's pension and postretirement benefit costs; $1.1 million of certain customer bankruptcy charges; $1.0 million of after-tax currency conversion impacts related to hyper-inflationary accounting at the Company's wholly owned Argentine subsidiaries; and $0.4 million of charges related to the settlement of a non-core equipment sale. See the Non-GAAP Measures section in Item 7 of this Report.

(2) Net income attributable to Quaker Chemical Corporation in 2018 includes equity income from a captive insurance company of $1.0 million after tax; a $0.4 million foreign currency transaction gain related to the liquidation of an inactive legal entity; and a $0.1 million insurance insolvency recovery; offset by $19.5 million of total Houghton combination and other acquisition-related expenses, which includes approximately $3.5 million of interest costs to maintain the bank commitment related to the Combination and a $0.6 million gain on the sale of a held-for-sale asset; $2.3 million for the non-service components of the Company's pension and postretirement benefit costs; $5.8 million of tax charges related to the U.S. Tax Reform; $0.4 million of currency conversion impacts related to hyper-inflationary accounting at the Company's affiliate in Argentina; and $0.3 million of after-tax currency conversion impacts related to hyper-inflationary accounting at the Company's 50% owned affiliate in Venezuela. See the Non-GAAP Measures section in Item 7 of this Report.

(3) Net income attributable to Quaker Chemical Corporation in 2017 includes equity income from a captive insurance company of $2.5 million after tax; and a $0.6 million insurance insolvency recovery; offset by $30.8 million of total Houghton combination and other acquisition-related expenses, which includes $0.9 million of interest costs to maintain the bank commitment related to the Combination; $4.2 million for the non-service components of the Company's pension and postretirement benefit costs; $22.2 million of tax charges related to the U.S. Tax Reform; $0.3 million of charges related to cost streamlining initiatives in the Company's corporate group; a $0.1 million loss on disposal of a held-for-sale asset; and $0.4 million of after-tax currency conversion impacts related to hyper-inflationary accounting at the Company's 50% owned affiliate in Venezuela. See the Non-GAAP Measures section in Item 7 of this Report.

(4) Net income attributable to Quaker Chemical Corporation in 2016 includes equity income from a captive insurance company of $1.7 million after tax; and a $0.4 million credit related to the Company's 2015 global restructuring program; offset by $1.5 million of total Houghton combination and other acquisition-related expenses; $2.3 million for the non-service components of the Company's pension and postretirement benefit costs; and $0.1 million of after-tax currency conversion impacts related to hyper-inflationary accounting at the Company's 50% owned affiliate in Venezuela.

(5) Net income attributable to Quaker Chemical Corporation in 2015 includes equity income from a captive insurance company of $2.1 million after tax; offset by $2.8 million of after-tax currency conversion impacts related to hyper-inflationary accounting at the Company's 50% owned affiliate in Venezuela; $3.3 million for the non-service components of the Company's pension and postretirement benefit costs; $2.8 million of acquisition-related expenses; $0.2 million of charges related to cost streamlining initiatives in the Company's Americas segment; $0.3 million of charges related to certain U.S. customer bankruptcies; and $6.8 million of charges related to the Company's 2015 global restructuring program.

Item 7. ***Management's Discussion and Analysis of Financial Condition and Results of Operations.***

Executive Summary

On August 1, 2019, Quaker Chemical Corporation completed its combination with Houghton International, Inc. ("Houghton") (herein referred to as "the Combination"). As a result, five months of operations of Houghton post-closing of the Combination are included in the Company's results described below. In addition, the Company acquired the operating divisions of Norman Hay plc ("Norman Hay") on October 1, 2019, so three months of operations of Norman Hay post-closing are included in the Company's results described below. See the Non-GAAP Measures section of this Item and reconciliations set forth therein, below.

Quaker Houghton is a global leader in industrial process fluids. With a presence around the world, including operations in over 25 countries, our customers include thousands of the world's most advanced and specialized steel, aluminum, automotive, aerospace, offshore, can, mining, and metalworking companies. Our high-performing, innovative and sustainable solutions are backed by best-in-class technology, deep process knowledge, and customized services. Quaker Houghton is headquartered in Conshohocken, Pennsylvania, located near Philadelphia in the United States.

The Company's 2019 operating performance was the result of a mix of both positive and negative financial impacts. Specifically, the Company benefited from the inclusion of the Houghton business post-closing of the Combination and the Norman Hay business acquired in the fourth quarter of 2019, but this was partially offset by increases in Combination-related costs, restructuring expenses, overall challenging end-market conditions, and negative effects from foreign currency translation. Specifically, net sales of $1,133.5 million in 2019 increased 31% compared to $867.5 million in 2018, due primarily to the inclusion of $319.4 million of Houghton and Norman Hay net sales. Excluding Houghton and Norman Hay net sales, the Company's net sales would have declined 6% year-over-year, primarily driven by lower volumes of approximately 3% and a negative impact from foreign currency translation of 3%. The Company's gross profit increased $79.8 million in 2019, primarily driven by the inclusion of Houghton and Norman Hay partially offset by the impact of $11.7 million of expense associated with selling acquired Houghton and Norman Hay inventory that was adjusted to fair value in accordance with purchase accounting. In 2019, the Company's gross margin was 34.6%; however, without the one-time increase to costs of goods sold ("COGS") associated with selling acquired Houghton and Norman Hay inventory and certain accelerated depreciation charges related to the Company's integration plans, the Company's gross margin would have been 35.7% in 2019 compared to 36.0% in 2018, reflecting the impact of price and product mix primarily due to lower gross margins in the Houghton business compared to Legacy Quaker. The Company's selling, general and administrative expenses ("SG&A") in 2019 were also higher compared to the prior year due to the inclusion of the Houghton and Norman Hay SG&A, partially offset by positive impacts due to foreign currency translation and the initial benefits of realized cost savings associated with the Combination. In addition, the Company incurred $38.0 million of total combination and other acquisition-related expenses in 2019 related to the completion of the Combination and acquisition of Norman Hay. The Company also initiated a restructuring program and recorded restructuring expense of approximately $26.7 million during 2019, as part of its plan to realize integration cost synergies associated with the Combination. Further details of the Company's consolidated operating performance are discussed in the Company's Consolidated Operations Review, in the Operations section of this Item, below.

The Company's 2019 net income and earnings per diluted share of $31.6 million and $2.08, respectively, declined compared to $59.5 million and $4.45 per diluted share, respectively, in 2018, which was primarily driven by the significant one-time impacts of the Combination mentioned above. Excluding all one-time costs associated with the Combination and other non-core items in each period, the Company's current year non-GAAP net income and non-GAAP earnings per diluted share were $88.7 million and $5.83, respectively, compared to $82.5 million and $6.17, respectively, in 2018. Also, the Company's current year adjusted EBITDA of $173.1 million increased 38% compared to $125.8 million in 2018. The increases in non-GAAP net income and adjusted EBITDA year-over-year were due to the Houghton and Norman Hay acquisitions, while the decrease in non-GAAP earnings per share was due to the issuance of approximately 4.3 million shares as part of the Combination. See the Non-GAAP Measures section of this Item, below.

During the third quarter of 2019 and in connection with the Combination, the Company established a new reportable segment structure which now includes four segments: (i) Americas; (ii) Europe, Middle East and Africa ("EMEA"); (iii) Asia/Pacific; and (iv) Global Specialty Businesses. The Company's 2019 operating performance reflected the positive impact of five months of Houghton's performance in all of its segments and three months of Norman Hay in its Global Specialty Businesses segment. Without the inclusion of Houghton and Norman Hay, net sales were lower in all segments compared to the prior year, primarily driven by declines in volume due to compounding conditions of weak automotive markets, specifically related to certain of our largest automotive customers, a generally weaker global industrial environment and certain customer inventory corrections and reductions in consumption. In addition, foreign currency translation negatively impacted all segments in 2019. As reported, segment operating earnings were higher in all segments compared to 2018, reflecting the inclusion of Houghton and Norman Hay net sales and gross profit, partially offset by higher SG&A as a result of the Combination and Norman Hay acquisition. Additional details of each segment's operating performance are further discussed in the Company's Reportable Segments Review, in the Operations section of this Item, below.

The Company generated net operating cash flow of $82.4 million in 2019 compared to $78.8 million in 2018. The increase in net operating cash flow year-over-year was primarily driven by the inclusion of operating cash flow from Houghton and Norman Hay and an increase in cash flow from working capital primarily due to accounts receivable on changes in net sales and lower inventory levels

compared to the prior year due to lower production, as well as efforts to improve working capital, which were partially offset by higher cash outflows for Combination and other acquisition-related costs. The key drivers of the Company's operating cash flow and overall liquidity are further discussed in the Company's Liquidity and Capital Resources section of this Item, below.

Despite weaker end market conditions and more significant foreign exchange headwinds in 2019 than originally anticipated, there were positive developments as well, as the Company achieved its targeted gross margin and SG&A levels as a combined company, and is effectively implementing its integration plan and is on track to achieve or exceed its planned integration cost synergies. Heading into 2020, the Company expected most of its business segments to show low to moderate growth. However, two negative events have since happened, coronavirus and Boeing's decision to temporarily stop production of the 737 Max aircraft, which have put more uncertainty than usual in the Company's ability to forecast 2020 results. Despite these challenges and other market uncertainties, the Company remains confident in its future as Quaker Houghton.

Critical Accounting Policies and Estimates

Quaker Houghton's discussion and analysis of its financial condition and results of operations are based upon its consolidated financial statements which have been prepared in accordance with accounting principles generally accepted in the United States ("U.S. GAAP"). The preparation of these financial statements requires the Company to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, the Company evaluates its estimates, including those related to customer sales incentives, product returns, bad debts, inventories, property, plant and equipment ("PP&E"), investments, goodwill, intangible assets, income taxes, business combinations, restructuring, incentive compensation plans (including equity-based compensation), pensions and other postretirement benefits, contingencies and litigation. Quaker Houghton bases its estimates on historical experience and on various other assumptions that are believed to be reasonable under such 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. However, actual results may differ from these estimates under different assumptions or conditions.

Quaker Houghton believes the following critical accounting policies describe the more significant judgments and estimates used in the preparation of its consolidated financial statements:

Accounts receivable and inventory exposures: Quaker Houghton establishes allowances for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. If the financial condition of the Company's customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances may be required. As part of our terms of trade, we may custom manufacture products for certain large customers and/or may ship products on a consignment basis. Further, a significant portion of our revenue is derived from sales to customers in industries where companies have experienced past financial difficulties. If a significant customer bankruptcy occurs, then we must judge the amount of proceeds, if any, that may ultimately be received through the bankruptcy or liquidation process. These matters may increase the Company's exposure should a bankruptcy occur, and may require a write down or a disposal of certain inventory as well as the failure to collect receivables. Reserves for customers filing for bankruptcy protection are established based on a percentage of the amount of receivables outstanding at the bankruptcy filing date. However, initially establishing this reserve and the amount thereto is dependent on the Company's evaluation of likely proceeds to be received from the bankruptcy process, which could result in the Company recognizing minimal or no reserve at the date of bankruptcy. We generally reserve for large and/or financially distressed customers on a specific review basis, while a general reserve is maintained for other customers based on historical experience. The Company's consolidated allowance for doubtful accounts was $11.7 million and $5.2 million as of December 31, 2019 and 2018, respectively. The Company recorded expense to increase its provision for doubtful accounts by $1.9 million, $0.5 million and $0.1 million for the years ended December 31, 2019, 2018 and 2017, respectively. Changing the amount of expense recorded to the Company's provisions by 10% would have increased or decreased the Company's pre-tax earnings by $0.2 million, $0.1 million and less than $0.1 million for the years ended December 31, 2019, 2018 and 2017, respectively. See Note 13 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Environmental and litigation reserves: Accruals for environmental and litigation matters are recorded when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated. Environmental costs and remediation costs are capitalized if the costs extend the life, increase the capacity or improve the safety or efficiency of the property from the date acquired or constructed, and/or mitigate or prevent contamination in the future. Estimates for accruals for environmental matters are based on a variety of potential technical solutions, governmental regulations and other factors, and are subject to a wide range of potential costs for remediation and other actions. A considerable amount of judgment is required in determining the most likely estimate within the range of total costs, and the factors determining this judgment may vary over time. Similarly, reserves for litigation and similar matters are based on a range of potential outcomes and require considerable judgment in determining the most probable outcome. If no amount within the range is considered more probable than any other amount, the Company accrues the lowest amount in that range in accordance with generally accepted accounting principles. See Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Realizability of equity investments: The Company holds equity investments in various foreign companies where it has the ability to influence, but not control, the operations of the entity and its future results. Quaker Houghton would record an impairment charge to an investment if it believed a decline in value that was other than temporary occurred. Adverse changes in market conditions, poor operating results of underlying investments, devaluation of foreign currencies or other events or circumstances could result in losses or an inability to recover the carrying value of the investments, potentially leading to an impairment charge in the future. The carrying amount of the Company's equity investments as of December 31, 2019 was $93.8 million, which included four investments: $16.2 million for a 33% interest in Primex, Ltd. (Barbados); $7.0 million for a 50% interest in Nippon Quaker Chemical, Ltd. (Japan); $0.2 million for a 50% interest in Kelko Quaker Chemical, S.A. (Panama), and $70.4 for a 50% interest in Korea Houghton Corporation (Korea) (which was acquired in the Combination), respectively. The Company also has a 50% interest in a Venezuelan affiliate, Kelko Quaker Chemical, S.A (Venezuela). Due to heightened foreign exchange controls, deteriorating economic circumstances and other restrictions in Venezuela, during the third quarter of 2018 the Company concluded that it no longer had significant influence over this affiliate. Prior to this determination, the Company historically accounted for this affiliate under the equity method. As of December 31, 2019 and 2018, the Company had no remaining carrying value for its investment in Venezuela. See Note 17 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Tax exposures, uncertain tax positions and valuation allowances: Quaker Houghton records expenses and liabilities for taxes based on estimates of amounts that will be determined as deductible in tax returns filed in various jurisdictions. The filed tax returns are subject to audit, which often occur several years subsequent to the date of the financial statements. Disputes or disagreements may arise during audits over the timing or validity of certain items or deductions, which may not be resolved for extended periods of time. The Company also evaluates uncertain tax positions on all income tax positions taken on previously filed tax returns or expected to be taken on a future tax return in accordance with FIN 48, which prescribes the recognition threshold and measurement attributes for financial statement recognition and measurement of tax positions taken or expected to be taken on a tax return and, also, whether the benefits of tax positions are probable or if they will be more likely than not sustained upon audit based upon the technical merits of the tax position. For tax positions that are determined to be more likely than not sustained upon audit, the Company recognizes the largest amount of benefit that is greater than 50% likely of being realized upon ultimate settlement in the financial statements. For tax positions that are not determined to be more likely than not sustained upon audit, the Company does not recognize any portion of the benefit in its financial statements. In addition, the Company's continuing practice is to recognize interest and/or penalties related to income tax matters in income tax expense. Also, the Company nets its liability for unrecognized tax benefits against deferred tax assets related to net operating losses or other tax credit carryforward on the basis that the uncertain tax position is settled for the presumed amount at the balance sheet date.

Quaker Houghton also records valuation allowances when necessary to reduce its deferred tax assets to the amount that is more likely than not to be realized. While the Company has considered future taxable income and assesses the need for a valuation allowance, in the event Quaker Houghton were to determine that it would be able to realize its deferred tax assets in the future in excess of its net recorded amount, an adjustment to the deferred tax asset would increase income in the period such determination was made. Likewise, should the Company determine that it would not be able to realize all or part of its net deferred tax assets in the future, an adjustment to the deferred tax asset would be charged to income in the period such determination was made. Both determinations could have a material impact on the Company's financial statements.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as "U.S. Tax Reform". U.S. Tax Reform implemented a new system of taxation for non-U.S. earnings which eliminated U.S. federal income taxes on dividends from certain foreign subsidiaries and imposed a one-time transition tax on the deemed repatriation of undistributed earnings of certain foreign subsidiaries that is payable over eight years. Based on interpretations and assumptions the Company believes to be reasonable with regard to various uncertainties and ambiguities in the application of certain provisions of U.S. Tax Reform and subsequent to numerous temporary regulations, notices, and other formal guidance published by the Internal Revenue Service ("I.R.S."), U.S. Treasury, and various state taxing authorities in 2018, the Company completed its accounting for the tax effects of U.S. Tax Reform as of December 22, 2018. It is possible that the I.R.S. could issue subsequent guidance or take positions on audit that differ from the Company's interpretations and assumptions. The Company currently believes that subsequent guidance or interpretations made by the I.R.S. will not be materially different from the Company's application of the provisions of U.S. Tax Reform and would not have a material adverse effect on the Company's tax liabilities, earnings, or financial condition.

Pursuant to U.S. Tax Reform, the Company recorded a $15.5 million transition tax liability for U.S. income taxes on the undistributed earnings of non-U.S. subsidiaries. However, the Company may also be subject to other taxes, such as withholding taxes and dividend distribution taxes, if these undistributed earnings are ultimately remitted to the U.S. As of December 31, 2019, the Company has a deferred tax liability of $8.2 million, which primarily represents the estimate of the non-U.S. taxes the Company will incur to remit certain previously taxed earnings to the U.S. It is the Company's current intention to reinvest its future undistributed earnings of non-U.S. subsidiaries to support working capital needs and certain other growth initiatives outside of the U.S. The amount of such undistributed earnings at December 31, 2019 was approximately $255.3 million. Any tax liability which might result from ultimate remittance of these earnings is expected to be substantially offset by foreign tax credits (subject to certain limitations). It is currently impractical to estimate any such incremental tax expense. See Note 10 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Goodwill and other intangible assets: The Company accounts for business combinations under the acquisition method of accounting. This method requires the recording of acquired assets, including separately identifiable intangible assets, at their acquisition date fair values. Any excess of the purchase price over the estimated fair value of the identifiable net assets acquired is recorded as goodwill. The determination of the estimated fair value of assets acquired requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, discount rates, royalty rates, asset lives and market multiples, among other items. When necessary, the Company consults with external advisors to help determine fair value. For non-observable market values, the Company may determine fair value using acceptable valuation principles, including the excess earnings, relief from royalty, lost profit or cost methods.

The Company amortizes definite-lived intangible assets on a straight-line basis over their useful lives. Goodwill and intangible assets that have indefinite lives are not amortized and are required to be assessed at least annually for impairment. In completing its quantitative impairment test, the Company compares the reporting units' fair value to their carrying value, primarily based on future discounted cash flows, in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable management judgment and are based upon certain significant assumptions. These assumptions include the weighted average cost of capital ("WACC") as well as projected revenue growth rates and operating income, which result in estimated EBITDA and EBITDA margins.

The Company completes its annual goodwill impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment in one or more of its reporting units. During the third quarter of 2019, the Company changed its reportable segments and associated reporting units. In connection with this change, the Company performed a qualitative assessment and concluded that there was no evidence of events or circumstances that would indicate a material change from the Company's prior year quantitative impairment assessment. The Company's consolidated goodwill at December 31, 2019 and 2018 was $607.2 million and $83.3 million, respectively. The Company completed its annual goodwill impairment assessment during the fourth quarter of 2019, and no impairment charge was warranted. Furthermore, the estimated fair value of each of the Company's reporting units substantially exceeded its carrying value, with none of the Company's reporting units at risk for failing step one of the goodwill impairment test. The Company used a WACC assumption for each of its reporting units of approximately 9%, and this assumption would have had to increase by approximately 24%, or 2.2 percentage points, before any of the Company's reporting units would be considered potentially impaired. Further, the Company's assumption of future and projected EBITDA margins by reporting unit would have had to decrease by more than approximately 16%, or 2.0 percentage points, before any of the Company's reporting units would be considered potentially impaired. The Company's consolidated indefinite lived intangible assets at December 31, 2019 and 2018 were $243.1 million and $1.1 million, respectively. The Company completed its annual indefinite lived intangible asset impairment assessment during the fourth quarter of 2019, and no impairment charge was warranted. Given the relative short period of time between the fair value determination for the acquired Houghton indefinite lived intangible assets as of the closing of the Combination and the annual impairment testing date, the Company's impairment assessment concluded that the $242.0 million carrying value of acquired Houghton indefinite lived intangible assets generally approximated fair value, with excess fair value of less than 5%. See Note 16 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Pension and Postretirement benefits: The Company provides certain defined benefit pension and other postretirement benefits to current employees, former employees and retirees. Independent actuaries, in accordance with U.S. GAAP, perform the required valuations to determine benefit expense and, if necessary, non-cash charges to equity for additional minimum pension liabilities. Critical assumptions used in the actuarial valuation include the weighted average discount rate, which is based on applicable yield curve data, including the use of a split discount rate (spot-rate approach) for the U.S. plans and certain foreign plans, rates of increase in compensation levels, and expected long-term rates of return on assets. If different assumptions were used, additional pension expense or charges to equity might be required.

The Company has a noncontributory U.S. pension plan (the "Legacy Quaker U.S. Pension Plan") that has a November 30 year-end and a measurement date of December 31. As previously disclosed, the Company began the process of terminating the Legacy Quaker U.S. Pension Plan during the fourth quarter of 2018. As part of this process, and considering the then fully funded status of the Legacy Quaker U.S. Pension Plan, the asset allocation of the Legacy Quaker U.S. Pension Plan was adjusted modeling a glide path that is more heavily allocated to fixed income securities with lengthened durations to match the projected liabilities. As a result, the expected return on plan assets declined during the year ended December 31, 2019 compared to the year ended December 31, 2018. In order to terminate the Legacy Quaker U.S. Pension Plan in accordance with I.R.S. and Pension Benefit Guaranty Corporation requirements, the Company will be required to fully fund the Legacy Quaker U.S. Pension Plan on a termination basis and will commit to contribute additional assets, if necessary, to do so. The amount necessary to do so is currently estimated to be between $1 and $2 million. In addition, the Company expects to record a non-cash pension settlement charge at plan termination. This settlement charge will include the immediate recognition into expense of the related unrecognized losses within accumulated other comprehensive (loss) income ("AOCI") on the balance sheet as of the plan termination date. The Company does not have a current estimate for this future settlement charge; however, the gross AOCI related to the Legacy Quaker U.S. Pension Plan was approximately $24 million as of December 31, 2019. During the third quarter of 2019, the Company received a favorable termination determination letter from the I.R.S. and has amended the Plan to comply with final regulations of the Internal Revenue Code. The Company currently estimates that the Legacy Quaker U.S. Pension Plan termination will be completed in the first half of 2020.

In connection with the Combination, the Company indirectly acquired all of Houghton's defined benefit pension plans. The pension plans cover certain U.S. salaried and hourly employees ("Houghton U.S. Plans") as well as certain employees in the U.K., France and Germany ("Houghton Foreign Plans"). The Houghton U.S. Plans provide benefits based on an employee's years of service and compensation received for the highest five consecutive years of earnings. Houghton management made the decision to freeze benefits for non-union employees as of March 31, 2009 for the Houghton U.S. Plans. The Houghton Foreign Plans provide benefits based on a formula of years of service and a percentage of compensation which varies among the Houghton Foreign Plans. Houghton management made the decision to freeze its U.K. plan benefits as of May 1, 2013. Also, in connection with the Combination, the Company now contributes to a multiemployer defined benefit pension plan under terms of a collective bargaining union contract (the Cleveland Bakers and Teamsters Pension Fund, Employer Identification Number: 34-0904419-001). The expiration date of the collective bargaining contract is May 1, 2022. The Employee Retirement Income Security Act of 1974, as amended by the Multi-Employer Pension Plan Amendments Act of 1980, imposes certain contingent liabilities upon an employer who is a contributor to a multiemployer pension plan if the employer withdraws from the plan or the plan is terminated or experiences a mass withdrawal. While the Company may also have additional liabilities imposed by law as a result of its participation in the multiemployer defined benefit pension plan, there is no liability as of December 31, 2019. See Note 21 of Notes to Consolidated Financial Statements in Item 8 of this Report.

The following table highlights the potential impact on the Company's pre-tax earnings due to changes in assumptions with respect to the Company's defined benefit pension and postretirement benefit plans, based on assets and liabilities as of December 31, 2019:

	1/2 Percentage Point Increase			**1/2 Percentage Point Decrease**		
(dollars in millions)	**Foreign**	**U.S.**	**Total**	**Foreign**	**U.S.**	**Total**
Discount rate (1)	$ 0.3	$ 0.2	$ 0.5	$ (0.4)	$ (0.2)	$ (0.6)
Expected rate of return on plan assets (2)	0.6	0.2	0.8	(0.7)	(0.2)	(0.9)

(1) The weighted-average discount rate used to determine net periodic benefit costs for the year ended December 31, 2019 was 2.41% for Foreign plans and 4.08% for U.S. plans.

(2) The weighted average expected rate of return on plan assets used to determine net periodic benefit costs for the year ended December 31, 2019 was 2.26% for Foreign plans and 5.75% for U.S. plans.

Restructuring and other related liabilities: A restructuring related program may consist of charges for employee severance, rationalization of manufacturing facilities and other related expenses. To account for such, the Company applies the Financial Accounting Standards Board's guidance regarding exit or disposal cost obligations. This guidance requires that a liability for a cost associated with an exit or disposal activity be recognized when the liability is incurred, is estimable, and payment is probable. See Note 7 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Recently Issued Accounting Standards

See Note 3 of Notes to the Consolidated Financial Statements in Item 8 of this Report for a discussion regarding recently issued accounting standards.

Liquidity and Capital Resources

At December 31, 2019, the Company had cash, cash equivalents and restricted cash of $143.6 million, including $20.0 million of restricted cash. Total cash, cash equivalents and restricted cash was approximately $124.4 million at December 31, 2018, which included $20.3 million of restricted cash. The approximately $19.2 million increase was the net result of $82.4 million of cash provided by operating activities, $908.6 million of cash used in investing activities, $844.1 million of cash provided by financing activities and a $1.3 million positive impact due to the effect of foreign exchange rate changes on cash.

Net cash provided by operating activities was $82.4 million in 2019 compared to $78.8 million in 2018. The $3.6 million increase in net cash flows provided by operating activities year-over-year was driven by the inclusion of operating cash flow from Houghton and Norman Hay and an increase in operating cash flow from working capital. The Company had higher operating cashflow from accounts receivables largely due to changes in net sales and from inventory due to lower production, as well as efforts to improve working capital. These increases to operating cashflow year-over-year were partially offset by approximately $35.6 million of additional cash outflows related to combination and other acquisition-related expenses year-over-year and $8.9 million of restructuring payments in 2019, discussed below. In addition, the Company had higher operating cash outflows associated with cash tax payments in 2019, including withholding taxes previously reserved for and related to the repatriation of certain foreign earnings during 2019. The Company also had lower cash dividends received from the Company's captive insurance company in the 2019 compared to 2018. In addition, 2018 working capital was impacted by lower receipts on accounts receivable due to an uncommon significant collection from a certain customer during the fourth quarter of 2017. Cash flow from operating activities also benefited from lower pension cash outflows resulting from the Company's fourth quarter of 2018 decision to begin the process of terminating the Legacy Quaker U.S. Pension Plan, also described below.

Net cash used in investing activities increased from $12.4 million in 2018 to $908.6 million in 2019. In 2019, the Company paid cash of approximately $797.6 million, net of cash acquired, to close the Combination with Houghton, and approximately $95.3 million, net of cash acquired, to purchase Norman Hay. In addition, during both 2019 and 2018, the Company paid $0.5 million for certain formulations and product technology in the mining industry in accordance with the terms of the associated asset purchase agreement. Cash used for investments in PP&E increased in 2019 compared to 2018 primarily due to capital spending for certain integration related projects for the Combination. Cash proceeds from dispositions of assets declined from 2018 to 2019, primarily as a result of $0.6 million of cash proceeds received during the second quarter of 2018 related to the sale of a held-for-sale asset.

Net cash provided by financing activities was $844.1 million in 2019 compared to cash used in financing activities of $46.9 million in 2018. The year-over-year change was primarily a result of $888.3 million of funds borrowed, net of repayments, primarily used to close the Combination and acquire Norman Hay in the current year compared to $26.7 million of debt repayments during the prior year. In addition, the Company replaced its previous revolving credit facility (the “Old Credit Facility”) with a new syndicated and secured facility, described below, which resulted in cash paid for financing-related debt issuance costs of $23.7 million in 2019 in connection with executing the New Credit Facility, described below. The Company paid cash dividends of $21.8 million in 2019, a $2.5 million or 13% increase in cash dividends compared to the prior year, primarily driven by an increase in shares outstanding due to the shares issued at closing of the Combination, as well as the current year cash dividend per share increase. Finally, in 2018, one of the Company’s less than 100% owned consolidated affiliates made a distribution to the noncontrolling affiliate shareholder of approximately $0.9 million; there were no similar distributions in 2019.

On August 1, 2019, the Company completed the Combination, whereby the Company acquired all of the issued and outstanding shares of Houghton from Gulf Houghton Lubricants, Ltd. in accordance with the share purchase agreement dated April 4, 2017. The final purchase consideration was comprised of: (i) $170.8 million in cash; (ii) the issuance of approximately 4.3 million shares of common stock of the Company with par value of $1.00, comprising approximately 24.5% of the common stock of the Company at closing; and (iii) the Company’s refinancing of $702.6 million of Houghton’s indebtedness at closing. Cash acquired in the Combination was $75.8 million.

The Combination was subject to certain regulatory and shareholder approvals. At a shareholder meeting held during 2017, the Company’s shareholders approved the issuance of the new shares of the Company’s common stock at closing of the Combination. Also in 2017, the Company received regulatory approvals for the Combination from China and Australia. The Company received regulatory approvals from the European Commission (“EC”) during the second quarter of 2019 and the U.S. Federal Trade Commission (“FTC”) in July 2019. The approvals from the FTC and the EC required the concurrent divestiture of certain steel and aluminum related product lines of Houghton, which were sold by Houghton on August 1, 2019 for approximately $37 million in cash. This cash is included in the $75.8 million of cash acquired on the date of close. The final remedy agreed with the EC and the FTC was consistent with the Company’s previous expectation that the total divested product lines would be approximately 3% of the combined company’s net sales.

Prior to the Combination, the Company secured commitments from certain banks for a new credit facility (as amended, the “New Credit Facility”). Concurrent with the closing of the Combination on August 1, 2019, those banks, Bank of America, N.A. as administrative agent, the Company and certain other parties closed on the New Credit Facility, replacing the Company’s Old Credit Facility.

The New Credit Facility is comprised of a $400.0 million multicurrency revolver (the “Revolver”), a $600.0 million U.S. term loan (the “U.S. Term Loan”), each with the Company as borrower, and a $150.0 million (as of August 1, 2019) Euro equivalent Euro term loan (the “Euro Term Loan” and together with the “U.S. Term Loan”, the “Term Loans”) with Quaker Chemical B.V., a Dutch subsidiary of the Company as borrower, each with a five-year term maturing in August 2024. Subject to the consent of the administrative agent and certain other conditions, the Company may designate additional borrowers. The maximum amount available under the New Credit Facility can be increased by up to $300.0 million at the Company’s request if there are lenders who agree to accept additional commitments and the Company has satisfied certain other conditions. Borrowings under the New Credit Facility bear interest at a base rate or LIBOR plus an applicable margin based upon the Company’s consolidated net leverage ratio. There are LIBOR replacement provisions that contemplate a further amendment if and when LIBOR ceases to be reported. Interest incurred on the outstanding borrowings under the New Credit Facility post-closing of the Combination through December 31, 2019 was approximately 3.1% per annum. In addition to paying interest on outstanding principal under the New Credit Facility, the Company is required to pay a 0.25% commitment fee to the lenders under the Revolver in respect of the unutilized commitments thereunder. The Company has unused capacity under the Revolver of approximately $221 million, net of bank letters of credit of approximately $8 million, as of December 31, 2019. Until closing of the Combination, the Company incurred ticking fees to maintain the bank commitment, which began to accrue on September 29, 2017. Concurrent with closing of the Combination and executing the New Credit Facility, the Company paid approximately $6.3 million of ticking fees.

The New Credit Facility is subject to certain financial and other covenants. The Company’s initial consolidated net debt to consolidated adjusted EBITDA ratio cannot exceed 4.25 to 1, with step downs in the permitted ratio over the course of the New Credit Facility. The Company’s consolidated adjusted EBITDA to interest expense ratio cannot be less than 3.0 to 1. Such covenants are more fully defined in the New Credit Facility, of which the associated credit agreement is included as an exhibit to this Report. The New Credit Facility has limitations on the ability of the Company to pay dividends; it may not pay cash dividends if it is in default and the amount it may pay each year is limited to the greater of $50.0 million and 20% of consolidated adjusted EBITDA unless the ratio

of consolidated net debt to consolidated adjusted EBITDA is less than 2.0 to 1.0, in which case there is no such limitation on amount. At the closing of the Combination and as of December 31, 2019, the Company was in compliance with all of the New Credit Facility covenants. The Term Loans have quarterly principal amortization during their respective five-year maturities, with 5.0% amortization of the principal balance due in years 1 and 2, 7.5% in year 3, and 10.0% in years 4 and 5, with the remaining principal amount due at maturity. The New Credit Facility is guaranteed by certain of the Company's domestic subsidiaries and is secured by first priority liens on substantially all of the assets of the Company and the domestic subsidiary guarantors, subject to certain customary exclusions. The obligations of the Dutch borrower only are guaranteed by certain foreign subsidiaries on an unsecured basis.

On March 17, 2020, the Company, the administrative agent, and certain other parties entered into an amendment (the "Amendment") to the New Credit Facility. The New Credit Facility requires the Company to deliver to the administrative agent and each lender the audited consolidated financial statements of the Company at the end of each fiscal year. Without having obtained the Amendment, failing to observe this financial statements covenant by March 17, 2020 with respect to the Company's financial statements for 2019 would have been an event of default under the New Credit Facility, thereby entitling the administrative agent and the lenders to accelerate the payment of the unpaid principal amount of all outstanding loans and all interest accrued and unpaid thereon, among other remedies. The Amendment extends the delivery dates for the foregoing financial statements to April 16, 2020.

The New Credit Facility required the Company to fix its variable interest rates on at least 20% of its total Term Loans. In order to satisfy this requirement as well as to manage the Company's exposure to variable interest rate risk associated with the New Credit Facility, in November 2019, the Company entered into $170.0 million notional amounts of three-year interest rate swaps at a base rate of 1.64% plus an applicable margin as provided in the New Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, this aggregate rate was 3.1%.

The Company capitalized $23.7 million of certain third-party debt issuance costs in connection with executing the New Credit Facility. Approximately $15.5 million of the capitalized costs was attributed to the Term Loans and was recorded as a direct reduction of long-term debt on the Company's Consolidated Balance Sheet. Approximately $8.3 million was attributed to the Revolver and recorded within other assets on the Company's Consolidated Balance Sheet. These capitalized costs will be amortized into interest expense over the five-year term of the New Credit Facility.

The Old Credit Facility was a $300.0 million syndicated multicurrency, unsecured revolving credit facility with a group of lenders. Borrowings under the Old Credit Facility generally bore interest at a base rate or LIBOR rate plus a margin. The Old Credit Facility had certain financial and other covenants, with the key financial covenant requiring that the Company's consolidated total debt to adjusted EBITDA ratio could not exceed 3.50 to 1. During July 2019, the Old Credit Facility was amended and restated to extend the maturity date to August 31, 2020 and was subsequently replaced by the New Credit Facility as of August 1, 2019. At the date the Old Credit Facility was replaced, the Company was in compliance with all of its covenants.

As of December 31, 2019, the Company had New Credit Facility borrowings outstanding of $922.4 million. As of December 31, 2018, the Company had Old Credit Facility borrowings of $24.0 million. The Company's other debt obligations are primarily industrial development bonds, bank lines of credit and municipality-related loans, which totaled $12.6 million as of both December 31, 2019 and 2018. Total unused capacity under these arrangements as of December 31, 2019 was approximately $28 million. The Company's aggregate net indebtedness as of December 31, 2019 was $811.4 million, excluding debt issuance costs recorded as a reduction of long-term debt.

The Company has begun to incur and will realize more costs and make associated cash payments to integrate Quaker and Houghton and begin realizing the Combination's total anticipated cost synergies, which are currently estimated to be at least $60 million once all cost savings actions have been implemented by the second year after close. Specifically, the Company incurred $38.0 million of total Combination and other acquisition-related expenses in 2019, described in the Non-GAAP Measures section of this Item below. This includes $2.1 million of ticking fees as well as $0.6 million of accelerated depreciation charges related to initial decisions made to rationalize the combined Company's manufacturing and office footprint globally. The Company had aggregate net cash outflows of approximately $52.4 million related to the combination and other acquisition-related expenses, which includes cash outflows of approximately $10.3 million for certain Combination-related liabilities assumed and paid out subsequent to the closing of the Combination. Comparatively, in 2018, total Combination and other acquisition-related expenses totaled $19.5 million, including $3.5 million of ticking fees as well as a $0.6 million gain on the sale of a held-for-sale asset, and aggregate net cash outflows related to these costs were approximately $16.8 million.

Quaker Houghton's management approved, and the Company initiated, a global restructuring plan (the "QH Program") in the third quarter of 2019 as part of its planned cost synergies associated with the Combination. The QH Program will include restructuring and associated severance costs to reduce total headcount by approximately 275 people globally and plans for the closure of certain manufacturing and non-manufacturing facilities. As a result of the QH Program, the Company recognized $26.7 million of restructuring expense in 2019. The exact timing and total costs associated with the QH Program will depend on a number of factors and is subject to change; however, the Company currently expects reduction in headcount and site closures to occur over the next two years under the QH Program and estimates that total costs related to the QH Program will approximate one-times the anticipated cost synergies realized under this program. The Company made cash payments related to the settlement of restructuring liabilities under the QH Program in 2019 of approximately $8.9 million.

Post-closing of the Combination, the Company currently projects combination and other acquisition-related costs and cash payments, including the QH Program, but excluding incremental capital expenditures related to the Combination, will generally approximate one-times the anticipated cost synergies. The Company expects to incur these costs over a three-year period post-close, with a significant portion of these costs incurred or expected to be incurred in 2019 and 2020. Including the QH Program and other cost savings, the Company estimates that in 2019 it achieved approximately $7 million in synergies related to the Combination on a combined company pro-forma basis as compared to the prior year.

In the fourth quarter of 2018, the Company began the process of terminating the Legacy Quaker U.S. Pension Plan. Participants of the Legacy Quaker U.S. Pension Plan will have their benefits either converted into a lump sum cash payment or an annuity contract placed with an insurance carrier. In order to terminate the Legacy Quaker U.S. Pension Plan in accordance with I.R.S. and Pension Benefit Guaranty Corporation requirements, the Company will be required to fully fund the Legacy Quaker U.S. Pension Plan on a termination basis and will commit to contribute additional assets, if necessary, to do so. The amount necessary to do so is currently estimated to be between $1 and $2 million. The Company currently estimates that the Legacy Quaker U.S. Pension Plan termination will be completed in the first half of 2020.

On October 1, 2019, the Company closed its acquisition of Norman Hay plc, a private U.K. company that provides specialty chemicals, operating equipment, and services to various industrial end markets. The original purchase price was 80.0 million GBP, on a cash-free and debt-free basis, subject to routine and customary post-closing adjustments related to working capital and net indebtedness levels. The Company expects to finalize its post-closing adjustments for the Norman Hay acquisition in the first half of 2020 and currently estimates that it will pay approximately 2.7 million GBP to settle such adjustments. The Company has accrued for this estimated additional purchase price as of December 31, 2019. Cash paid for Norman Hay in the fourth quarter of 2019 was approximately $95.3 million, net of cash acquired.

As of December 31, 2019, the Company's gross liability for uncertain tax positions, including interest and penalties, was $24.5 million. The Company cannot determine a reliable estimate of the timing of cash flows by period related to its uncertain tax position liability. However, should the entire liability be paid, the amount of the payment may be reduced by up to $5.8 million as a result of offsetting benefits in other tax jurisdictions.

The Company believes it is capable of supporting its operating requirements and funding its business objectives, including but not limited to, payments of dividends to shareholders, costs related to the Combination and other acquisition-related activities, restructuring expenses, pension plan contributions, capital expenditures, other business opportunities and other potential contingencies, through internally generated funds supplemented with debt or equity as needed.

Beginning in early 2020, there has been an outbreak of coronavirus (COVID-19), initially in China and which has spread to other jurisdictions, including locations where the Company does business. The full extent of the outbreak, related business and travel restrictions and changes to behavior intended to reduce its spread are uncertain as of the date of the Report as this continues to evolve globally. Therefore, the full extent to which coronavirus may impact the Company's results of operations or liquidity is uncertain. This outbreak has already had a material disruption on the operations of the Company and its suppliers and customers. Management continues to monitor the impact that the COVID-19 pandemic is having on the Company, the specialty chemical industry and the economies in which the Company operates. The Company anticipates that its future results of operations, including the results for 2020, will be materially impacted by the coronavirus outbreak, but at this time does not currently expect that the impact from the coronavirus outbreak will have a material effect on the Company's liquidity or financial position. However, given the speed and frequency of continuously evolving developments with respect to this pandemic, the Company cannot reasonably estimate the magnitude of the impact to its results of operations, and, if the outbreak continues on its current trajectory, such impacts could grow and become material to its liquidity or financial position. To the extent that the Company's customers and suppliers continue to be materially and adversely impacted by the coronavirus outbreak, this could reduce the availability, or result in delays, of materials or supplies to or from the Company, which in turn could materially interrupt the Company's business operations.

The following table summarizes the Company's contractual obligations as of December 31, 2019, and the effect such obligations are expected to have on its liquidity and cash flows in future periods. Pension and other postretirement plan contributions excludes any potential required cash contributions, if necessary, as a part of the Legacy Quaker U.S. Pension Plan settlement, described above. In addition, pension and postretirement plan contributions beyond 2020 are not determinable since the amount of any contribution is heavily dependent on the future economic environment and investment returns on pension trust assets. The timing of payments related to other long-term liabilities which consists primarily of deferred compensation agreements and environmental reserves, also cannot be readily determined due to their uncertainty. Interest obligations on the Company's long-term debt and capital leases assume the current debt levels will be outstanding for the entire respective period and apply the interest rates in effect as of December 31, 2019.

(dollars in thousands)	Payments due by period						
Contractual Obligations	**Total**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025 and Beyond**
Long-term debt	$ 934,800	$ 38,634	$ 37,970	$ 56,628	$ 75,380	$ 716,012	$ 10,176
Interest obligations	118,848	26,722	25,639	24,228	22,280	18,226	1,753
Capital lease obligations	165	52	37	33	34	9	-
Operating leases	48,929	12,731	10,095	6,570	4,692	3,859	10,982
Purchase obligations	2,066	2,066	-	-	-	-	-
Transition tax	8,500	-	-	-	1,529	3,099	3,872
Pension and other postretirement plan contributions	10,449	10,449	-	-	-	-	-
Other long-term liabilities (See Note 22 of Notes to Consolidated Financial Statements)	13,182	-	-	-	-	-	13,182
Total contractual cash obligations	$ 1,136,939	$ 90,654	$ 73,741	$ 87,459	$ 103,915	$ 741,205	$ 39,965

Non-GAAP Measures

The information in this Form 10-K filing includes non-GAAP (unaudited) financial information that includes EBITDA, adjusted EBITDA, adjusted EBITDA margin, non-GAAP operating income, non-GAAP operating margin, non-GAAP net income and non-GAAP earnings per diluted share. The Company believes these non-GAAP financial measures provide meaningful supplemental information as they enhance a reader's understanding of the financial performance of the Company, are indicative of future operating performance of the Company, and facilitate a comparison among fiscal periods, as the non-GAAP financial measures exclude items that are not considered indicative of future operating performance or not considered core to the Company's operations. Non-GAAP results are presented for supplemental informational purposes only and should not be considered a substitute for the financial information presented in accordance with GAAP.

The Company presents EBITDA which is calculated as net income attributable to the Company before depreciation and amortization, interest expense, net, and taxes on income before equity in net income of associated companies. The Company also presents adjusted EBITDA which is calculated as EBITDA plus or minus certain items that are not considered indicative of future operating performance or not considered core to the Company's operations. In addition, the Company presents non-GAAP operating income which is calculated as operating income plus or minus certain items that are not considered indicative of future operating performance or not considered core to the Company's operations. Adjusted EBITDA margin and non-GAAP operating margin are calculated as the percentage of adjusted EBITDA and non-GAAP operating income to consolidated net sales, respectively. The Company believes these non-GAAP measures provide transparent and useful information and are widely used by analysts, investors, and competitors in our industry as well as by management in assessing the operating performance of the Company on a consistent basis.

Additionally, the Company presents non-GAAP net income and non-GAAP earnings per diluted share as additional performance measures. Non-GAAP net income is calculated as adjusted EBITDA, defined above, less depreciation and amortization – adjusted, interest expense, net - adjusted, and taxes on income before equity in net income of associated companies - adjusted, as applicable, for any depreciation, amortization, interest or tax impacts resulting from the non-core items identified in the reconciliation of net income attributable to the Company to adjusted EBITDA. Non-GAAP earnings per diluted share is calculated as non-GAAP net income per diluted share as accounted for under the "two-class share method." The Company believes that non-GAAP net income and non-GAAP earnings per diluted share provide transparent and useful information and are widely used by analysts, investors, and competitors in our industry as well as by management in assessing the operating performance of the Company on a consistent basis.

During the first quarter of 2019, the Company updated its calculation methodology to include the use of interest expense net of interest income in the reconciliation of EBITDA and adjusted EBITDA, compared to its historical use of only interest expense, and also to include the non-service component of the Company's pension and postretirement benefit costs in the reconciliation of adjusted EBITDA, non-GAAP net income attributable to Quaker Chemical Corporation and non-GAAP earnings per diluted share. Prior year amounts have been recast for comparability purposes and the change in calculation methodology does not produce materially different results. The Company believes these updated calculations better reflect its underlying operating performance and better aligns the Company's calculations to those commonly used by analysts, investors, and competitors in our industry.

The following tables reconcile the Company's non-GAAP financial measures (unaudited) to their most directly comparable GAAP financial measures (dollars in thousands, unless otherwise noted, except per share amounts):

Non-GAAP Operating Income and Margin Reconciliations	**For the years ended December 31,**		
	2019	**2018**	**2017**
Operating income	$ 46,134	$ 87,781	$ 62,744
Fair value step up of Houghton and Norman Hay inventory sold (a)	11,714	—	—
Houghton combination and other acquisition-related expenses (b)	35,945	16,661	29,938
Restructuring expense (c)	26,678	—	—
Charges related to the settlement of a non-core equipment sale (d)	384	—	—
Customer bankruptcy costs (f)	1,073	—	—
Cost streamlining initiative (g)	—	—	286
Non-GAAP operating income	$ 121,928	$ 104,442	$ 92,968
Non-GAAP operating margin (%) (q)	10.8%	12.0%	11.3%

EBITDA, Adjusted EBITDA, Adjusted EBITDA Margin and Non-GAAP Net Income Reconciliations	**For the years ended December 31,**		
	2019	**2018**	**2017**
Net income attributable to Quaker Chemical Corporation	$ 31,622	$ 59,473	$ 20,278
Depreciation and amortization (b)(n)	45,264	19,714	19,966
Interest expense, net (b)	16,976	4,041	1,358
Taxes on income before equity in net income of associated companies (p)	2,084	25,050	41,653
EBITDA	95,946	108,278	83,255
Equity income in a captive insurance company (e)	(1,822)	(966)	(2,547)
Fair value step up of Houghton and Norman Hay inventory sold (a)	11,714	—	—
Houghton combination and other acquisition-related expenses (b)	35,361	16,051	29,938
Restructuring expense (c)	26,678	—	—
Pension and postretirement benefit costs, non-service components (h)	2,805	2,285	4,235
Customer bankruptcy costs (f)	1,073	—	—
Insurance insolvency recovery (j)	(60)	(90)	(600)
Charges related to the settlement of a non-core equipment sale (d)	384	—	—
Cost streamlining initiative (g)	—	—	286
Loss on disposal of held-for-sale asset (i)	—	—	125
Gain on liquidation of an inactive legal entity (k)	—	(446)	—
Currency conversion impacts of hyper-inflationary economies (l)	1,033	664	388
Adjusted EBITDA	$ 173,112	$ 125,776	$ 115,080
Adjusted EBITDA margin (%) (q)	15.3%	14.5%	14.0%
Adjusted EBITDA	$ 173,112	$ 125,776	$ 115,080
Less: Depreciation and amortization - adjusted (b)	44,680	19,714	19,966
Less: Interest expense, net - adjusted (b)	14,896	593	484
Less: Taxes on income before equity in net income of associated companies - adjusted (m)(o)(p)	24,825	22,978	26,162
Non-GAAP net income	$ 88,711	$ 82,491	$ 68,468

Non-GAAP Earnings per Diluted Share Reconciliations	For the years ending December 31,		
	2019	2018	2017
GAAP earnings per diluted share attributable to Quaker Chemical Corporation common shareholders	$ 2.08	$ 4.45	$ 1.52
Equity income in a captive insurance company per diluted share (e)	(0.12)	(0.07)	(0.19)
Fair value step up of Houghton and Norman Hay inventory sold per diluted share (a)	0.58	—	—
Houghton combination and other acquisition-related expenses per diluted share (b)	2.05	1.21	1.90
Restructuring expense per diluted share (c)	1.34	—	—
Transition tax adjustments per diluted share (m)	(0.03)	0.43	1.67
Deferred tax benefit on an intercompany intangible asset transfer per diluted share (o)	(0.35)	—	—
Pension and postretirement benefit costs, non-service components per diluted share (h)	0.14	0.13	0.22
Customer bankruptcy costs per diluted share (f)	0.05	—	—
Insurance insolvency recovery per diluted share (j)	(0.00)	(0.01)	(0.03)
Charges related to the settlement of a non-core equipment sale per diluted share (d)	0.02	—	—
Cost streamlining initiative per diluted share (g)	—	—	0.01
Loss on disposal of held-for-sale asset per diluted share (i)	—	—	0.01
Gain on liquidation of an inactive legal entity per diluted share (k)	—	(0.03)	—
Currency conversion impacts of hyper-inflationary economies per diluted share (l)	0.07	0.06	0.03
Non-GAAP earnings per diluted share (r)	$ 5.83	$ 6.17	$ 5.14

(a) Fair value step up of Houghton and Norman Hay inventory sold relates to expenses associated with selling inventory acquired which was adjusted to fair value as a part of purchase accounting. Both increases to COGS are not indicative of the future operating performance of the Company.

(b) Houghton combination and other acquisition-related expenses include certain legal, financial, and other advisory and consultant costs incurred in connection with due diligence, regulatory approvals, integration planning, and closing the Combination, as well as certain one-time labor costs associated with the Company's acquisition-related activities. These costs are not indicative of the future operating performance of the Company. Approximately $9.4 million, $5.1 million and $13.7 million for the years ended December 31, 2019, 2018 and 2017, respectively, of these pre-tax costs were considered non-deductible for the purpose of determining the Company's effective tax rate, and, therefore, taxes on income before equity in net income of associated companies - adjusted reflects the impact of these items. During 2019, 2018 and 2017, the Company incurred $2.1 million, $3.5 million and $0.9 million of ticking fees to maintain the bank commitment related to the Combination. These interest costs are included in the caption "Interest expense, net" in the reconciliation of net income attributable to the Company to EBITDA, but are excluded from the caption "Interest expense, net – adjusted" in the reconciliation of adjusted EBITDA to non-GAAP net income attributable to the Company. Included in 2019 was $0.6 million of accelerated depreciation related to certain of the Company's facilities. This accelerated depreciation is included in the caption "Houghton combination and other acquisition-related expenses" in the reconciliation of operating income to non-GAAP operating income and included in the caption "Depreciation and amortization" in the reconciliation of net income attributable to the Company to EBITDA, but excluded from the caption "Depreciation and amortization – adjusted" in the reconciliation of adjusted EBITDA to non-GAAP net income attributable to the Company. Also, included in the caption "Houghton combination and other acquisition-related expenses" for 2018 is a $0.6 million gain on the sale of a held-for-sale asset. See Note 2 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(c) Restructuring expense represents the costs incurred by the Company associated with the QH restructuring program which was initiated in the third quarter of 2019 as part of the Company's plan to realize cost synergies associated with the Combination. These costs are not indicative of the future operating performance of the Company. See Note 7 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(d) Charges related to the settlement of a non-core equipment sale represent the pre-tax charge related to a one-time, uncommon, customer settlement associated with a prior sale of non-core equipment. These charges are not indicative of the future operating performance of the Company.

(e) Equity income in a captive insurance company represents the after-tax income attributable to the Company's interest in Primex, Ltd. ("Primex"), a captive insurance company. The Company holds a 33% investment in and has significant influence over Primex, and therefore accounts for this investment under the equity method of accounting. The income attributable to Primex is not indicative of the future operating performance of the Company and is not considered core to the Company's operations.

(f) Customer bankruptcy costs represent costs associated with specific reserves for trade accounts receivable of certain customers who filed for bankruptcy protection. These expenses are not indicative of the future operating performance of the Company. See Note 13 of Notes to Consolidated Financial Statements in Item 8 of this report.

(g) Cost streamlining initiative represents expenses associated with certain actions taken to reorganize the Company's corporate staff. This was a one-time cost incurred and are not indicative of the future operating performance of the Company.

(h) Pension and postretirement benefit costs, non-service components represent the pre-tax, non-service components of the Company's pension and postretirement net periodic benefit cost in each period. These costs are not indicative of the future operating performance of the Company. See Note 21 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(i) Loss on disposal of held-for-sale asset represents a one-time charge to write down the value of a held-for-sale asset at the Company's India affiliate to its fair value. This charge was a result of a specific one-time event and is not indicative of the future operating performance of the Company. See Note 9 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(j) Insurance insolvency recovery represents income associated with cash receipts from an insolvent insurance carrier for previously submitted claims by an inactive subsidiary of the Company. This other income is not indicative of the future operating performance of the Company. See Notes 9 and 26 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(k) Gain on liquidation of an inactive legal entity represents the decrease in historical cumulative currency translation adjustments associated with an inactive legal entity which was closed. These cumulative currency translation adjustments were the result of remeasuring the legal entity's monetary assets and liabilities to the applicable published exchange rates and were a component of accumulated other comprehensive loss, which was included in total shareholder's equity on the Company's Consolidated Balance Sheet. As required under U.S. GAAP, when a legal entity is liquidated, any amount attributable to that legal entity and accumulated in the currency translation adjustment component of equity is required to be removed from equity and reported as part of the gain or loss on liquidation of the legal entity during the period in which the liquidation occurs. This non-deductible recognized gain is not indicative of the future operating performance of the Company. See Note 9 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(l) Currency conversion impacts of hyper-inflationary economies represents the foreign currency remeasurement impacts associated with the Company's affiliates whose local economies are designated as hyper-inflationary under U.S. GAAP. An entity which operates within an economy deemed to be hyper-inflationary under U.S. GAAP is required to remeasure its monetary assets and liabilities to the applicable published exchange rates and record the associated gains or losses resulting from the remeasurement directly to the Consolidated Statements of Income. Venezuela's economy has been considered hyper-inflationary under U.S. GAAP since 2010, while Argentina's economy has been considered hyper-inflationary beginning July 1, 2018. In addition, the Company acquired an Argentine Houghton subsidiary which also applies hyper-inflationary accounting. During 2019, the Company incurred non-deductible, pre-tax charges related to the Company's Argentine affiliates. During 2018, the Company incurred non-deductible, pre-tax charges related to the Company's Legacy Quaker Argentine affiliate as well as after-tax charges related to the Company's Venezuela joint venture. The charges incurred related to the immediate recognition of foreign currency remeasurement in the Consolidated Statements of Income associated with these entities are not indicative of the future operating performance of the Company. See Notes 1, 9 and 17 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(m) Transition tax adjustments represent the tax (benefit) or expense incurred by the Company related to its initial 2017 estimates and subsequent 2018 and 2019 adjustments to adopt U.S. Tax Reform. The 2017 tax expense included the Company's initial estimated impact of the one-time charge on the gross deemed repatriation on previously untaxed accumulated and current earnings and profits of certain of the Company's foreign subsidiaries ("Transition Tax"), net of eliminating U.S. federal income taxes on dividends from certain foreign subsidiaries in 2017, as well as the impact of revaluing certain of the Company's U.S. deferred tax balances from 35% to the new 21% U.S. corporate tax rate. The 2018 tax expense includes certain adjustments recorded by the Company as a result of changes to the Company's initial 2017 estimates. Specifically, the Company adjusted the initial amount estimated for the Transition Tax, as well as updated its assertion related to permanent reinvestment of accumulated earnings and profits of certain of these foreign subsidiaries. In addition, the Company has adjusted its initial estimate of the impact from certain Internal Revenue Code changes associated with the deductibility of certain executive compensation. The 2019 tax benefit includes certain return to provision adjustments recorded as a result of adjustments to the initial estimated Transition Tax. All of these adjustments were based on guidance issued during 2017, 2018 and 2019 by the I.R.S., the U.S. Treasury and various state taxing authorities and were the result of specific one-time events that are not indicative of future operating performance of the Company. U.S. Tax Reform charges, net, are included within taxes on income before equity in net income of associated companies in the reconciliation of net income attributable to Quaker Chemical Corporation to adjusted EBITDA, but are excluded from the caption "Taxes on income before equity in net income of associated companies – adjusted" in the reconciliation of adjusted EBITDA to non-GAAP net income attributable to the Company. See Note 10 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(n) Depreciation and amortization for 2019 included $0.4 million of amortization expense recorded within equity in net income of associated companies in the Company's Consolidated Statement of Income, which is attributable to the amortization of the fair value step up for the Company's 50% interest in a Houghton joint venture in Korea as a result of required purchase accounting.

(o) Deferred tax benefit on an intercompany intangible asset transfer relates to a one-time deferred tax benefit recorded on the transfer of an intangible asset between two of the Company's European subsidiaries. The Company expects to see the offsetting impact and incremental deferred tax expense related to this item in future periods. These transactions are the result of a specific one-time event that is non-core to the Company's performance. Deferred tax benefits on an intercompany intangible asset transfer are included within the caption "Taxes on income before equity in net income of associated companies" in the reconciliation of net income attributable to Quaker Chemical Corporation to adjusted EBITDA, but are excluded from the caption "Taxes on income before equity in net income of associated companies – adjusted" in the reconciliation of adjusted EBITDA to non-GAAP net income attributable to the Company. See Note 10 of Notes to Consolidated Financial Statements in Item 8 of this Report.

(p) Taxes on income before equity in net income of associated companies – adjusted presents the impact of any current and deferred income tax expense (benefit), as applicable, of the reconciling items presented in the reconciliation of net income attributable to Quaker Chemical Corporation to adjusted EBITDA, and was determined utilizing the applicable rates in the taxing jurisdictions in which these adjustments occurred, subject to deductibility. Fair value step up of Houghton and Norman Hay inventory sold described in (a) resulted in incremental taxes of $2.9 million during 2019. Houghton combination and other acquisition-related expenses described in (b) resulted in incremental taxes of $6.7 million for 2019, $3.1 million for 2018, and $5.5 million for 2017. Restructuring charges described in (c) resulted in incremental taxes of $6.2 million for 2019. Charges related to the settlement of a non-core equipment sale described in (d) resulted in incremental taxes of $0.1 million for 2019. Customer bankruptcy costs described in (f) resulted in incremental taxes of $0.3 million in 2019. Cost streamlining initiative described in (g) resulted in incremental taxes of $0.1 million in 2017. Pension and postretirement benefit costs, non-service components described in (h) resulted in incremental taxes of $0.7 million for 2019, $0.5 million for 2018, and $1.3 million for 2017. Insurance insolvency recovery described in (j) resulted in a reduction of taxes of less than $0.1 million in 2019 and 2018, and $0.2 million in 2017. Gain on liquidation of an inactive legal entity described in (k) resulted in a reduction of taxes of $0.1 million in 2018. U.S. Tax Reform charges, net, described in (m) resulted in incremental taxes of $0.4 million for 2019 and a reduction of taxes of $5.8 million in 2018 and $22.2 million for 2017. In addition, deferred tax benefits described in (o) resulted in incremental taxes of $5.3 million in 2019.

(q) The Company calculates adjusted EBITDA margin and non-GAAP operating margin as the percentage of adjusted EBITDA and non-GAAP operating income to consolidated net sales.

(r) The Company calculates non-GAAP earnings per diluted share as non-GAAP net income attributable to the Company per weighted average diluted shares outstanding using the "two-class share method" to calculate such in each given period.

Off-Balance Sheet Arrangements

The Company had no material off-balance sheet items, as defined under Item 303(a)(4) of Regulation S-K as of December 31, 2019. The Company's only off-balance sheet items outstanding as of December 31, 2019 represented approximately $15 million of total bank letters of credit and guarantees. The bank letters of credit and guarantees are not significant to the Company's liquidity or capital resources. See Note 20 of Notes to Condensed Consolidated Financial Statements in Item 8 of this Report.

Operations

Consolidated Operations Review – Comparison of 2019 with 2018

Net sales were $1,133.5 million in 2019 compared to $867.5 million in 2018. The net sales increase of 31% year-over-year includes additional net sales from Houghton and Norman Hay of $319.4 million. Excluding Houghton and Norman Hay net sales, the Company's current year net sales would have declined 6% compared to the prior year, reflecting a decrease in sales volumes of approximately 3% and a negative impact from foreign currency translation of 3%.

COGS in 2019 of $741.4 million increased approximately $186.2 million or 34% from $555.2 million in 2018. The increase in COGS was primarily due to the impact of Houghton and Norman Hay sales and associated COGS, as well as the respective fair value inventory step up and accelerated depreciation charges described in the Non-GAAP Measures section of this Item above, partially offset by lower COGS on the decline in Legacy Quaker net sales described above.

Gross profit in 2019 increased $79.8 million from 2018 due primarily to Houghton and Norman Hay net sales noted above. The Company's reported gross margin in the current year was 34.6%, which includes an aggregate $11.7 million of expense associated with selling Houghton and Norman Hay acquired inventory adjusted to fair value as well as current year accelerated depreciation charges, both of which are described in the Non-GAAP Measures section of this Item above. Excluding these one-time increases to COGS, the Company estimates that its gross margin would have been approximately 35.7% in 2019 compared to 36.0% in 2018. The decrease in gross margin year-over-year was primarily the result of price and product mix attributed to lower Houghton gross margin compared to Legacy Quaker.

SG&A in 2019 increased $76.0 million compared to 2018 driven by additional Houghton and Norman Hay SG&A as well as current year charges related to the settlement of a non-core equipment sale and certain customer bankruptcy costs, both of which are described in the Non-GAAP Measures section of this Item above, partially offset by lower SG&A due to foreign currency translation, the impact of the year-over-year base sales decline noted above on direct selling costs, and the benefits of realized cost savings associated with the Combination.

During 2019, the Company incurred $35.5 million of Combination and other acquisition-related expenses, primarily for legal, financial, and other advisory and consultant expenses for integration planning and regulatory approvals, fees associated with the closing of the Combination and costs associated with various integration activities. Comparatively, the Company incurred $16.7 million of expenses in 2018, primarily due to various professional fees related to integration planning and regulatory approval. See the Non-GAAP Measures section of this Item above.

The Company initiated a restructuring program during the third quarter of 2019 as part of its global plan to realize cost synergies associated with the Combination. The Company expects reductions in headcount and site closures to occur over the next two years under this program. The Company recorded restructuring expense during 2019 of $26.7 million related to this program. There were no similar restructuring expenses recorded during the prior year. See the Non-GAAP Measures section of this Item, above.

Operating income in 2019 was $46.1 million compared to $87.8 million in 2018. Excluding the Combination and other acquisition-related charges, restructuring expenses and other non-core items, described in the Non-GAAP Measures section of this Item, above, the Company's current year non-GAAP operating income increased to $121.9 million compared to $104.4 million in 2018, primarily due to additional net sales and operating income from Houghton and Norman Hay.

The Company had other expense, net, of $0.3 million in 2019 compared to $0.6 million in 2018. The decrease in other expense, net, was primarily driven by foreign currency transaction gains in 2019 compared to foreign currency transaction losses in 2018. The Company's 2019 and 2018 foreign currency transaction gains and losses included both recurring transactional activity as well as foreign currency transaction losses of approximately $1.0 million and $0.4 million, respectively, related to the Company's Argentine subsidiaries and, in 2018, a foreign currency transaction gain of approximately $0.4 million related to the liquidation of an inactive legal entity, both of which are described in the Non-GAAP measures section of this Item, above. In addition, the Company had an increase in receipts of local municipality-related grants in one of the Company's regions year-over-year, partially offset by an increase in pension and postretirement benefit costs, non-service components, in 2019 compared to 2018. Lastly, in 2018, the Company recorded a gain of $0.6 million for the sale of a held-for-sale asset.

Interest expense, net, increased $12.9 million in 2019 compared to 2018, primarily as a result of additional borrowings under the Company's New Credit Facility to finance the closing of the Combination on August 1, 2019.

The Company's effective tax rates for 2019 and 2018 were 7.2% and 30.1%, respectively. The Company's low current year effective tax rate is primarily driven by a one-time deferred tax benefit related to an intercompany intangible asset transfer, described in the Non-GAAP measures section of this Item, above. Comparatively, the Company's higher 2018 effective tax rate was largely driven by combination-related expenses incurred, certain of which were non-deductible for the purpose of determining the Company's effective tax rate, as well as tax charges related to an adjustment to the Company's initial estimate of the impact from U.S. Tax Reform. Excluding the impact of these and all other non-core items in each period, described in the Non-GAAP Measures section of this Item, above, the Company estimates that its effective tax rates would have been approximately 22% in each year. The Company has experienced and expects to continue to experience volatility in its effective tax rates due to several factors, including the timing of tax audits and the expiration of applicable statutes of limitations as they relate to uncertain tax positions, the unpredictability of the timing and amount of certain incentives in various tax jurisdictions, valuation allowances necessary on certain of the Company's tax positions, the treatment of certain acquisition-related costs and the timing and amount of certain share-based compensation-related tax benefits, among other factors.

Equity in net income of associated companies increased $3.3 million in 2019 compared to 2018, primarily due to additional earnings from the Company's 50% interest in a Houghton joint venture in Korea and higher earnings from the Company's interest in a captive insurance company.

Net income attributable to noncontrolling interest was relatively consistent in both 2019 and 2018.

Foreign exchange negatively impacted the Company's 2019 earnings by approximately 2% or $0.09 per diluted share, as the negative impact from foreign currency translation of approximately 3% due to the strengthening of the U.S. dollar in the current year was partially offset by higher current year foreign exchange transaction gains.

Consolidated Operations Review – Comparison of 2018 with 2017

Net sales grew $47.4 million or 6% in 2018, increasing to $867.5 million compared to $820.1 million in 2017. The Company's 2018 net sales benefited from increases in volume of 3%, selling price and product mix of 2%, as well as a positive impact from foreign currency translation of less than 1% or $3.7 million.

COGS in 2018 of $555.2 million increased 5% from $528.6 million in 2017. The increase in COGS was primarily due to the increase in product volumes, noted above, the impact of certain raw material cost increases, changes in product mix and the negative impact of foreign currency translation year-over-year.

Gross profit in 2018 increased $20.8 million or 7% compared to 2017, primarily driven by the increase in net sales and product volumes, noted above, as well as a higher gross margin of 36.0% in 2018 compared to 35.5% in 2017. The increase in the Company's gross margin in 2018 was primarily driven by pricing initiatives and the mix of certain products sold which more than offset increases in raw material costs.

SG&A in 2018 increased $9.1 million compared to 2017 due to higher labor-related costs, primarily from annual merit increases and incentive-based compensation due to the Company's strong operating performance, as well as the negative impact from foreign currency translation. These increases year-over-year were partially offset by a first quarter of 2017 cost streamlining initiative described in the Non-GAAP measures section of this Item, above.

During 2018, the Company incurred $16.7 million of costs related to the Combination with Houghton, described in the Non-GAAP measures section of this Item, above. Comparatively, the Company incurred $29.9 million of similar combination-related expenses in 2017 as well as certain due diligence-related costs.

Operating income in 2018 was $87.8 million compared to $62.7 million in 2017. The increase in operating income was due to strong net sales and gross profit increases as well as lower Houghton combination-related expenses, noted above, partially offset by an increase in SG&A not related to the Combination.

The Company had other expense, net, of $0.6 million in 2018 compared to $0.7 million in 2017. The decrease in other expense, net, includes both a $1.9 million settlement charge in one of the Company's U.S. pension plans and a $0.1 million loss on the disposal of a held-for-sale asset in 2017, as well as a 2018 gain of $0.6 million on the sale of a held-for-sale asset. The positive year-over-year impact of these items was partially offset by $0.5 million lower year-over-year cash proceeds received from an insolvent insurance carrier with respect to previously filed recovery claims by an inactive subsidiary of the Company. In addition to all of these items, which are described in the Non-GAAP measures section of this Item, above, the Company also had foreign currency transaction losses in 2018 compared to foreign currency transaction gains in 2017. The Company's 2018 foreign currency transaction losses included both recurring transactional activity as well as foreign currency transaction losses of approximately $0.4 million related to the Legacy Quaker Argentine subsidiary. In 2018, the Company also incurred a foreign currency transaction gain of approximately $0.4 million related to the liquidation of an inactive legal entity. Both the losses related to Argentina and the gain related to the liquidation are described in the Non-GAAP measures section of this Item, above. Lastly, the Company had a decrease in receipts of local municipality grants in one of the Company's regions year-over-year.

Interest expense increased $2.3 million year-over-year, primarily due to higher 2018 costs incurred to maintain the bank commitment for the Combination, partially offset by a decrease in interest expense due to lower average outstanding borrowings on the Company's Old Credit Facility during 2018 compared to 2017. Interest income was $0.4 million lower in 2018 compared to 2017 primarily due to changes in the level of the Company's invested cash in certain regions with higher returns as well as a decrease in interest received on certain tax-related credits year-over-year.

The Company's effective tax rates for 2018 and 2017 were 30.1% and 68.7%, respectively. The Company's elevated 2018 and 2017 effective tax rates were impacted by its initial estimate and subsequent adjustments related to U.S. Tax Reform, as well as certain non-deductible Houghton combination-related expenses in both years, described in the Non-GAAP measures section of this Item, above. Excluding these and all other non-core items in each period, described in the Non-GAAP Measures section of this Item, above, the Company estimates that its 2018 and 2017 effective tax rates would have been approximately 22% and 27%, respectively. The decrease in the Company's effective tax rate year-over-year was primarily due to a shift in earnings to lower tax jurisdictions and a lower U.S. statutory tax rate of 21% in 2018 compared to 35% in 2017.

Equity in net income of associated companies decreased $1.5 million in 2018 compared to 2017. The decrease was primarily due to lower earnings from the Company's interest in a captive insurance company in 2018, partially offset by higher currency conversion charges in 2017 related to hyper-inflationary accounting at the Company's Venezuelan joint venture, both described in the Non-GAAP measures section of this Item, above.

The Company had a $1.7 million decrease in net income attributable to noncontrolling interest in 2018 compared to 2017, primarily due to the Company's purchase of the remaining interest in its India joint venture during December 2017.

Foreign exchange negatively impacted the Company's 2018 earnings by approximately 1% or $0.08 per diluted share, driven by the negative impact of net foreign currency transaction losses year-over-year, noted above, partially offset by a positive impact from foreign currency translation.

Reportable Operating Segment Review – Comparison of 2019 with 2018

The Company's reportable segments reflect the structure of the Company's internal organization, the method by which the Company's resources are allocated and the manner by which the chief operating decision maker of the Company assesses its performance. During the third quarter of 2019 and in connection with the Combination, the Company reorganized its executive management team to align with its new business structure which reflects the method by which the Company assesses its performance and allocates its resources. The Company's new reportable segment structure includes four segments: (i) Americas; (ii) EMEA; (iii) Asia/Pacific; and (iv) Global Specialty Businesses. The three geographic segments are composed of the net sales and operations in each respective region, excluding net sales and operations managed globally by the Global Specialty Businesses segment, which includes the Company's container, metal finishing, mining, offshore, specialty coatings, specialty grease and Norman Hay businesses.

Though the Company changed its reportable segments in the third quarter of 2019, the calculation of the reportable segments' measure of earnings remains otherwise generally consistent with past practices. Segment operating earnings for the Company's reportable segments are comprised of net sales less COGS and SG&A directly related to the respective segment's product sales. Operating expenses not directly attributable to the net sales of each respective segment are excluded from segment operating earnings and include certain corporate and administrative costs, Combination and other acquisition-related expenses, restructuring and related charges and COGS related to acquired inventory sold adjusted to fair value as a part of purchase accounting. Other items not specifically identified with the Company's reportable segments include interest expense, net and other expense, net.

All prior period information has been recast to reflect these four segments as the Company's new reportable segments. See Note 4 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Americas

Americas represented approximately 35% of the Company's consolidated net sales in 2019. The segment's net sales were $392.1 million, an increase of $94.5 million or 32% compared to 2018. The increase in net sales reflects the inclusion of Houghton net sales of $110.1 million. Excluding Houghton net sales, the segment's net sales decrease year-over-year of 5% was due primarily to lower volumes of 6% and a negative impact from foreign currency translation of 1% partially offset by a positive impact from selling price and product mix of 2%. The decline in volumes compared to 2018 was driven by compounding conditions of weak automotive and steel markets, a generally weaker overall industrial environment in the region and some customer inventory corrections. The segment's operating earnings were $78.3 million, an increase of $15.6 million or 25% compared to 2018. The increase in segment operating earnings reflects the inclusion of Houghton net sales, partially offset by a lower gross margin due to price and product mix, including lower Houghton gross margins compared to Legacy Quaker and higher SG&A, including Houghton SG&A.

EMEA

EMEA represented approximately 25% of the Company's consolidated net sales in 2019. The segment's net sales were $285.6 million, an increase of $68.6 million or 32% compared to 2018. The increase in net sales reflects the inclusion of Houghton net sales of $92.5 million. Excluding Houghton net sales, the segment's net sales decrease year-over-year of 11% was due to a negative impact of foreign currency translation of 5%, lower volumes of approximately 5% and a decrease from selling price and product mix of 1%. The foreign exchange impact was primarily due to the weakening of the euro against the U.S. dollar as this exchange rate averaged 1.12 in 2019 compared to 1.18 in 2018. The decline in volumes compared to 2018 was driven by a weak automotive market and the challenging overall industrial environment in the region, as well as a decrease in volume associated with a specific piece of business which the Company stopped selling during the second half of 2018 primarily due to its limited profitability. This segment's operating earnings were $47.4 million, an increase of $11.3 million or 31% compared to 2018. The increase in segment operating earnings reflects the inclusion of Houghton net sales and a slightly higher gross margin, partially offset by higher SG&A, including Houghton SG&A.

Asia/Pacific

Asia/Pacific represented approximately 22% of the Company's consolidated net sales in 2019. The segment's net sales were $247.8 million, an increase of $55.3 million or 29% compared to 2018. The increase in net sales reflects the inclusion of Houghton net sales of $67.4 million. Excluding Houghton net sales, the segment's net sales decreased 6% year-over-year due primarily to the negative impact of foreign currency translation of 3% and lower volumes of approximately 3%. The foreign exchange impact was primarily due to the weakening of the Chinese renminbi and India rupee against the U.S. dollar as these exchange rates averaged 6.90 and 70.3, respectively, in 2019 compared to 6.60 and 68.18, respectively, in 2018. The decline in volumes was driven by weak automotive and steel markets and the challenging overall industrial environment in the region. This segment's operating earnings were $67.6 million, an increase of $13.8 million or 26% compared to 2018. The increase in segment operating earnings reflects the inclusion of Houghton net sales, and relatively consistent gross margins, partially offset by higher SG&A, including Houghton SG&A.

Global Specialty Businesses

Global Specialty Businesses represented approximately 18% of the Company's consolidated net sales in 2019. The segment's net sales were $208.0 million, an increase of $47.5 million or 30% compared to 2018. The increase in net sales reflects the inclusion of Houghton and Norman Hay net sales of $49.4 million. Excluding Houghton and Norman Hay net sales, the segment's net sales decreased 1% year-over-year driven by a decline in selling price and product mix of 5% and a negative impact from foreign currency translation of less than 1% partially offset by an increase in volume of 4%. This segment's operating earnings were $58.5 million, an increase of $15.5 million or 36% compared to 2018. The increase in segment operating earnings reflects the inclusion of Houghton and Norman Hay net sales, and relatively consistent gross margins, partially offset by higher SG&A, including Houghton and Norman Hay.

Reportable Operating Segment Review – Comparison of 2018 with 2017

Americas

Americas represented approximately 34% of the Company's consolidated net sales in 2018. The segment's net sales were $297.6 million, an increase of $14.1 million or 5% compared to 2017. The segment's net sales increase year-over-year of 5% was due primarily to an increase in volume of 4% and increases in selling price and product mix of approximately 3%, partially offset by a negative impact of foreign currency translation of 2%. The foreign exchange impact was primarily due to the weakening of the Brazilian real against the U.S. dollar as this exchange rate averaged 3.63 in 2018 compared to 3.19 in 2017. The segment's operating earnings were $62.7 million, an increase of $6.6 million or 12% compared to 2017. The increase in segment operating earnings reflects the benefit of higher net sales, a slight increase in gross margins and lower SG&A.

EMEA

EMEA represented approximately 25% of the Company's consolidated net sales in 2018. The segment's net sales were $217.0 million, an increase of $8.5 million or 4% compared to 2017. The segment's net sales increase year-over-year of 4% was due to increases in selling price and product mix of 5% and a positive impact of foreign currency translation of 4% partially offset by volume declines of approximately 5%. The foreign exchange impact was primarily due to the strengthening of the euro against the U.S. dollar as this exchange rate averaged 1.18 in 2018 compared to 1.13 in 2017. The year-over-year volume comparison was impacted by an atypically high sales pattern in EMEA during the first quarter of 2017, a decrease in volume associated with a specific piece of business which the Company stopped selling during the second half of 2018 primarily due to its limited profitability, and a slowing of orders at the end of 2018 due to market challenges in Europe. This segment's operating earnings were $36.1 million, an increase of $1.7 million or 5% compared to 2017. The increase in segment operating earnings year-over-year was a result of higher gross profit on higher sales noted above, coupled with an increase in gross margin due to changes in product mix and the impact of pricing initiatives which more than offset raw material cost increases. The increases to the segment's operating earnings were partially offset by higher SG&A, primarily due to the impact of foreign currency translation as well as higher labor costs associated with annual merit increases.

Asia/Pacific

Asia/Pacific represented approximately 22% of the Company's consolidated net sales in 2018. The segment's net sales were $192.5 million, an increase of $11.4 million or 6% compared to 2018. The segment's net sales increase year-over-year of 6% was primarily due to higher volumes of 7% partially offset by a decrease in selling price and product mix of approximately 1%. This segment's operating earnings were $53.7 million, an increase of $7.4 million or 16% compared to 2017. The increase in segment operating earnings year-over-year was a result of higher net sales noted above, coupled with an increase in gross margin due to changes in product mix and a decrease in SG&A due to lower labor expenses.

Global Specialty Businesses

Global Specialty Businesses represented approximately 18% of the Company's consolidated net sales in 2018. The segment's net sales were $160.4 million, an increase of $13.5 million or 9%. The segment's net sales increase year-over-year of 9% was primarily due to higher volumes of 10%, partially offset by a decrease in selling price and product mix of approximately 1%. This segment's operating earnings were $42.9 million, an increase of $3.4 million or 9% compared to 2017. The increase in segment operating earnings reflects the benefit of higher net sales and relatively consistent gross margins, partially offset by higher SG&A.

Environmental Clean-up Activities

The Company is involved in environmental clean-up activities in connection with an existing plant location and former waste disposal sites. This includes certain soil and groundwater contamination the Company identified in 1992 at AC Products, Inc. ("ACP"), a wholly owned subsidiary. In voluntary coordination with the Santa Ana California Regional Water Quality Board, ACP has been remediating the contamination. In 2007, ACP agreed to operate two groundwater treatment systems, so as to hydraulically contain groundwater contamination emanating from ACP's site until such time as the concentrations of contaminants are below the current Federal maximum contaminant level for four consecutive quarterly sampling events. In 2014, ACP ceased operation at one of its two groundwater treatment systems, as it had met the above condition for closure. As of December 31, 2019, ACP believes it is close to meeting the conditions for closure of the remaining groundwater treatment system but continues to operate this system while in discussions with the relevant authorities and believes that the range of potential-known liabilities associated with the balance of ACP's water remediation program is approximately $0.1 million to $1.0 million. The low and high ends of the range are based on the length of operation of the treatment system as determined by groundwater modeling and the required conditions, noted above.

As a result of the closing of the Combination on August 1, 2019, the Company is now party to Houghton environmental matters related to certain domestic and foreign properties currently or previously owned. Houghton's Sao Paulo, Brazil site was required under Brazilian environmental, health and safety regulations to perform an environmental assessment as part of a permit renewal process. Initial investigations identified soil and ground water contamination in select areas of the site. The site has conducted a multi-year soil and groundwater investigation and corresponding risk assessments based on the result of the investigations. In 2017, the site had to submit a new 5-year permit renewal request and was asked to complete additional investigations to further delineate the site based on review of the technical data by the local regulatory agency, Companhia Ambiental do Estado de São Paulo ("CETESB").

Based on review of the updated investigation data, CETESB issued a Technical Opinion regarding the investigation and remedial actions taken to date. The site developed an action plan and submitted it to CETESB in 2018 based on CETESB requirements. The site intervention plan primarily requires the site, amongst other actions, to conduct periodic monitoring for methane in soil vapors, source zone delineation, groundwater plume delineation, bedrock aquifer assessment, update the human health risk assessment, develop a current site conceptual model and conduct a remedial feasibility study and provide a revised intervention plan. In December 2019, the site submitted a report on the activities completed including the revised site conceptual model and results of the remedial feasibility study and recommended remedial strategy for the site. Other Houghton environmental matters include participation in certain payments in connection with four currently active environmental consent orders related to certain hazardous waste cleanup activities under the U.S. Federal Superfund statute. Houghton has been designated a potentially responsible party ("PRP") by the Environmental Protection Agency along with other PRPs depending on the site, and has other obligations to perform cleanup activities at certain other foreign subsidiaries. These environmental matters primarily require the Company to perform long-term monitoring as well as operating and maintenance at each of the applicable sites. The Company continually evaluates its obligations related to such matters and, based on historical costs incurred and projected costs to be incurred over the next 28 years, has estimated the present value range of costs for all of the Houghton environmental matters, on a discounted basis, to be between approximately $6 million and $7 million as of December 31, 2019, for which $6.6 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2019.

The Company believes, although there can be no assurance regarding the outcome of other unrelated environmental matters, that it has made adequate accruals for costs associated with other environmental problems of which it is aware. Approximately $0.2 million was accrued as of December 31, 2019 and 2018, respectively, to provide for such anticipated future environmental assessments and remediation costs.

Notwithstanding the foregoing, the Company cannot be certain that future liabilities in the form of remediation expenses and damages will not exceed amounts reserved. See Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report

General

See Item 7A of this Report, below, for further discussion of certain quantitative and qualitative disclosures about market risk.

Item 7A. *Quantitative and Qualitative Disclosures About Market Risk.*

Quaker Houghton is exposed to the impact of interest rates, foreign currency fluctuations, changes in commodity prices, and credit risk.

Interest Rate Risk. The Company's exposure to changes in interest rates relates primarily to its borrowings under the New Credit Facility as of December 31, 2019, and to its borrowings under the Old Credit Facility and the Company's other smaller credit facilities as of December 31, 2018. Borrowings under the New Credit Facility bear interest at a base rate or LIBOR plus an applicable margin based upon the Company's consolidated net leverage ratio. Borrowings under the Old Credit Facility and the Company's other smaller credit facilities were generally based on a base rate or LIBOR plus a spread. As a result of the variable interest rates applicable under the New Credit Facility, if interest rates rise significantly, the cost of debt to the Company could increase as well. This can have an adverse effect on the Company, depending on the extent of the Company's borrowings outstanding throughout a given year. As of December 31, 2019, the Company had outstanding borrowings under the New Credit Facility of approximately $922.4 million. The interest rate applicable on outstanding borrowings under the New Credit Facility post-closing of the Combination was approximately 3.1%. If interest rates had changed by 10%, the Company's interest expense for the period ended December 31, 2019 on its credit facilities, including the New Credit Facility borrowings outstanding post-closing of the Combination, would have correspondingly increased or decreased by approximately $1.1 million.

The New Credit Facility required the Company to fix its variable interest rates on at least 20% of its total Term Loans. In order to satisfy this requirement as well as to manage the Company's exposure to variable interest rate risk associated with the New Credit Facility, in November 2019, the Company entered into $170.0 million notional amounts of three-year interest rate swaps at a base rate of 1.64% plus an applicable margin as provided in the New Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, this aggregate rate was 3.1%. These interest rate swaps are designated and qualify as cash flow hedges. The Company has previously used derivative financial instruments primarily for the purpose of hedging exposures to fluctuations in interest rates.

Foreign Exchange Risk. A significant portion of the Company's revenues and earnings are generated by its foreign operations. These foreign operations also represent a significant portion of Quaker Houghton's assets and liabilities. Generally, all of these foreign operations use the local currency as their functional currency. Accordingly, Quaker Houghton's financial results are affected by foreign currency fluctuations, particularly between the U.S. dollar and the euro, the British pound sterling, the Brazilian real, the Mexican peso, the Chinese renminbi and the Indian rupee. Quaker Houghton's results can be materially affected depending on the volatility and magnitude of foreign exchange rate changes. If the euro, the British pound sterling, the Brazilian real, the Mexican peso, the Chinese renminbi and the Indian rupee had all weakened or strengthened by 10% against the U.S. dollar, the Company's 2019 revenues and pre-tax earnings would have correspondingly decreased or increased by approximately $59.3 million and $4.5 million, respectively.

The Company generally does not use financial instruments that expose it to significant risk involving foreign currency transactions. However, the size of its non-U.S. activities has a significant impact on reported operating results and the attendant net assets. During the past three years, sales by its non-U.S. subsidiaries accounted for approximately 60% to 65% of its consolidated net sales. In addition, the Company occasionally sources inventory among its worldwide operations. This practice can give rise to foreign exchange risk resulting from the varying cost of inventory to the receiving location, as well as from the revaluation of intercompany balances. The Company primarily mitigates this risk through local sourcing efforts.

Commodity Price Risk. Many of the raw materials used by Quaker Houghton are derivatives of commodity chemicals, which can experience significant price volatility, and therefore Quaker Houghton's earnings can be materially affected by market changes in raw material prices. At times, the Company has entered into fixed-price purchase contracts to manage this risk. These contracts provide protection to Quaker Houghton if the prices for the contracted raw materials rise; however, in certain circumstances, the Company may not realize the benefit if such prices decline. A gross margin change of one percentage point, would correspondingly have increased or decreased the Company's pre-tax earnings by approximately $11.3 million.

Credit Risk. Quaker Houghton establishes allowances for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. If the financial condition of Quaker Houghton's customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances might be required. Downturns in the overall economic climate may also exacerbate specific customer financial issues. A significant portion of the Company's revenues are derived from sales to customers in the steel and automotive industries, including some of our larger customers, where bankruptcies have occurred in the past and where companies have experienced past financial difficulties. Though infrequent, when a bankruptcy occurs, Quaker Houghton must judge the amount of proceeds, if any, that may ultimately be received through the bankruptcy or liquidation process. In addition, as part of its terms of trade, Quaker Houghton may custom manufacture products for certain large customers and/or may ship product on a consignment basis. These practices may increase the Company's exposure should a bankruptcy occur and may require a write-down or disposal of certain inventory due to its estimated obsolescence or limited marketability as well as of accounts receivable. Customer returns of products or disputes may also result in similar issues related to the realizability of recorded accounts receivable or returned inventory. The Company recorded expense to its provision for doubtful accounts by $1.9 million, $0.5 million and $0.1 million for the years ended December 31, 2019, 2018 and 2017, respectively. A change of 10% to the expense recorded to the Company's provision would have increased or decreased the Company's pre-tax earnings by $0.2 million, $0.1 million and less than $0.1 million for the years ended December 31, 2019, 2018, and 2017, respectively.

Item 8. ***Financial Statements and Supplementary Data.***

QUAKER CHEMICAL CORPORATION
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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Quaker Chemical Corporation:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Quaker Chemical Corporation and its subsidiaries (the “Company”) as of December 31, 2019 and 2018, and the related consolidated statements of income, of comprehensive income, of changes in equity and of cash flows for each of the three years in the period ended December 31, 2019, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO because material weaknesses in internal control over financial reporting existed as of that date relating to the lack of (i) design and maintenance of controls in response to the risks of material misstatement, (ii) design and maintenance of effective controls over the review of pricing, quantity and customer data to verify that revenue recognized at certain smaller locations was complete and accurate, and (iii) design and maintenance of effective controls over the reliability of certain data used to support the reasonableness of certain assumptions in the accounting for business combinations.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis. The material weaknesses referred to above are described in Management’s Report on Internal Control over Financial Reporting appearing under Item 9A. We considered these material weaknesses in determining the nature, timing, and extent of audit tests applied in our audit of the 2019 consolidated financial statements, and our opinion regarding the effectiveness of the Company’s internal control over financial reporting, does not affect our opinion on those consolidated financial statements.

Change in Accounting Principle

As discussed in Note 3 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in management’s report referred to above. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

As described in Management’s Report on Internal Control over Financial Reporting, management has excluded Houghton International, Inc. (“Houghton”) and Norman Hay plc (“Norman Hay”) from its assessment of internal control over financial reporting as of December 31, 2019, because they were acquired by the Company in purchase business combinations during 2019. We have also excluded Houghton and Norman Hay from our audit of internal control over financial reporting. Houghton and Norman Hay are wholly-owned subsidiaries whose total assets and total revenues excluded from management’s assessment and our audit of internal

control over financial reporting represent approximately 18% and 2% of total assets, respectively and approximately 26% and 2% of total revenues, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2019.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed 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. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Valuation of Indefinite and Definite-lived Intangible Assets Acquired in the Houghton Business Combination

As described in Note 2 to the consolidated financial statements, on August 1, 2019, the Company completed the combination with Houghton International, Inc. ("Houghton"), whereby the Company acquired all of the issued and outstanding shares of Houghton from Gulf Houghton Lubricants, Ltd. and certain other selling shareholders in exchange for a combination of cash and shares of the Company's common stock. Total fair value of consideration transferred was $1,662 million. Management allocated $1,028.4 million of the purchase price to intangible assets, comprised of $242.0 million of trademarks and formulations, $677.3 million of customer relationships, and $109.1 million of existing product technology. The determination of the estimated fair value of assets acquired, including indefinite and definite-lived intangible assets, requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, discount rates, customer attrition rates, royalty rates, asset lives and market multiples, among other items. The valuation methods included discounted cash flow analyses, excess earnings, relief from royalty, and other appropriate valuation techniques to determine the fair value of the assets acquired.

The principal considerations for our determination that performing procedures relating to the valuation of indefinite and definite-lived intangible assets acquired in the Houghton Business Combination is a critical audit matter are (i) there was a high degree of auditor judgment and subjectivity in performing procedures and in evaluating audit evidence relating to the estimated fair value of the Houghton trademark, Houghton customer relationships, and Houghton existing product technology due to the significant amount of judgment by management in determining these estimates, (ii) significant audit effort was necessary in evaluating management's estimated fair value of the aforementioned intangible assets acquired and significant assumptions, including future cash inflows, discount rates, customer attrition rates, and royalty rates, (iii) the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained, and (iv) as described in the "Opinions on the Financial Statements and Internal Control over Financial Reporting" section, a material weakness as of December 31, 2019 was identified related to designing and maintaining controls over the reliability of certain data used to support the reasonableness of certain assumptions in the accounting for business combinations.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included, among others, testing management's process for developing the fair value estimates. This included evaluating the appropriateness of the discounted cash flow method; testing the completeness, accuracy, and relevance of underlying data used in the estimate; and evaluating the significant assumptions used by management, including the future cash inflows, discount rates, customer attrition rates, and royalty rates. Evaluating management's assumptions related to future cash inflows and customer attrition rates involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the acquired entity, (ii) the consistency with external market and industry data, and (iii) whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in evaluating the appropriateness of the Company's discounted cash flow method and reasonableness of certain significant assumptions, including the discount rates, royalty rates, and customer attrition rates.

Goodwill Impairment Assessment - EMEA Reporting Unit

As described in Note 16 to the consolidated financial statements, the Company’s consolidated goodwill balance was $607 million as of December 31, 2019 of which $133 million was associated with the EMEA segment and associated reporting unit (“EMEA”). Management completes its annual goodwill impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment in one or more of its reporting units. As disclosed by management, in completing its quantitative impairment test, management compares the reporting units’ fair value to their carrying value, primarily based on future discounted cash flows, in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable management judgment and are based upon certain significant assumptions. These assumptions include the weighted average cost of capital (“WACC”) as well as projected revenue growth rates and operating income, which result in estimated EBITDA and EBITDA margins.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment associated with EMEA is a critical audit matter are (i) there was a high degree of auditor judgment and subjectivity in performing procedures and in evaluating audit evidence relating to management’s cash flow projections due to the significant amount of judgment by management in developing the fair value measurement of EMEA, (ii) significant audit effort was necessary in evaluating management’s cash flow projections and significant assumptions, including the WACC as well as projected revenue growth rates and operating income and (iii) the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management’s goodwill impairment assessment, including controls over the valuation of EMEA. These procedures also included, among others, testing management’s process for developing the fair value estimate. This included evaluating the appropriateness of the discounted cash flow method; testing the completeness, accuracy, and relevance of underlying data used in the estimate; and evaluating the significant assumptions used by management, including the WACC as well as projected revenue growth rates and operating income. Evaluating management’s assumptions related to revenue growth rates and projected operating income involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of EMEA, (ii) the consistency with external market and industry data, and (iii) whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the appropriateness of the Company’s discounted cash flow method and reasonableness of certain significant assumptions, including the WACC.

/s/ PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
March 20, 2020

We have served as the Company’s auditor since at least 1972. We have not been able to determine the specific year we began serving as auditor of the Company.

QUAKER CHEMICAL CORPORATION
CONSOLIDATED STATEMENTS OF INCOME
(*Dollars in thousands, except per share data*)

	Year Ended December 31,		
	2019	2018	2017
Net sales	$ 1,133,503	$ 867,520	$ 820,082
Cost of goods sold (excluding amortization expense - See Note 16)	741,386	555,206	528,587
Gross profit	392,117	312,314	291,495
Selling, general and administrative expenses	283,828	207,872	198,813
Restructuring and related charges	26,678	—	—
Combination and acquisition-related expenses	35,477	16,661	29,938
Operating income	46,134	87,781	62,744
Other expense, net	(254)	(642)	(718)
Interest expense, net	(16,976)	(4,041)	(1,358)
Income before taxes and equity in net income of associated companies	28,904	83,098	60,668
Taxes on income before equity in net income of associated companies	2,084	25,050	41,653
Income before equity in net income of associated companies	26,820	58,048	19,015
Equity in net income of associated companies	5,064	1,763	3,285
Net income	31,884	59,811	22,300
Less: Net income attributable to noncontrolling interest	262	338	2,022
Net income attributable to Quaker Chemical Corporation	$ 31,622	$ 59,473	$ 20,278
Earnings per common share data:			
Net income attributable to Quaker Chemical Corporation common shareholders – basic	$ 2.08	$ 4.46	$ 1.53
Net income attributable to Quaker Chemical Corporation common shareholders – diluted	$ 2.08	$ 4.45	$ 1.52

The accompanying notes are an integral part of these consolidated financial statements.

QUAKER CHEMICAL CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(*Dollars in thousands*)

	Year Ended December 31,		
	2019	**2018**	**2017**
Net income	$ 31,884	$ 59,811	$ 22,300
Other comprehensive income (loss), net of tax			
Currency translation adjustments	4,779	(17,519)	21,076
Defined benefit retirement plans			
Net (loss) gain arising during the period, other	(6,289)	1,119	(96)
Amortization of actuarial loss	2,458	2,507	2,255
Amortization of prior service gain	(151)	(84)	(84)
Current period change in fair value of derivatives	(320)	—	—
Unrealized gain (loss) on available-for-sale securities	2,093	(1,728)	(130)
Other comprehensive income (loss)	2,570	(15,705)	23,021
Comprehensive income	34,454	44,106	45,321
Less: Comprehensive income attributable to noncontrolling interest	(287)	(248)	(2,736)
Comprehensive income attributable to Quaker Chemical Corporation	$ 34,167	$ 43,858	$ 42,585

The accompanying notes are an integral part of these consolidated financial statements.

QUAKER CHEMICAL CORPORATION
CONSOLIDATED BALANCE SHEETS
(*Dollars in thousands, except par value and share amounts*)

	December 31,	
	2019	2018
ASSETS		
Current assets		
Cash and cash equivalents	$ 123,524	$ 104,147
Accounts receivable, net	375,982	202,139
Inventories, net	174,950	94,090
Prepaid expenses and other current assets	41,516	18,134
Total current assets	715,972	418,510
Property, plant and equipment, net	213,469	83,923
Right of use lease assets	42,905	—
Goodwill	607,205	83,333
Other intangible assets, net	1,121,765	63,582
Investments in associated companies	93,822	21,316
Deferred tax assets	14,745	6,946
Other non-current assets	40,433	32,055
Total assets	$ 2,850,316	$ 709,665
LIABILITIES AND EQUITY		
Current liabilities		
Short-term borrowings and current portion of long-term debt	$ 38,332	$ 670
Accounts payable	164,101	87,819
Dividends payable	6,828	4,935
Accrued compensation	45,620	25,727
Accrued restructuring	18,043	—
Accrued pension and postretirement benefits	3,405	1,211
Other accrued liabilities	83,605	31,108
Total current liabilities	359,934	151,470
Long-term debt	882,437	35,934
Long-term lease liabilities	31,273	—
Deferred tax liabilities	211,094	10,003
Non-current accrued pension and postretirement benefits	56,828	32,360
Other non-current liabilities	66,384	43,529
Total liabilities	1,607,950	273,296
Commitments and contingencies (Note 26)		
Equity		
Common stock, $ 1.00 par value; authorized 30,000,000 shares; issued and outstanding		
2019 – 17,735,162 shares; 2018 – 13,338,026 shares	17,735	13,338
Capital in excess of par value	888,218	97,304
Retained earnings	412,979	405,125
Accumulated other comprehensive loss	(78,170)	(80,715)
Total Quaker shareholders’ equity	1,240,762	435,052
Noncontrolling interest	1,604	1,317
Total equity	1,242,366	436,369
Total liabilities and equity	$ 2,850,316	$ 709,665

The accompanying notes are an integral part of these consolidated financial statements.

QUAKER CHEMICAL CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS
(*Dollars in thousands*)

	Year Ended December 31,		
	2019	**2018**	**2017**
Cash flows from operating activities			
Net income	$ 31,884	$ 59,811	$ 22,300
Adjustments to reconcile net income to net cash provided by operating activities:			
Amortization of debt issuance costs	1,979	70	241
Depreciation and amortization	44,895	19,714	19,966
Equity in undistributed earnings of associated companies, net of dividends	(2,115)	2,784	(2,895)
Acquisition-related fair value adjustments related to inventory	11,714	—	—
Deferred income taxes	(24,242)	8,197	3,754
Uncertain tax positions (non-deferred portion)	958	(89)	(817)
Non-current income taxes payable	856	(8,181)	15,825
Deferred compensation and other, net	(6,789)	2,914	833
Share-based compensation	4,861	3,724	4,190
(Gain) loss on disposal of property, plant, equipment and other assets	(58)	(657)	79
Insurance settlement realized	(822)	(1,055)	(762)
Combination and other acquisition-related expenses, net of payments	(14,414)	2,727	4,952
Restructuring and related charges	26,678	—	—
Pension and other postretirement benefits	46	(1,392)	(123)
Increase (decrease) in cash from changes in current assets and current liabilities, net of acquisitions:			
Accounts receivable	19,926	(2,822)	(1,941)
Inventories	10,844	(10,548)	(6,135)
Prepaid expenses and other current assets	(4,640)	(1,540)	(2,932)
Change in restructuring liabilities	(8,899)	—	(675)
Accounts payable and accrued liabilities	(8,915)	190	12,381
Estimated taxes on income	(1,373)	4,932	(3,479)
Net cash provided by operating activities	82,374	78,779	64,762
Cash flows from investing activities			
Investments in property, plant and equipment	(15,545)	(12,886)	(10,872)
Payments related to acquisitions, net of cash acquired	(893,412)	(500)	(5,363)
Proceeds from disposition of assets	103	866	1,577
Insurance settlement interest earned	222	162	50
Net cash used in investing activities	(908,632)	(12,358)	(14,608)
Cash flows from financing activities			
Proceeds from term loan debt	750,000	—	—
Borrowings (repayments) on revolving credit facilities, net	147,135	(21,120)	566
Repayments on other debt, net	(8,798)	(5,671)	(3,419)
Financing-related debt issuance costs	(23,747)	—	—
Dividends paid	(21,830)	(19,319)	(18,613)
Stock options exercised, other	1,370	82	(1,956)
Purchase of noncontrolling interest in affiliates, net	—	—	(31,787)
Distributions to noncontrolling affiliate shareholders	—	(877)	—
Net cash provided by (used in) financing activities	844,130	(46,905)	(55,209)
Effect of foreign exchange rate changes on cash	1,258	(6,141)	5,404
Net increase in cash, cash equivalents and restricted cash	19,130	13,375	349
Cash, cash equivalents and restricted cash at the beginning of the period	124,425	111,050	110,701
Cash, cash equivalents and restricted cash at the end of the period	$ 143,555	$ 124,425	$ 111,050
Supplemental cash flow disclosures:			
Cash paid during the year for:			
Income taxes, net of refunds	$ 15,499	$ 19,617	$ 21,544
Interest	19,553	2,417	2,767
Non-cash activities:			
Change in accrued purchases of property, plant and equipment, net	$ 1,978	$ 281	$ (240)

The accompanying notes are an integral part of these consolidated financial statements.

QUAKER CHEMICAL CORPORATION
CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY
(*Dollars in thousands, except per share amounts*)

	Common stock	Capital in excess of par value	Retained earnings	Accumulated other comprehensive loss	Noncontrolling interest	Total
Balance as of December 31, 2016	$ 13,278	$ 112,475	$ 364,414	$ (87,407)	$ 9,846	$ 412,606
Net income	—	—	20,278	—	2,022	22,300
Amounts reported in other comprehensive income	—	—	—	22,307	714	23,021
Dividends ($1.410 per share)	—	—	(18,756)	—	—	(18,756)
Acquisition of noncontrolling interest	—	(21,151)	—	—	(10,636)	(31,787)
Shares issued upon exercise of stock options and other	5	(2,456)	—	—	—	(2,451)
Shares issued for employee stock purchase plan	4	491	—	—	—	495
Share based compensation plans	21	4,169	—	—	—	4,190
Balance as of December 31, 2017	13,308	93,528	365,936	(65,100)	1,946	409,618
Cumulative effect of an accounting change	—	—	(754)	—	—	(754)
Balance as of January 1, 2018	13,308	93,528	365,182	(65,100)	1,946	408,864
Net income	—	—	59,473	—	338	59,811
Amounts reported in other comprehensive loss	—	—	—	(15,615)	(90)	(15,705)
Dividends ($1.465 per share)	—	—	(19,530)	—	—	(19,530)
Distributions to noncontrolling affiliate shareholders	—	—	—	—	(877)	(877)
Shares issued upon exercise of stock options and other	9	(432)	—	—	—	(423)
Shares issued for employee stock purchase plan	3	502	—	—	—	505
Share based compensation plans	18	3,706	—	—	—	3,724
Balance as of December 31, 2018	13,338	97,304	405,125	(80,715)	1,317	436,369
Cumulative effect of an accounting change	—	—	(44)	—	—	(44)
Balance as of January 1, 2019	13,338	97,304	405,081	(80,715)	1,317	436,325
Net income	—	—	31,622	—	262	31,884
Amounts reported in other comprehensive income	—	—	—	2,545	25	2,570
Dividends ($1.525 per share)	—	—	(23,724)	—	—	(23,724)
Shares issued related to the Combination	4,329	784,751	—	—	—	789,080
Shares issued upon exercise of stock options and other	23	871	—	—	—	894
Shares issued for employee stock purchase plan	3	473	—	—	—	476
Share based compensation plans	42	4,819	—	—	—	4,861
Balance as of December 31, 2019	$ 17,735	$ 888,218	$ 412,979	$ (78,170)	$ 1,604	$ 1,242,366

The accompanying notes are an integral part of these consolidated financial statements.

Note 1 – Significant Accounting Policies

As used in these Notes to Consolidated Financial Statements, the terms “Quaker”, “Quaker Houghton”, the “Company”, “we”, and “our” refer to Quaker Chemical Corporation (doing business as Quaker Houghton), its subsidiaries, and associated companies, unless the context otherwise requires. As used in these Notes to Consolidated Financial Statements, the term Legacy Quaker refers to the Company prior to the closing of its combination with Houghton International, Inc. (“Houghton”) (herein referred to as the “Combination”).

Principles of consolidation: All majority-owned subsidiaries are included in the Company’s consolidated financial statements, with appropriate elimination of intercompany balances and transactions. Investments in associated companies (less than majority-owned and in which the Company has significant influence) are accounted for under the equity method. The Company’s share of net income or losses in these investments in associated companies is included in the Consolidated Statements of Income. The Company periodically reviews these investments for impairments and, if necessary, would adjust these investments to their fair value when a decline in market value or other impairment indicators are deemed to be other than temporary. See Note 17 of Notes to Consolidated Financial Statements. The Company is not the primary beneficiary of any variable interest entities (“VIEs”) and therefore the Company’s consolidated financial statements do not include the accounts of any VIEs.

Translation of foreign currency: Assets and liabilities of non-U.S. subsidiaries and associated companies are translated into U.S. dollars at the respective rates of exchange prevailing at the end of the year. Income and expense accounts are translated at average exchange rates prevailing during the year. Translation adjustments resulting from this process are recorded directly in equity as accumulated other comprehensive (loss) income (“AOCI”) and will be included as income or expense only upon sale or liquidation of the underlying entity or asset. Generally, all of the Company’s non-U.S. subsidiaries use their local currency as their functional currency.

Cash and cash equivalents: The Company invests temporary and excess funds in money market securities and financial instruments having maturities within 90 days. The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents. The Company has not experienced losses from the aforementioned investments.

Inventories: Inventories are valued at the lower of cost or net realizable value, and are valued using the first-in, first-out method. See Note 14 of Notes to Consolidated Financial Statements.

Long-lived assets: Property, plant and equipment (“PP&E”) are stated at gross cost, less accumulated depreciation. Depreciation is computed using the straight-line method on an individual asset basis over the following estimated useful lives: buildings and improvements, 10 to 45 years; and machinery and equipment, 1 to 15 years. The carrying values of long-lived assets are evaluated whenever changes in circumstances or current events indicate the carrying amount of such assets may not be recoverable. An estimate of undiscounted cash flows produced by the asset, or the appropriate group of assets, is compared with the carrying value to determine whether an impairment exists. If necessary, the Company recognizes an impairment loss for the difference between the carrying amount of the assets and their estimated fair value. Fair value is based on current and anticipated future cash flows. Upon sale or other dispositions of long-lived assets, the applicable amounts of asset cost and accumulated depreciation are removed from the accounts and the net amount, less proceeds from disposals, is recorded in the Consolidated Statements of Income. Expenditures for renewals or improvements that increase the estimated useful life or capacity of the assets are capitalized, whereas expenditures for repairs and maintenance are expensed when incurred. See Notes 9 and 15 of Notes to Consolidated Financial Statements.

Capitalized software: The Company capitalizes certain costs in connection with developing or obtaining software for internal use, depending on the associated project. These costs are amortized over a period of 3 to 5 years once the assets are ready for their intended use. In connection with the implementations and upgrades to the Company’s global transaction, consolidation and other related systems, approximately $2.6 million and $1.1 million of net costs were capitalized in PP&E on the Company’s December 31, 2019 and 2018 Consolidated Balance Sheets, respectively.

Goodwill and other intangible assets: The Company records goodwill, definite-lived intangible assets and indefinite-lived intangible assets at fair value at the date of acquisition. Goodwill and indefinite-lived intangible assets are not amortized but tested for impairment at least annually. These tests will be performed more frequently if triggering events indicate potential impairment. Definite-lived intangible assets are amortized over their estimated useful lives, generally for periods ranging from 4 to 20 years. The Company continually evaluates the reasonableness of the useful lives of these assets, consistent with the discussion of long-lived assets, above. See Note 16 of Notes to Consolidated Financial Statements.

Revenue recognition: The Company applies the Financial Accounting Standards Board’s (“FASB’s”) guidance on revenue recognition which requires the Company to recognize revenue in an amount that reflects the consideration to which the Company

expects to be entitled in exchange for goods or services transferred to its customers. To do this, the Company applies the five-step model in the FASB's guidance, which requires the Company to: (i) identify the contract with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when, or as, the Company satisfies a performance obligation. The Company adopted the new revenue recognition guidance electing to use a modified retrospective adoption approach applied to those contracts which were not completed as of January 1, 2018. Therefore, comparative information has not been restated and continues to be accounted for and reported under the historical revenue recognition accounting standards in effect for those periods. As a result of the Company's adoption, using the modified retrospective adoption approach, the Company recorded a cumulative effect of an accounting change as of January 1, 2018 to adjust the Company's estimate of variable consideration related to the customer's expected rights to return product. This adjustment resulted in an increase to other accrued liabilities of $1.0 million, an increase to deferred tax assets of $0.2 million and a decrease to retained earnings of $0.8 million. Prior to this adoption, the Company recognized revenue in accordance with the terms of the underlying agreements, when title and risk of loss had been transferred, when collectability was reasonably assured, and when pricing was fixed or determinable. This generally occurred when products were shipped or delivered to customers or, for consignment-type arrangements, upon usage by the customer and when services were performed. See Notes 3 and 5 of Notes to Consolidated Financial Statements.

Accounts receivable and allowance for doubtful accounts: Trade accounts receivable subject the Company to credit risk. Trade accounts receivable are recorded at the invoiced amount and generally do not bear interest. The allowance for doubtful accounts is the Company's best estimate of the amount of probable credit losses with its existing accounts receivable. Reserves for customers filing for bankruptcy protection are established based on a percentage of the amount outstanding at the bankruptcy filing date. However, initially establishing a reserve and the amount thereto is dependent on the Company's evaluation of likely proceeds to be received from the bankruptcy process, which could result in the Company recognizing minimal or no reserve at the date of bankruptcy. Large and/or financially distressed customers are generally reserved for on a specific review basis while a general reserve is established for other customers based on historical experience. The Company performs a formal review of its allowance for doubtful accounts quarterly. Account balances are charged off against the allowance when the Company deems it is probable the receivable will not be recovered. The Company does not have any off-balance-sheet credit exposure related to its customers. See Note 13 of Notes to Consolidated Financial Statements.

Research and development costs: Research and development costs are expensed as incurred and are included in selling, general and administrative expenses ("SG&A"). Research and development expenses were $32.1 million, $24.5 million and $23.9 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Environmental liabilities and expenditures: Accruals for environmental matters are recorded when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated. If there is a range of estimated liability and no amount in that range is considered more probable than another, then the Company records the lowest amount in the range in accordance with generally accepted accounting principles in the United States ("U.S. GAAP"). Environmental costs and remediation costs are capitalized if the costs extend the life, increase the capacity or improve safety or efficiency of the property from the date acquired or constructed, and/or mitigate or prevent contamination in the future. See Note 26 of Notes to Consolidated Financial Statements.

Asset retirement obligations: The Company follows the FASB's guidance regarding asset retirement obligations, which addresses the accounting and reporting for obligations associated with the retirement of tangible long-lived assets and the associated retirement costs. Also, the Company follows the FASB's guidance for conditional asset retirement obligations ("CARO"), which relates to legal obligations to perform an asset retirement activity in which the timing and (or) method of settlement are conditional on a future event that may or may not be within the control of the entity. In accordance with this guidance, the Company records a liability when there is enough information regarding the timing of the CARO to perform a probability-weighted discounted cash flow analysis. As of December 31, 2019 and 2018, the Company had limited exposure to such obligations and had immaterial liabilities recorded for such on its Consolidated Balance Sheets.

Pension and other postretirement benefits:

The Company maintains various noncontributory retirement plans, the largest of which is in the U.S., covering a portion of its employees in the U.S. and certain other countries. The plans of the Company's subsidiaries in the Netherlands, the United Kingdom ("U.K."), Mexico and Sweden are subject to the provisions of FASB's guidance regarding employers' accounting for defined benefit pension plans. In connection with the Combination, the Company indirectly acquired all of Houghton's defined benefit pension plans, covering a portion of its employees in the U.S. and certain other countries. The plans of Houghton's subsidiaries in France, Germany and the U.K. are subject to the provisions of FASB's guidance regarding employers' accounting for defined benefit pension plans. The plans of the remaining non-U.S. subsidiaries are, for the most part, either fully insured or integrated with the local governments' plans and are not subject to the provisions of the guidance. The guidance requires that employers recognize on a prospective basis the funded status of their defined benefit pension and other

postretirement plans on their consolidated balance sheet and, also, recognize as a component of AOCI, net of tax, the gains or losses and prior service costs or credits that arise during the period but are not recognized as components of net periodic benefit cost. In addition, the guidance requires that an employer recognize a settlement charge in their consolidated statement of income when certain events occur, including plan termination or the settlement of certain plan liabilities. A settlement charge represents the immediate recognition into expense of a portion of the unrecognized loss within AOCI on the balance sheet in proportion to the share of the projected benefit obligation that was settled. The Company's Legacy Quaker U.S. pension plan year ends on November 30 and the measurement date is December 31. The measurement date for the Company's other postretirement benefits plan is December 31.

The Company's global pension investment policies are designed to ensure that pension assets are invested in a manner consistent with meeting the future benefit obligations of the pension plans and maintaining compliance with various laws and regulations including the Employee Retirement Income Security Act of 1974. The Company establishes strategic asset allocation percentage targets and benchmarks for significant asset classes with the aim of achieving a prudent balance between return and risk. The Company's investment horizon is generally long term, and, accordingly, the target asset allocations encompass a long-term perspective of capital markets, expected risk and return and perceived future economic conditions while also considering the profile of plan liabilities. To the extent feasible, the short-term investment portfolio is managed to match the short-term obligations, the intermediate portfolio duration is matched to reduce the risk of volatility in intermediate plan distributions, and the total return portfolio is managed to maximize the long-term real growth of plan assets. The critical investment principles of diversification, assessment of risk and targeting the optimal expected returns for given levels of risk are applied. The Company's investment guidelines prohibit the use of securities such as letter stock and other unregistered securities, commodities or commodity contracts, short sales, margin transactions, private placements (unless specifically addressed by addendum), or any derivatives, options or futures for the purpose of portfolio leveraging.

The target asset allocation is reviewed periodically and is determined based on a long-term projection of capital market outcomes, inflation rates, fixed income yields, returns, volatilities and correlation relationships. The interaction between plan assets and benefit obligations is periodically studied to assist in establishing such strategic asset allocation targets. Asset performance is monitored with an overall expectation that plan assets will meet or exceed benchmark performance over rolling five-year periods. The Company's pension committee, as authorized by the Company's Board of Directors, has discretion to manage the assets within established asset allocation ranges approved by senior management of the Company. As of December 31, 2019, the plan's investments were in compliance with all approved ranges of asset allocations. See Note 21 of Notes to Consolidated Financial Statements.

Comprehensive income (loss): The Company presents other comprehensive income (loss) in its Statements of Comprehensive Income. The Company follows the FASB's guidance regarding the disclosure of reclassifications from AOCI which requires the disclosure of significant amounts reclassified from each component of AOCI, the related tax amounts and the income statement line items affected by such reclassifications. See Note 23 of Notes to Consolidated Financial Statements.

Income taxes and uncertain tax positions: The provision for income taxes is determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. The provision for income taxes represents income taxes paid or payable for the current year and the change in deferred taxes during the year. Deferred taxes result from differences between the financial and tax bases of the Company's assets and liabilities and are adjusted for changes in tax rates and tax laws when changes are enacted. Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized. The FASB's guidance regarding accounting for uncertainty in income taxes prescribes the recognition threshold and measurement attributes for financial statement recognition and measurement of tax positions taken or expected to be taken on a tax return. The guidance further requires the determination of whether the benefits of tax positions are probable or more likely than not sustained upon audit based upon the technical merits of the tax position. For tax positions that are determined to be more likely than not sustained upon audit, a company recognizes the largest amount of benefit that is greater than 50% likely of being realized upon ultimate settlement in the financial statements. For tax positions that are not determined to be more likely than not sustained upon audit, a company does not recognize any portion of the benefit in the financial statements. Additionally, the Company monitors and adjusts for derecognition, classification, and penalties and interest in interim periods, with appropriate disclosure and transition thereto. Also, the amount of interest expense and income related to uncertain tax positions is computed by applying the applicable statutory rate of interest to the difference between the tax position recognized, including timing differences, and the amount previously taken or expected to be taken in a tax return. The Company's continuing practice is to recognize interest and/or penalties related to income tax matters in income tax expense. Finally, when applicable, the Company nets its liability for unrecognized tax benefits against deferred tax assets related to net operating losses or other tax credit carryforwards that would apply if the uncertain tax position were settled for the presumed amount at the balance sheet date.

Pursuant to the Tax Cuts and Jobs Act ("U.S. Tax Reform"), specifically the one-time tax on deemed repatriation (the "Transition Tax"), the Company has provided for U.S. income tax on its undistributed earnings of non-U.S. subsidiaries, however, the Company is subject to and will incur other taxes, such as withholding taxes and dividend distribution taxes, if these undistributed earnings were ultimately remitted to the U.S. It is the Company's current intention to reinvest its future undistributed earnings of non-U.S. subsidiaries to support working capital needs and certain other growth initiatives of those subsidiaries. However, in certain cases the Company has and may in the future change its indefinite reinvestment assertion for any or all of these undistributed earnings. In this case, the Company would estimate and record a tax liability and corresponding tax expense for the amount of non-U.S. income taxes it would incur to ultimately remit these earnings to the U.S. See Note 10 of Notes to Consolidated Financial Statements.

Derivatives: The Company is exposed to the impact of changes in interest rates, foreign currency fluctuations, changes in commodity prices and credit risk. The Company utilizes interest rate swap agreements to enhance its ability to manage risk, including exposure to variability in interest payments associated with its variable rate debt. Derivative instruments are entered into for periods consistent with the related underlying exposures and do not constitute positions independent of those exposures. As of December 31, 2019, the Company had certain interest rate swap agreements that were designated as cash flow hedges. Interest rate swaps are entered into with a limited number of counterparties, each of which allows for net settlement of all contracts through a single payment in a single currency in the event of a default on or termination of any one contract. The Company records these instruments on a net basis within the Consolidated Balance Sheets. The effective portion of the change in fair value of the agreement is recorded in AOCI and will be recognized in the Consolidated Statements of Income when the hedge item affects earnings or losses or it becomes probable that the forecasted transaction will not occur. See Note 25 of Notes to Consolidated Financial Statements.

Fair value measurements: The Company utilizes the FASB's guidance regarding fair value measurements, which establishes a common definition for fair value to be applied to guidance requiring use of fair value, establishes a framework for measuring fair value and expands disclosure about such fair value measurements. Specifically, the guidance utilizes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value into three broad levels. See Notes 21 and 24 of Notes to Consolidated Financial Statements. The following is a brief description of those three levels:

- Level 1: Observable inputs such as quoted prices (unadjusted) in active markets for identical assets or liabilities.
- Level 2: Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly. These include quoted prices for similar assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.
- Level 3: Unobservable inputs that reflect the reporting entity's own assumptions.

Share-based compensation: The Company applies the FASB's guidance regarding share-based payments, which requires the recognition of the fair value of share-based compensation as a component of expense. The Company has a long-term incentive program ("LTIP") for key employees which provides for the granting of options to purchase stock at prices not less than its market value on the date of the grant. Most options become exercisable within three years after the date of the grant for a period of time determined by the Company, but not to exceed seven years from the date of grant. Restricted stock awards and restricted stock units issued under the LTIP program are generally subject to time vesting over a one to three-year period. In addition, as part of the Company's Global Annual Incentive Plan (now the "Annual Incentive Plan"), nonvested shares may be issued to key employees, which generally would vest over a two to five-year period. In addition, while the FASB's guidance permits the Company to make an accounting policy election to account for forfeitures as they occur for service condition aspects of certain share-based awards, the Company has decided not to elect this accounting policy and instead has elected to continue utilizing a forfeiture rate assumption. Based on historical experience, the Company has assumed a forfeiture rate of 13% on certain of its nonvested stock awards. The Company will record additional expense if the actual forfeiture rate is lower than estimated and will record a recovery of prior expense if the actual forfeiture is higher than estimated.See Note 8 of Notes to Consolidated Financial Statements.

Earnings per share: The Company follows the FASB's guidance regarding the calculation of earnings per share for nonvested stock awards with rights to non-forfeitable dividends. The guidance requires nonvested stock awards with rights to non-forfeitable dividends to be included as part of the basic weighted average share calculation under the two-class method. See Note 11 of Notes to Consolidated Financial Statements.

Segments: The Company's reportable segments reflect the structure of the Company's internal organization, the method by which the Company's resources are allocated and the manner by which the Company and the chief operating decision maker assess its performance. See Note 4 of Notes to Consolidated Financial Statements.

Hyper-inflationary accounting: Economies that have a cumulative three-year rate of inflation exceeding 100% are considered hyper-inflationary in accordance with U.S. GAAP. A legal entity that operates within an economy deemed to be hyper-inflationary is required to remeasure its monetary assets and liabilities to the applicable published exchange rates and record the associated gains or losses resulting from the remeasurement directly to the Consolidated Statements of Income.

Venezuela's economy has been considered hyper-inflationary under U.S. GAAP since 2010. The Company has a 50% equity interest in a Venezuelan affiliate, Kelko Quaker Chemical, S.A ("Kelko Venezuela"). Due to heightened foreign exchange controls and restrictions currently present within Venezuela, during the third quarter of 2018 the Company concluded that it no longer had significant influence over this affiliate. Prior to this determination, the Company historically accounted for this affiliate under the equity method. As of December 31, 2019 and 2018, the Company had no remaining carrying value for its investment in Kelko Venezuela. See Note 17 of Notes to Consolidated Financial Statements.

Based on various indices or index compilations currently being used to monitor inflation in Argentina as well as recent economic instability, effective July 1, 2018, Argentina's economy was considered hyper-inflationary under U.S. GAAP. As a result, the Company began applying hyper-inflationary accounting with respect to the Company's wholly owned Argentine subsidiary beginning July 1, 2018. In addition, Houghton has an Argentine subsidiary to which hyper-inflationary accounting also is applied. As of, and for the year ended December 31, 2019, the Company's Argentine subsidiaries represented less than 1% of the Company's consolidated total assets and net sales, respectively. During the years ended December 31, 2019, 2018 and 2017, the Company recorded $1.0 million, $0.7 million, and $0.4 million, respectively, of remeasurement losses associated with the applicable currency conversions related to Venezuela and Argentina.

Business combinations: The Company accounts for business combinations under the acquisition method of accounting. This method requires the recording of acquired assets, including separately identifiable intangible assets and assumed liabilities at their respective acquisition date estimated fair values. Any excess of the purchase price over the estimated fair value of the identifiable net assets acquired is recorded as goodwill. The determination of the estimated fair value of assets acquired and liabilities assumed requires significant estimates and assumptions. Based on the assessment of additional information during the measurement period, which may be up to one year from the acquisition date, the Company may record adjustments to the estimated fair value of assets acquired and liabilities assumed. See Note 2 of Notes to Consolidated Financial Statements.

Restructuring activities: Restructuring programs consist of employee severance, rationalization of manufacturing or other facilities and other related items. To account for such programs, the Company applies FASB's guidance regarding exit or disposal cost obligations. This guidance requires that a liability for a cost associated with an exit or disposal activity be recognized when the liability is incurred, is estimable, and payment is probable. See Note 7 of Notes to Consolidated Financial Statements.

Reclassifications: Certain information has been reclassified to conform to the current year presentation.

Accounting estimates: The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities and disclosure of contingencies at the date of the financial statements and the reported amounts of net sales and expenses during the reporting period. Actual results could differ from such estimates.

Note 2 – Business Combinations

Houghton

On August 1, 2019, the Company completed the Combination with Houghton, whereby the Company acquired all of the issued and outstanding shares of Houghton from Gulf Houghton Lubricants, Ltd. and certain other selling shareholders in exchange for a combination of cash and shares of the Company's common stock in accordance with the share purchase agreement dated April 4, 2017. Houghton is a leading global provider of specialty chemicals and technical services for metalworking and other industrial applications. The Company believes that combining Quaker's and Houghton's products and service offerings will allow Quaker Houghton to better serve its customers in its various end markets.

The Combination was subject to certain regulatory and shareholder approvals. At a shareholder meeting held during 2017, the Company's shareholders approved the issuance of new shares of the Company's common stock at closing of the Combination. Also in 2017, the Company received regulatory approvals for the Combination from China and Australia. The Company received regulatory approvals from the European Commission ("EC") during the second quarter of 2019 and the U.S. Federal Trade Commission ("FTC") in July 2019. The approvals from the FTC and the EC required the concurrent divestiture of certain steel and aluminum related product lines of Houghton, which were sold by Houghton on August 1, 2019 for approximately $37 million in cash. The final remedy agreed with the EC and the FTC was consistent with the Company's previous expectation that the total divested product lines would be approximately 3% of the combined company's net sales.

The following table summarizes the fair value of consideration transferred in the Combination:

Cash transferred to Houghton shareholders (a)	$ 170,829
Cash paid to extinguish Houghton debt obligations	702,556
Fair value of common stock issued as consideration (b)	789,080
Total fair value of consideration transferred	$ 1,662,465

(a) A portion is held in escrow by a third party, subject to indemnification rights that lapse upon the achievement of certain milestones.
(b) Amount was determined based on approximately 4.3 million shares, comprising approximately 24.5% of the common stock of the Company at closing, and the closing price per share of Quaker Chemical Corporation common stock of $182.27 on August 1, 2019.

The Company accounted for the Combination under the acquisition method of accounting. This method requires the recording of acquired assets, including separately identifiable intangible assets, at their fair value on the acquisition date. Any excess of the purchase price over the estimated fair value of the identifiable net assets acquired is recorded as goodwill. The determination of the estimated fair value of assets acquired, including indefinite and definite-lived intangible assets, requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, discount rates, customer attrition rates, royalty rates, asset lives and market multiples, among other items. Fair values were determined by management, using a variety of methodologies and resources, including external independent valuation experts. The valuation methods included physical appraisals, discounted cash flow analyses, excess earnings, relief from royalty, and other appropriate valuation techniques to determine the fair value of assets acquired and liabilities assumed.

The following table presents the current preliminary estimated fair values of Houghton net assets acquired:

	August 1, 2019 (as Initially Reported)	Measurement Period Adjustments	August 1, 2019 (as adjusted)
Cash and cash equivalents	$ 75,821	$ —	$ 75,821
Accounts receivable, net	179,745	(823)	178,922
Inventories, net	95,193	—	95,193
Prepaid expenses and other assets	11,373	(721)	10,652
Deferred tax assets	8,703	(8,703)	—
Property, plant and equipment	125,099	(9,570)	115,529
Right of use lease assets	10,747	(74)	10,673
Investments in associated companies	69,683	(3,236)	66,447
Other non-current assets	1,368	3,342	4,710
Intangible assets	1,022,500	5,900	1,028,400
Goodwill	483,921	10,994	494,915
Total assets purchased	2,084,153	(2,891)	2,081,262
Short-term borrowings, not refinanced at closing	9,297	—	9,297
Accounts payable, accrued expenses and other accrued liabilities	152,829	(2,751)	150,078
Deferred tax liabilities	213,779	(8,697)	205,082
Long-term lease liabilities	6,655	(48)	6,607
Other non-current liabilities	39,128	8,605	47,733
Total liabilities assumed	421,688	(2,891)	418,797
Total consideration paid for Houghton	1,662,465	—	1,662,465
Less: cash acquired	75,821	—	75,821
Less: fair value of common stock issued as consideration	789,080	—	789,080
Net cash paid for Houghton	$ 797,564	$ —	$ 797,564

As of December 31, 2019, the allocation of the purchase price for the Combination has not been finalized and the one-year measurement period has not ended. Further adjustments may be necessary as a result of the Company's on-going assessment of additional information related to the fair value of assets acquired and liabilities assumed. Houghton assets acquired and liabilities assumed have been assigned to each of the Company's reportable segments on a specific identification or allocated basis, as applicable.

Accounts receivable, net, presented in the table above, including the measurement period adjustment recorded during the fourth quarter of 2019, represents the Company's fair value estimate of receivables acquired, which includes the gross contractual receivables less the Company's estimate of the amounts that will not be collected. See Note 13 of Notes to Consolidated Financial Statements. Measurement period adjustments recorded during the fourth quarter of 2019 related to deferred tax assets, deferred tax liabilities, other non-current assets and other non-current liabilities are primarily due to additional information obtained regarding certain tax audits, valuation allowances related to foreign tax credits and deferred taxes related to the step-up in intangibles and property, plant and equipment. See Note 10 of Notes to Consolidated Financial Statements. In addition, the Company recorded measurement period adjustments to accounts payable, accrued expenses and other accrued liabilities and other non-current liabilities, presented in the table above, primarily due to additional information obtained related to the projected obligations for certain environmental matters. See Note 26 of Notes to Consolidated Financial Statements. The measurement period adjustment recorded during the fourth quarter of 2019 related to property, plant and equipment presented in the table above is the result of additional information obtained related to the estimated fair value of certain real property acquired. Investments in associated companies presented in the table above, including the measurement period adjustment recorded during the fourth quarter of 2019, represents the Company's fair value estimate of its 50% interest in a Houghton joint venture in Korea ("Houghton Korea"). The Company accounts for this interest under the equity method of accounting. See Note 17 of Notes to Consolidated Financial Statements. The Company allocated $1,028.4 million of the purchase price to intangible assets, including certain measurement period adjustments recorded during the fourth quarter of 2019, comprised of $242.0 million of trademarks and formulations, to which management has assigned indefinite lives; $677.3 million of customer relationships, to be amortized over 15 to 18 years; and $109.1 million of existing product technology, to be amortized over 20 years. In addition, the Company recorded $494.9 million of goodwill, including measurement period adjustments during the fourth quarter of 2019, related to expected value not allocated to other acquired assets, none of which will be tax deductible. See Note 16 of Notes to Consolidated Financial Statements. Factors contributing to the purchase price that resulted in goodwill included the acquisition of management, technology, intellectual property, business processes and personnel that will allow Quaker Houghton to better serve its customers. The expanded portfolio is expected to generate significant cross-selling opportunities and allow further expansion into certain emerging growth markets.

Commencing August 1, 2019, the Company's Consolidated Statements of Income included the results of Houghton. Net sales of Houghton subsequent to closing of the Combination and included in the Company's Consolidated Statements of Income were $299.8 million. The following unaudited pro forma consolidated financial information has been prepared as if the Combination had taken place on January 1, 2018. The unaudited pro forma results include certain adjustments to each company's historical actual results, including: (i) additional depreciation and amortization expense based on the initial estimates of fair value step up and estimated useful lives of depreciable fixed assets, definite-lived intangible assets and investment in associated companies acquired; (ii) adoption of required accounting guidance and alignment of related accounting policies, (iii) elimination of transactions between Quaker and Houghton; (iv) elimination of results associated with the divested product lines; (v) adjustment to interest expense, net, to reflect the impact of the financing and capital structure of the combined Company; and (vi) adjustment for certain Combination and other acquisition-related costs to reflect such costs as if they were incurred in the period immediately following the pro-forma closing of the Combination on January 1, 2018. The adjustments described in (vi) include an expense recorded in costs of goods sold ("COGS") associated with selling inventory acquired in the Combination which was adjusted to fair value as part of purchase accounting, restructuring expense incurred associated with the Company's global restructuring program initiated post-closing of the Combination and certain other integration costs incurred post-closing included in combination and other acquisition-related expenses. These costs have been presented in the unaudited pro forma results as if they were incurred during the year ended December 31, 2018. Unaudited pro forma results are not necessarily indicative of the results that would have occurred if the acquisition had occurred on the date indicated, or that may result in the future for various reasons, including the potential impact of revenue and cost synergies on the business.

Unaudited Pro Forma	**For the years ending December 31,**	
(as if the Combination occurred on January 1, 2018)	**2019**	**2018**
Net sales	$ 1,562,427	$ 1,654,588
Net income attributable to Quaker Chemical Corporation	94,537	35,337

Combination and other acquisition-related expenses have been and are expected to continue to be significant. The Company incurred total costs of $38.0 million, $19.5 million and $30.8 million for the years ended December 31, 2019, 2018 and 2017 related to the Combination and other acquisition-related activities. These costs included certain legal, financial and other advisory and consultant costs related to due diligence, regulatory approvals and integration planning as well as professional fees associated with closing the Combination. These costs also include interest costs to maintain the bank commitment ("ticking fees") for the Combination during each of the years ended December 31, 2019 and 2018, accelerated depreciation charges during the year ended

December 31, 2019, and a gain on the sale of a held-for-sale asset during the year ended December 31, 2018. As of December 31, 2019 and 2018, the Company had current liabilities related to the Combination and other acquisition-related activities of $6.6 million and $8.2 million, respectively, primarily recorded within other accrued liabilities on its Consolidated Balance Sheets.

Norman Hay

On October 1, 2019, the Company completed its acquisition of the operating divisions of Norman Hay plc, a private U.K. company that provides specialty chemicals, operating equipment, and services to industrial end markets. The acquisition adds new technologies in automotive, original equipment manufacturer ("OEM"), and aerospace, as well as engineering expertise which is expected to strengthen the existing equipment solutions platform inside Quaker Houghton. The acquired Norman Hay assets and liabilities were assigned to the Global Specialty Businesses reportable segment. The original purchase price was 80.0 million GBP, on a cash-free and debt-free basis, subject to routine and customary post-closing adjustments related to working capital and net indebtedness levels. The Company expects to finalize its post-closing adjustments for the Norman Hay acquisition in the first half of 2020 and currently estimates that it will pay approximately 2.7 million GBP to settle such adjustments. The Company has accrued for this estimated additional purchase price as of December 31, 2019.

The following table presents the preliminary estimated fair values of Norman Hay net assets acquired:

Cash and cash equivalents	$	18,981
Accounts receivable, net		15,471
Inventories, net		8,213
Prepaid expenses and other assets		4,203
Property, plant and equipment		14,981
Right of use lease assets		10,608
Intangible assets		51,088
Goodwill		29,384
Total assets purchased		152,929
Long-term debt included current portions		485
Accounts payable, accrued expenses and other accrued liabilities		13,488
Deferred tax liabilities		12,746
Long-term lease liabilities		8,594
Total liabilities assumed		35,313
Total consideration paid for Norman Hay		117,616
Less: estimated purchase price settlement		3,287
Less: cash acquired		18,981
Net cash paid for Norman Hay	$	95,348

The Company allocated $51.1 million of the purchase price to intangible assets, comprised of $36.9 million of customer relationships, to be amortized over 13 to 17 years; $7.5 million of existing product technology, to be amortized over 20 years; $6.3 million of trademarks, to be amortized over 16 to 17 years; and $0.4 million of non-compete agreements, to be amortized over 2 to 11 years. In addition, the Company recorded $29.4 million of goodwill related to expected value not allocated to other acquired assets, none of which will be tax deductible. Factors contributing to the purchase price that resulted in goodwill included the acquisition of management, technology, intellectual property, business processes and personnel that will allow Quaker Houghton to better serve its customers.

As of December 31, 2019, the allocation of the purchase price for Norman Hay has not been finalized and the one-year measurement period has not ended. Further adjustments may be necessary as a result of the Company's on-going assessment of additional information related to the fair value of assets acquired and liabilities assumed.

The results of operations of Norman Hay are included in the Consolidated Statements of Income as of October 1, 2019. Transaction expenses associated with this acquisition are included in Combination and other acquisition-related expenses in the Company's Consolidated Statements of Income. Certain pro forma and other information is not presented, as the operations of Norman Hay represent less than approximately 5% of the Company's operations and are therefore considered not material to the overall operations of the Company for the periods presented.

Other Acquisitions

In March 2018, the Company purchased certain formulations and product technology for the mining industry for $1.0 million. The Company allocated the entire purchase price to intangible assets representing formulations and product technology, to be amortized over 10 years. In accordance with the terms of the applicable purchase agreement, $0.5 million of the purchase price was paid at signing, and the remaining $0.5 million of the purchase price was paid during the first quarter of 2019.

In December 2017, the Company acquired the remaining 45% ownership interest in its India affiliate, Quaker Chemical India Private Limited ("QCIL") for 2,025.0 million INR, or approximately $31.8 million, from its joint venture partner, Asianol Lubricants Limited. QCIL sells products to the steel and metalworking industries in India and has associates based in various locations around India. The Company had been a joint venture partner in QCIL for 20 years. QCIL is a part of the Company's Asia/Pacific reportable segment. As this acquisition was a change in an existing controlling ownership, the Company recorded $21.2 million of excess purchase price over the carrying value of the noncontrolling interest in Capital in excess of par value. In May 2017, the Company acquired assets associated with a business that markets, sells and manufactures certain metalworking fluids for its previous North America reportable segment for 7.3 million CAD, or approximately $5.4 million.

Note 3 – Recently Issued Accounting Standards

Recently Issued Accounting Standards Not Yet Adopted

The FASB issued an accounting standard update in January 2020 clarifying the interaction between accounting standards related to equity securities, equity method investments, and certain derivatives. The new guidance, among other things, states that a company should consider observable transactions that require a company to either apply or discontinue the equity method of accounting, for the purposes of applying the fair value measurement alternative immediately before applying or upon discontinuing the equity method. The new guidance also addresses the measurement of certain purchased options and forward contracts used to acquire investments. The guidance within this accounting standard update is effective for annual and interim periods beginning after December 15, 2020 and is to be applied prospectively. Early adoption is permitted. The Company has not early adopted the guidance and is currently evaluating its implementation.

The FASB issued an accounting standard update in December 2019 to simplify the accounting for income taxes. The guidance within this accounting standard update removes certain exceptions, including the exception to the incremental approach for certain intra-period tax allocations, to the requirement to recognize or not recognize certain deferred tax liabilities for equity method investments and foreign subsidiaries, and to the general methodology for calculating income taxes in an interim period when a year-to-date loss exceeds the anticipated loss for the year. Further, the guidance simplifies the accounting related to franchise taxes, the step up in tax basis for goodwill, current and deferred tax expense, and codification improvements for income taxes related to employee stock ownership plans. The guidance is effective for annual and interim periods beginning after December 15, 2020. Early adoption is permitted. The Company has not early adopted the guidance and is currently evaluating its implementation.

The FASB issued an accounting standard update in August 2018 that modifies certain disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The amendments in this accounting standard update remove disclosures that are no longer considered cost beneficial, clarify the specific requirements of certain disclosures, and add new disclosure requirements as relevant. The guidance within this accounting standard update is effective for annual periods beginning after December 15, 2020, and should be applied retrospectively to all periods presented. Early adoption is permitted. The Company has not early adopted the guidance and is currently evaluating its implementation.

The FASB also issued an accounting standard update in August 2018 that clarifies the accounting for implementation costs incurred in a cloud computing arrangement under a service contract. This guidance generally aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement under a service contract with the requirements for capitalizing implementation costs related to internal-use software. The guidance within this accounting standard update is effective for annual periods beginning after December 15, 2019 and may be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. Early adoption is permitted. The Company has not early adopted the guidance, is currently working through the implementation of this guidance and does not currently expect the guidance to have a material impact to its financial statements.

The FASB issued an additional accounting standard update in August 2018 that modifies certain disclosure requirements for fair value measurements. The guidance removes certain disclosure requirements regarding transfers between levels of the fair value hierarchy as well as certain disclosures related to the valuation processes for certain fair value measurements. Further, the guidance added certain disclosure requirements including unrealized gains and losses and significant unobservable inputs used to develop certain fair value measurements. The guidance within this accounting standard update is effective for annual and interim periods beginning after December 15, 2019, and may be applied prospectively in the initial year of adoption or retrospectively to all periods presented, depending on the amended disclosure requirement. Early adoption is permitted. The Company has not early adopted the

guidance, is currently working through the implementation of this guidance and does not currently expect the guidance to have a material impact to its financial statements.

The FASB issued an accounting standard update in June 2016 related to the accounting for and disclosure of credit losses. In May 2019, the FASB issued an accounting standard update to provide targeted transition relief to increase comparability of financial statements. The guidance introduces a new model for recognizing credit losses on financial instruments, including customer accounts receivable, based on an estimate of current expected credit losses. The guidance within this accounting standard update is effective for annual and interim periods beginning after December 15, 2019, and aspects of the guidance which may be applicable to the Company should be applied on a modified retrospective basis. Early adoption is permitted. The Company has not early adopted the guidance, is currently working through the implementation of this guidance and does not currently expect the guidance to have a material impact to its financial statements.

Recently Issued Accounting Standards Adopted

The FASB issued an accounting standard update in February 2018 that allows a reclassification from AOCI to retained earnings for stranded tax effects resulting from the U.S. Tax Reform enacted in December 2017. The guidance within this accounting standard update is effective for annual and interim periods beginning after December 15, 2018, and may be applied either in the period of adoption or retrospectively to each period in which the effect of the change in the U.S. federal corporate income tax rate in U.S. Tax Reform is recognized. Early adoption was permitted. The Company adopted this guidance in the first quarter of 2019, as required, but elected not to reclassify any stranded tax effects resulting from U.S. Tax Reform, therefore adoption of this guidance did not have any impact on its financial statements. The FASB issued an accounting standard update in February 2016 regarding the accounting and disclosure for leases. During 2018 and 2019, the FASB issued a series of accounting standard updates to clarify and expand on the original 2016 implementation guidance, including providing an accounting policy election for lessors, certain targeted improvements around comparative reporting requirements and accounting for lease and non-lease components by lessors as well as other technical corrections and improvements. The amendments in these 2018 and 2019 updates did not change the core principles of the guidance previously issued in February 2016. The guidance within all of the leasing accounting standard updates were effective for annual and interim periods beginning after December 15, 2018, and are to be applied on a modified retrospective basis, applying the transition requirements either (a) at the beginning of the earliest period presented in the financial statements in the year of adoption (January 1, 2017) or (b) in the period of adoption (January 1, 2019). Early adoption was permitted.

As part of the Company's implementation planning and its impact assessment related to the new lease accounting guidance, the Company developed a detailed project plan, identified and established a cross-functional implementation team and developed pre-adoption internal controls. In addition, the Company gathered an inventory of the Company's outstanding leases globally, performed certain review procedures to ensure completeness of its lease population and abstracted required information from its lease population for inclusion within the Company's leasing software. The Company performed similar implementation planning and impact assessment procedures as it relates to Houghton and Norman Hay.

For Legacy Quaker, the Company adopted the guidance in the first quarter of 2019, as required, electing to use a modified retrospective transition approach and applied transition requirements as of January 1, 2019, as permitted. Subsequent to the acquisitions of Houghton and Norman Hay, previously private companies, the Company adopted the guidance and elected to use a modified retrospective transition approach and applied transition requirements as of August 1, 2019 and October 1, 2019, respectively. Comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods. In addition, the Company elected to apply certain of the permitted transition practical expedients within the new lease accounting related to lease identification, lease classification, and initial direct costs. The Company made certain accounting policy elections as a result of adopting the new lease accounting guidance, which include not separating lease and non-lease components, applying a portfolio approach in the development of the Company's discount rates, applying the short-term lease exemption and establishing a capitalization threshold policy.

Adoption of the lease accounting guidance did not have a material impact on the Company's reported earnings or cash flows, however, adoption did result in a material impact to the Company's balance sheet to establish the right of use lease assets and associated lease liabilities. As of January 1, 2019, Legacy Quaker recorded a cumulative effect of an accounting change that resulted in an increase to its right of use lease assets of $27.3 million, an increase of $5.3 million of short-term lease liabilities and $21.4 million of long-term lease liabilities, a decrease in PP&E, net of $1.1 million, a decrease in other accrued liabilities of $0.4 million and a decrease to retained earnings of less than $0.1 million. The cumulative effect of an accounting change related to Houghton as of August 1, 2019 resulted in an increase to its right of use lease assets of $10.7 million, and an increase of $4.1 million of short-term lease liabilities and approximately $6.6 million of long-term lease liabilities. The cumulative effect of an accounting change related to Norman Hay as of October 1, 2019 resulted in an increase to its right of use lease assets of $10.6 million, and an increase of $2.0 million of short-term lease liabilities and approximately $8.6 million of long-term lease liabilities. See Note 6 of Notes to Consolidated Financial Statements.

Note 4 – Business Segments

The Company's operating segments, which are consistent with its reportable segments, reflect the structure of the Company's internal organization, the method by which the Company's resources are allocated and the manner by which the Company and the chief operating decision maker assess its performance. During the third quarter of 2019 and in connection with the Combination, the Company reorganized its executive management team to align with its new business structure, which reflects the method by which the chief operating decision maker of Company assesses its performance and allocates its resources. The Company's new reportable segment structure includes four segments: (i) Americas; (ii) Europe, Middle East and Africa ("EMEA"); (iii) Asia/Pacific; and (iv) Global Specialty Businesses. The three geographic segments are composed of the net sales and operations in each respective region, excluding net sales and operations managed globally by the Global Specialty Businesses segment, which includes the Company's container, metal finishing, mining, offshore, specialty coatings, specialty grease and Norman Hay businesses. All prior period information for Legacy Quaker has been recast to reflect these four segments as the Company's new reportable segments. Prior to the Company's re-segmentation during the third quarter of 2019, the Company's historical reportable segments were four geographic regions: (i) North America; (ii) EMEA; (iii) Asia/Pacific; and (iv) South America.

Though the Company changed its reportable segments in the third quarter of 2019, the calculation of the reportable segments' measures of earnings remains otherwise generally consistent with past practices. Segment operating earnings for the Company's reportable segments are comprised of net sales less COGS and SG&A directly related to the respective segment's product sales. Operating expenses not directly attributable to the net sales of each respective segment are excluded from segment operating earnings, which includes certain corporate and administrative costs, Combination and other acquisition-related expenses, Restructuring and related charges and COGS related to acquired Houghton inventory sold, which was adjusted to fair value as a part of purchase accounting. Other items not specifically identified with the Company's reportable segments include interest expense, net and other expense, net.

The following tables present information about the performance of the Company's reportable segments for the years ended December 31, 2019, 2018 and 2017:

	2019	2018	2017
Net sales			
Americas	$ 392,121	$ 297,601	$ 283,460
EMEA	285,570	216,984	208,522
Asia/Pacific	247,839	192,502	181,134
Global Specialty Businesses	207,973	160,433	146,966
Total net sales	$ 1,133,503	$ 867,520	$ 820,082

	2019	2018	2017
Segment operating earnings			
Americas	$ 78,268	$ 62,686	$ 56,088
EMEA	47,388	36,119	34,431
Asia/Pacific	67,573	53,739	46,330
Global Specialty Businesses	58,475	42,931	39,553
Total segment operating earnings	251,704	195,475	176,402
Combination and other acquisition-related expenses	(35,477)	(16,661)	(29,938)
Restructuring and related charges	(26,678)	—	—
Fair value step up of inventory sold	(11,714)	—	—
Non-operating and administrative expenses	(104,572)	(83,515)	(76,231)
Depreciation of corporate assets and amortization	(27,129)	(7,518)	(7,489)
Operating income	46,134	87,781	62,744
Other expense, net	(254)	(642)	(718)
Interest expense, net	(16,976)	(4,041)	(1,358)
Income before taxes and equity in net income of associated companies	$ 28,904	$ 83,098	$ 60,668

The following tables present information regarding the Company's reportable segments' assets and long-lived assets, including certain identifiable assets as well as an allocation of shared assets, of December 31, 2019, 2018 and 2017:

	2019	2018	2017
Segment assets			
Americas	$ 926,122	$ 180,037	$ 189,645
EMEA	688,663	149,984	167,243
Asia/Pacific	685,476	205,424	190,633
Global Specialty Businesses	550,055	174,220	174,605
Total segment assets	$ 2,850,316	$ 709,665	$ 722,126

	2019	2018	2017
Segment long-lived assets			
Americas	$ 139,170	$ 60,745	$ 66,380
EMEA	56,108	23,383	24,795
Asia/Pacific	126,166	26,217	24,876
Global Specialty Businesses	69,184	26,949	26,392
Total segment long-lived assets	$ 390,628	$ 137,294	$ 142,443

The following tables present information regarding the Company's reportable segments' capital expenditures and depreciation for identifiable assets for the years ended December 31, 2019, 2018 and 2017:

	2019	2018	2017
Capital expenditures			
Americas	$ 6,404	$ 3,401	$ 3,685
EMEA	3,263	2,081	3,936
Asia/Pacific	3,857	6,059	2,458
Global Specialty Businesses	2,021	1,345	793
Total segment capital expenditures	$ 15,545	$ 12,886	$ 10,872

	2019	2018	2017
Depreciation			
Americas	$ 7,500	$ 4,225	$ 4,395
EMEA	4,560	3,434	3,368
Asia/Pacific	3,458	2,552	2,669
Global Specialty Businesses	2,248	1,985	2,045
Total segment depreciation	$ 17,766	$ 12,196	$ 12,477

During the years ended December 31, 2019, 2018 and 2017, the Company had approximately $719.8 million, $534.6 million and $513.1 million of net sales, respectively, attributable to non-U.S. operations. As of December 31, 2019, 2018 and 2017, the Company had approximately $174.4 million, $60.8 million and $61.8 million of long-lived assets, respectively, attributable to non-U.S. operations.

Inter-segment revenue for the years ended December 31, 2019, 2018 and 2017 was $7.3 million, $8.3 million and $9.4 million for Americas, $20.3 million, $21.9 million and $20.8 million for EMEA, $0.2 million, $0.5 million and $1.5 million for Asia/Pacific and $5.4 million, $5.3 million and $4.4 million for Global Specialty Businesses, respectively. However, all inter-segment transactions have been eliminated from each reportable operating segment's net sales and earnings for all periods presented in the above tables.

Note 5 – Net Sales and Revenue Recognition

Business Description

The Company develops, produces, and markets a broad range of formulated specialty chemical products and offers chemical management services ("Fluidcare") for various heavy industrial and manufacturing applications throughout its four segments. The Combination increased the Company's addressable metalworking, metals and industrial end markets, including steel, aluminum, aerospace, defense, transportation-OEM, transportation-components, offshore sub-sea energy, architectural aluminum, construction, tube and pipe, can and container, mining, specialty coatings and specialty greases. The Combination also strengthened the product portfolio of the combined Company. The major product lines of Quaker Houghton include metal removal fluids, cleaning fluids, corrosion inhibitors, metal drawing and forming fluids, die cast mold releases, heat treatment and quenchants, metal forging fluids, hydraulic fluids, specialty greases, offshore sub-sea energy control fluids, rolling lubricants, rod and wire drawing fluids and surface treatment chemicals.

A substantial portion of the Company's sales worldwide are made directly through its own employees and its Fluidcare programs, with the balance being handled through distributors and agents. The Company's employees visit the plants of customers regularly, work on site, and, through training and experience, identify production needs which can be resolved or otherwise addressed either by adapting the Company's existing products or by applying new formulations developed in its laboratories. The specialty chemical industry comprises many companies similar in size to the Company, as well as companies larger and smaller than Quaker Houghton. The offerings of many of the Company's competitors differ from those of Quaker Houghton; some offer a broad portfolio of fluids, including general lubricants, while others have a more specialized product range. All competitors provide different levels of technical services to individual customers. Competition in the industry is based primarily on the ability to provide products that meet the needs of the customer, render technical services and laboratory assistance to the customer and, to a lesser extent, on price.

As part of the Company's Fluidcare business, certain third-party product sales to customers are managed by the Company. Where the Company acts as a principal, revenues are recognized on a gross reporting basis at the selling price negotiated with its customers. Where the Company acts as an agent, revenue is recognized on a net reporting basis generally at the amount of the administrative fee earned by the Company for ordering the goods. In determining whether the Company is acting as a principal or an agent in each arrangement, the Company considers whether it is primarily responsible for the obligation to provide the specified good, has inventory risk before the specified good has been transferred to the customer and has discretion in establishing the prices for the specified goods. The Company transferred third-party products under arrangements resulting in net reporting of $48.0 million, $47.1 million and $44.5 million for the years ended December 31, 2019, 2018 and 2017, respectively.

A significant portion of the Company's revenues are realized from the sale of process fluids and services to manufacturers of steel, aluminum, automobiles, aircraft, industrial equipment, and durable goods, and, therefore, the Company is subject to the same business cycles as those experienced by these manufacturers and their customers. The Company's financial performance is generally correlated to the volume of global production within the industries it serves, rather than discretely related to the financial performance of such industries. Furthermore, steel and aluminum customers typically have limited manufacturing locations compared to metalworking customers and generally use higher volumes of products at a single location. During the year ended December 31, 2019, the Company's five largest customers (each composed of multiple subsidiaries or divisions with semiautonomous purchasing authority) accounted for approximately 12% of consolidated net sales, with its largest customer accounting for approximately 6% of consolidated net sales.

Revenue Recognition Model

The Company applies the FASB's guidance on revenue recognition which requires the Company to recognize revenue in an amount that reflects the consideration to which the Company expects to be entitled in exchange for goods or services transferred to its customers. To do this, the Company applies the five-step model in the FASB's guidance, which requires the Company to: (i) identify the contract with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when, or as, the Company satisfies a performance obligation.

The Company identifies a contract with a customer when a sales agreement indicates approval and commitment of the parties; identifies the rights of the parties; identifies the payment terms; has commercial substance; and it is probable that the Company will collect the consideration to which it will be entitled in exchange for the goods or services that will be transferred to the customer. In most instances, the Company's contract with a customer is the customer's purchase order. For certain customers, the Company may also enter into a sales agreement which outlines a framework of terms and conditions which apply to all future and subsequent purchase orders for that customer. In these situations, the Company's contract with the customer includes both the sales agreement and the specific customer purchase order. Because the Company's contract with a customer is typically for a single transaction or

customer purchase order, the duration of the contract is almost always one year or less. As a result, the Company has elected to apply certain practical expedients and omit certain disclosures of remaining performance obligations for contracts that have an initial term of one year or less as permitted by the FASB.

The Company identifies a performance obligation in a contract for each promised good or service that is separately identifiable from other obligations in the contract and for which the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer. The Company determines the transaction price as the amount of consideration it expects to be entitled to in exchange for fulfilling the performance obligations, including the effects of any variable consideration, significant financing elements, amounts payable to the customer or noncash consideration. For any contracts that have more than one performance obligation, the Company allocates the transaction price to each performance obligation in an amount that depicts the amount of consideration to which the Company expects to be entitled in exchange for satisfying each performance obligation.

In accordance with the last step of the FASB's guidance, the Company recognizes revenue when, or as, it satisfies the performance obligation in a contract by transferring control of a promised good or providing the service to the customer. The Company recognizes revenue over time as the customer receives and consumes the benefits provided by the Company's performance; the Company's performance creates or enhances an asset that the customer controls as the asset is created or enhanced; or the Company's performance does not create an asset with an alternative use to the entity, and the entity has an enforceable right to payment, including a profit margin, for performance completed to date. For performance obligations not satisfied over time, the Company determines the point in time at which a customer obtains control of an asset and the Company satisfies a performance obligation by considering when the Company has a right to payment for the asset; the customer has legal title to the asset; the Company has transferred physical possession of the asset; the customer has the significant risks and rewards of ownership of the asset; or the customer has accepted the asset.

The Company typically satisfies its performance obligations and recognizes revenue at a point in time for product sales, generally when products are shipped or delivered to the customer, depending on the terms underlying each arrangement. In circumstances where the Company's products are on consignment, revenue is generally recognized upon usage or consumption by the customer. For any Fluidcare or other services provided by the Company to the customer, the Company typically satisfies its performance obligations and recognizes revenue over time, as the promised services are performed. The Company uses input methods to recognize revenue over time related to these services, including labor costs and time incurred. The Company believes that these input methods represent the most indicative measure of the Fluidcare or other service work performed by the Company.

Other Considerations

The Company does not have standard payment terms for all customers globally, however the Company's general payment terms require customers to pay for products or services provided after the performance obligation is satisfied. The Company does not have significant financing arrangements with its customers. The Company does not have significant amounts of variable consideration in its contracts with customers and where applicable, the Company's estimates of variable consideration are not constrained. The Company records certain third-party license fees in other income (expense), net, in its Consolidated Statement of Income, which generally include sales-based royalties in exchange for the license of intellectual property. These license fees are recognized in accordance with their agreed-upon terms and when performance obligations are satisfied, which is generally when the third party has a subsequent sale.

Practical Expedients and Accounting Policy Elections

The Company has made certain accounting policy elections and elected to use certain practical expedients as permitted by the FASB in applying the guidance on revenue recognition. It is the Company's policy not to adjust the promised amount of consideration for the effects of a significant financing component because the Company expects, at contract inception, that the period between when the Company transfers a promised good or service to the customer and when the customer pays for that good or service will be one year or less. In addition, it is the Company's policy to expense costs to obtain a contract as incurred when the expected period of benefit, and therefore the amortization period, is one year or less. It is also the Company's accounting policy to exclude from the measurement of the transaction price all taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction and collected by the entity from a customer, including sales, use, value added, excise and various other taxes. Lastly, the Company has elected to account for shipping and handling activities that occur after the customer has obtained control of a good as a fulfilment cost, rather than an additional promised service.

Contract Assets and Liabilities

The Company recognizes a contract asset or receivable on its Consolidated Balance Sheet when the Company performs a service or transfers a good in advance of receiving consideration. A receivable is the Company's right to consideration that is unconditional and only the passage of time is required before payment of that consideration is due. A contract asset is the Company's right to consideration in exchange for goods or services that the Company has transferred to a customer. The Company had no material contract assets recorded on its Consolidated Balance Sheets as of December 31, 2019 or December 31, 2018.

A contract liability is recognized when the Company receives consideration, or if it has the unconditional right to receive consideration, in advance of performance. A contract liability is the Company's obligation to transfer goods or services to a customer for which the Company has received consideration, or a specified amount of consideration is due, from the customer. The Company's contract liabilities primarily represent deferred revenue recorded for customer payments received by the Company prior to the Company satisfying the associated performance obligation. The Company acquired and recorded an immaterial amount of deferred revenue as of the respective opening balance sheet dates related to the Combination and Norman Hay acquisition. Deferred revenues are presented within other accrued liabilities in the Company's Consolidated Balance Sheets. The Company had approximately $2.2 million and $1.3 million of deferred revenue as of December 31, 2019 and 2018, respectively. During the years ended December 31, 2019 and 2018, respectively, the Company satisfied all of the associated performance obligations and recognized into revenue the advance payments received and recorded as of December 31, 2018 and 2017, respectively.

Disaggregated Revenue

The Company sells its various industrial process fluids, its specialty chemicals and its technical expertise as a global product portfolio. The Company generally manages and evaluates its performance by segment first, and then by customer industry, rather than by individual product lines. Also, net sales of each of the Company's major product lines are generally spread throughout all three of the Company's geographic regions, and in most cases, approximately proportionate to the level of total sales in each region.

The following tables present disaggregated information regarding the Company's net sales, first by major product lines that represent approximately 10% or more of consolidated net sales for any of the years ended December 31, 2019, 2018 and 2017, and followed then by a disaggregation of the Company's net sales by segment, geographic region, customer industry, and timing of revenue recognized for the years ended December 31, 2019 and December 31, 2018. The Company has made certain reclassifications of disaggregated customer industry disclosures for the year ended December 31, 2018 to conform with the Company's current period customer industry segmentation.

	2019	2018	2017
Rolling lubricants	21.9 %	25.5 %	26.7 %
Metal removal fluids	19.9 %	15.4 %	15.1 %
Hydraulic fluids	13.0 %	13.0 %	13.7 %

	Net sales for the year ending December 31, 2019			
	Americas	EMEA	Asia/Pacific	Consolidated Total
Customer Industries				
Metals	$ 171,784	$ 100,605	$ 141,870	$ 414,259
Metalworking and other	220,337	184,965	105,969	511,271
	392,121	285,570	247,839	925,530
Global Specialty Businesses	149,428	30,115	28,430	207,973
	$ 541,549	$ 315,685	$ 276,269	$ 1,133,503
Timing of Revenue Recognized				
Product sales at a point in time	$ 525,802	$ 310,274	$ 269,228	$ 1,105,304
Services transferred over time	15,747	5,411	7,041	28,199
	$ 541,549	$ 315,685	$ 276,269	$ 1,133,503

	Net sales for the year ending December 31, 2018			
	Americas	EMEA	Asia/Pacific	Consolidated Total
Customer Industries				
Metals	$ 164,263	$ 101,028	$ 120,627	$ 385,918
Metalworking and other	133,338	115,956	71,875	321,169
	297,601	216,984	192,502	707,087
Global Specialty Businesses	122,165	16,613	21,655	160,433
	$ 419,766	$ 233,597	$ 214,157	$ 867,520
Timing of Revenue Recognized				
Product sales at a point in time	$ 408,402	$ 233,372	$ 206,112	$ 847,886
Services transferred over time	11,364	225	8,045	19,634
	$ 419,766	$ 233,597	$ 214,157	$ 867,520

Note 6 – Leases

The Company determines if an arrangement is a lease at its inception. This determination generally depends on whether the arrangement conveys the right to control the use of an identified fixed asset explicitly or implicitly for a period of time in exchange for consideration. Control of an underlying asset is conveyed if the Company obtains the rights to direct the use of, and obtains substantially all of the economic benefits from the use of, the underlying asset. Lease expense for variable leases and short-term leases is recognized when the obligation is incurred.

The Company has operating leases for certain facilities, vehicles and machinery and equipment with remaining lease terms up to 12 years. In addition, the Company has certain land use leases with remaining lease terms up to 96 years. The lease term for all of the Company's leases includes the non-cancellable period of the lease plus any additional periods covered by an option to extend the lease that the Company is reasonably certain it will exercise. Operating leases are included in right of use lease assets, other accrued liabilities and long-term lease liabilities on the Consolidated Balance Sheet. Right of use lease assets and liabilities are recognized at each lease's commencement date based on the present value of its lease payments over its respective lease term. The Company uses the stated borrowing rate for a lease when readily determinable. When a stated borrowing rate is not available in a lease agreement, the Company uses its incremental borrowing rate based on information available at the lease's commencement date to determine the present value of its lease payments. In determining the incremental borrowing rate used to present value each of its leases, the Company considers certain information including fully secured borrowing rates readily available to the Company and its subsidiaries. The Company has immaterial finance leases, which are included in PP&E, current portion of long-term debt and long-term debt on the Consolidated Balance Sheet.

Operating lease expense is recognized on a straight-line basis over the lease term. Operating lease expense for the year ended December 31, 2019 was $9.4 million. Short-term lease expense for the year ended December 31, 2019 was $1.5 million. The Company has no material variable lease costs or sublease income for the year ended December 31, 2019. Cash paid for operating leases during the year ended December 31, 2019 was $9.2 million. Subsequent to the Company's adoption of the new lease accounting guidance, the Company recorded new right of use lease assets and associated lease liabilities of $2.6 million during the year ended December 31, 2019. Supplemental balance sheet information related to the Company's leases is as follows:

	December 31, 2019
Right of use lease assets	$ 42,905
Other accrued liabilities	11,177
Long-term lease liabilities	31,273
Total operating lease liabilities	$ 42,450
Weighted average remaining lease term (years)	6.2
Weighted average discount rate	4.21%

Maturities of operating lease liabilities as of December 31, 2019 were as follows:

	December 31, 2019
For the year ended December 31, 2020	$ 12,731
For the year ended December 31, 2021	10,095
For the year ended December 31, 2022	6,570
For the year ended December 31, 2023	4,692
For the year ended December 31, 2024	3,859
For the year ended December 31, 2025 and beyond	10,982
Total lease payments	48,929
Less: imputed interest	(6,479)
Present value of lease liabilities	$ 42,450

Pursuant to the Company’s adoption of the new lease accounting guidance using a modified retrospective transition approach, as permitted, comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods. As previously disclosed in its Annual Report filed on Form 10-K, as amended by Form 10-K/A, for the year ended December 31, 2018, the following table presents the Company’s future minimum rental commitments under operating leases as of December 31, 2018:

For the year ended 2019	$ 7,068
For the year ended 2020	5,635
For the year ended 2021	4,509
For the year ended 2022	3,523
For the year ended 2023	2,659
For the year ended 2024 and beyond	7,779

Note 7 – Restructuring and Related Activities

During the third quarter of 2019, the Company’s management approved and the Company initiated a global restructuring plan (the “QH Program”) as part of its plan to realize certain cost synergies associated with the Combination. The QH Program will include restructuring and associated severance costs to reduce total headcount by approximately 275 people globally and plans for the closure of certain manufacturing and non-manufacturing facilities. The exact timing and total costs associated with the QH Program will depend on a number of factors and is subject to change; however, the Company currently expects reduction in headcount and site closures to occur over the next two years under the QH Program and estimates that total costs related to the QH Program will approximate one-times the anticipated cost synergies realized. Employee separation benefits will vary depending on local regulations within certain foreign countries and will include severance and other benefits.

All costs incurred to date related to severance costs to reduce headcount and are recorded in Restructuring and related charges in the Company’s Statements of Income. As described in Note 4 of Notes to Consolidated Financial Statements, restructuring and related charges are not included in the Company’s calculation of reportable segments’ measure of earnings and therefore these costs are not reviewed by or recorded to reportable segments.

Activity in the Company’s accrual for restructuring under the QH Program for the year ended December 31, 2019 is as follows:

	QH Program
Accrued restructuring as of December 31, 2018	$ -
Restructuring expense, net	26,678
Cash payments	(8,899)
Currency translation adjustments	264
Accrued restructuring as of December 31, 2019	$ 18,043

In response to weak economic conditions and market declines in many regions, the Company’s management approved a global restructuring plan (the “2015 Program”) in the fourth quarter of 2015 and had only $0.7 million of remaining accrued restructuring as of December 31, 2016. The Company completed all of the remaining initiatives under the 2015 Program in the first half of 2017, including final cash payments of $0.7 million. There were no restructuring expenses incurred under the 2015 Program during 2017.

Note 8 – Share-Based Compensation

The Company recognized the following share-based compensation expense in its Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017:

	2019	2018	2017
Stock options	$ 1,448	$ 1,053	$ 958
Nonvested stock awards and restricted stock units	3,206	2,459	2,935
Employee stock purchase plan	84	89	88
Non-elective and elective 401(k) matching contribution in stock	—	—	72
Director stock ownership plan	123	123	137
Total share-based compensation expense	$ 4,861	$ 3,724	$ 4,190

Share-based compensation expense is recorded in SG&A, except for $0.9 million and $0.1 million during the years ended December 2019 and 2018, respectively, recorded within Combination and other acquisition-related expenses.

Stock Options

Stock option activity under all plans is as follows:

	Number of Options	Weighted Average Exercise Price (per option)	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value
Options outstanding as of January 1, 2019	122,072	$ 116.39		
Options granted	51,610	154.92		
Options exercised	(28,535)	80.22		
Options forfeited	(735)	147.01		
Options outstanding as of December 31, 2019	144,412	$ 137.15	4.8	$ 4,066
Options expected to vest after December 31, 2019	84,839	$ 151.12	5.6	$ 1,204
Options exercisable as of December 31, 2019	59,573	$ 117.27	3.7	$ 2,862

The total intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017 was approximately $2.5 million, $2.0 million and $3.4 million, respectively. Intrinsic value is calculated as the difference between the current market price of the underlying security and the strike price of a related option.

A summary of the Company's outstanding stock options as of December 31, 2019 is as follows:

Range of Exercise Prices	Number of Options Outstanding	Weighted Average Remaining Contractual Term (years)	Weighted Average Exercise Price (per option)	Number of Options Exercisable	Weighted Average Exercise Price (per option)
$ 50.01 - $ 60.00	874	0.2	$ 58.26	874	$ 58.26
$ 60.01 - $ 70.00	—	—	—	—	—
$ 70.01 - $ 80.00	17,268	2.7	72.29	17,268	72.29
$ 80.01 - $ 90.00	2,797	2.1	87.30	2,797	87.30
$ 90.01 - $ 130.00	—	—	—	—	—
$ 130.01 - $ 140.00	37,167	4.0	134.60	24,898	134.60
$ 140.01 - $ 150.00	—	—	—	—	—
$ 150.01 - $ 160.00	86,306	5.7	153.65	13,736	152.26
	144,412	4.8	137.15	59,573	117.27

As of December 31, 2019, unrecognized compensation expense related to options granted in 2019, 2018 and 2017 was $1.0 million, $0.4 million and less than $0.1 million, respectively, to be recognized over a weighted average period of 1.3 years.

The Company granted stock options under its LTIP plan that are subject only to time vesting generally over a three-year period during 2019, 2018, 2017 and 2016. For the purposes of determining the fair value of stock option awards, the Company uses the Black-Scholes option pricing model and the assumptions set forth in the table below:

	2019	2018	2017	2016
Number of stock options granted	51,610	35,842	42,477	67,444
Dividend yield	1.12 %	1.37 %	1.49 %	1.49 %
Expected volatility	26.29 %	24.73 %	25.52 %	28.39 %
Risk-free interest rate	1.52 %	2.54 %	1.67 %	1.08 %
Expected term (years)	4.0	4.0	4.0	4.0

These awards are being amortized on a straight-line basis over the respective vesting period of each award. The compensation expense recorded on each award during the years ended December 31, 2019, 2018 and 2017, respectively, is as follows:

	2019	2018	2017
2019 Stock option awards	$ 665	$ —	$ —
2018 Stock option awards	364	310	—
2017 Stock option awards	369	367	308
2016 Stock option awards	50	332	332

Restricted Stock Awards

Activity of nonvested restricted stock awards granted under the Company's LTIP plan is shown below:

	Number of Shares	Weighted Average Grant Date Fair Value (per share)
Nonvested awards, December 31, 2018	52,785	$ 112.09
Granted	40,382	158.16
Vested	(27,572)	84.19
Forfeited	(1,095)	123.27
Nonvested awards, December 31, 2019	64,500	$ 152.67

The fair value of the nonvested stock is based on the trading price of the Company's common stock on the date of grant. The Company adjusts the grant date fair value for expected forfeitures based on historical experience for similar awards. As of December 31, 2019, unrecognized compensation expense related to these awards was $5.5 million, to be recognized over a weighted average remaining period of 1.9 years.

Restricted Stock Units

Activity of nonvested restricted stock units granted under the Company's LTIP plan is shown below:

	Number of Units	Weighted Average Grant Date Fair Value (per unit)
Nonvested awards, December 31, 2018	4,650	$ 117.03
Granted	6,060	154.92
Vested	(1,972)	78.36
Forfeited	(83)	145.96
Nonvested awards, December 31, 2019	8,655	$ 152.09

The fair value of the nonvested restricted stock units is based on the trading price of the Company's common stock on the date of grant. The Company adjusts the grant date fair value for expected forfeitures based on historical experience for similar awards. As of December 31, 2019, unrecognized compensation expense related to these awards was $0.8 million, to be recognized over a weighted average remaining period of 1.8 years.

Employee Stock Purchase Plan

In 2000, the Board adopted an Employee Stock Purchase Plan ("ESPP") whereby employees may purchase Company stock through a payroll deduction plan, which was in place and active as of December 31, 2019. Purchases were made from the plan and credited to each participant's account on the last day of each calendar month in which the organized securities trading markets in the United States were open for business (the "Investment Date"). The purchase price of the stock was 85% of the fair market value on the Investment Date. The plan was compensatory, and the 15% discount was expensed on the Investment Date. All employees, including officers, were eligible to participate in this plan. A participant could withdraw all uninvested payment balances credited to a participant's account at any time. An employee whose stock ownership of the Company exceeds five percent of the outstanding common stock was not eligible to participate in this plan. Effective January 1, 2020, the Company discontinued the ESPP.

2013 Director Stock Ownership Plan In 2013, the Company adopted the 2013 Director Stock Ownership Plan (the "Plan"), to encourage the Directors to increase their investment in the Company, which was approved at the Company's May 2013 shareholders' meeting. The Plan authorizes the issuance of up to 75,000 shares of Quaker common stock in accordance with the terms of the Plan in payment of all or a portion of the annual cash retainer payable to each of the Company's non-employee directors in 2013 and subsequent years during the term of the Plan. Under the Plan, each director who, on May 1 of the applicable calendar year, owns less than 400% of the annual cash retainer for the applicable calendar year, divided by the average of the closing price of a share of Quaker Common Stock as reported by the composite tape of the New York Stock Exchange for the previous calendar year (the "Threshold Amount"), is required to receive 75% of the annual cash retainer in Quaker common stock and 25% of the retainer in cash, unless the director elects to receive a greater percentage of Quaker common stock, up to 100% of the annual cash retainer for the applicable year. Each director who owns more than the Threshold Amount may elect to receive common stock in payment of a percentage (up to 100%) of the annual cash retainer. The annual retainer is $0.1 million and the retainer payment date is June 1.

Note 9 – Other Expense, net

Other expense, net, for the years ended December 31, 2019, 2018 and 2017 are as follows:

	2019	2018	2017
Income from third party license fees	$ 1,035	$ 862	$ 861
Foreign exchange gains (losses), net	223	(807)	891
Gain (loss) on fixed asset disposals, net	58	657	(79)
Non-income tax refunds and other related credits	1,118	668	1,015
Pension and postretirement benefit costs, non-service components	(2,805)	(2,285)	(4,234)
Insurance insolvency recovery	60	90	600
Other non-operating income	455	425	380
Other non-operating expense	(398)	(252)	(152)
Total other expense, net	$ (254)	$ (642)	$ (718)

Foreign exchange gains (losses), net, during the years ended December 31, 2019 and 2018, include foreign currency transaction losses of $1.0 million and $0.4 million, respectively, related to hyper-inflationary accounting for the Company's Argentine subsidiaries, and specific to 2018, a foreign currency transaction gain of approximately $0.4 million related to the liquidation of an inactive legal entity. See Note 1 of Notes to Consolidated Financial Statements. Gain (loss) on fixed asset disposals, net, during the year ended December 31, 2018 and 2017, includes a $0.6 million gain and a $0.1 million loss, respectively, on the sale of held-for-sale assets in each period. Pension and postretirement benefit costs, non-service components during the year ended December 31, 2017 includes a $1.9 million pension settlement charge. See Note 21 of Notes to Consolidated Financial Statements. Insurance insolvency recovery during the years ended December 31, 2019, 2018 and 2017 represents cash proceeds from an insolvent insurance carrier with respect to a previously filed recovery claim by an inactive subsidiary of the Company.

Note 10 – Taxes on Income

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as U.S. Tax Reform. U.S. Tax Reform implemented a new system of taxation for non-U.S. earnings which eliminated U.S. federal income taxes on dividends from certain foreign subsidiaries and imposed a one-time transition tax on the deemed repatriation of undistributed earnings of certain foreign subsidiaries that is payable over eight years.

Following numerous regulations, notices, and other formal guidance published by the Internal Revenue Service ("I.R.S."), U.S. Department of Treasury, and various state taxing authorities, the Company has completed its accounting for the transition tax and has elected to pay its $15.5 million transition tax in installments over eight years as permitted under U.S. Tax Reform. As of December 31, 2019, $7.0 million in installments have been paid with the remaining $8.5 million to be paid through installments in future years.

As of December 31, 2019, the Company has a deferred tax liability of $8.2 million on certain undistributed foreign earnings, which primarily represents the Company's estimate of the non-U.S. income taxes the Company will incur to ultimately remit certain earnings to the U.S. The Company's reinvestment assertions are further explained below.

Taxes on income before equity in net income of associated companies for the years ended December 31, 2019, 2018 and 2017 are as follows:

	2019	2018	2017
Current:			
Federal	$ (239)	$ 6,583	$ 21,265
State	352	(1,844)	2,529
Foreign	26,213	12,114	14,105
	26,326	16,853	37,899
Deferred:			
Federal	(9,267)	7,859	6,889
State	(396)	(173)	(36)
Foreign	(14,579)	511	(3,099)
Total	$ 2,084	$ 25,050	$ 41,653

The components of earnings before income taxes for the years ended December 31, 2019, 2018 and 2017 are as follows:

	2019	2018	2017
U.S.	$ (46,697)	$ 27,387	$ 10,468
Foreign	75,601	55,711	50,200
Total	$ 28,904	$ 83,098	$ 60,668

Total deferred tax assets and liabilities are composed of the following as of December 31, 2019 and 2018:

	2019	2018
Retirement benefits	$ 15,142	$ 8,185
Allowance for doubtful accounts	2,253	1,160
Insurance and litigation reserves	1,002	357
Performance incentives	7,213	4,364
Equity-based compensation	1,050	753
Prepaid expense	2,976	(6)
Insurance settlement	3,895	3,962
Operating loss carryforward	16,044	8,434
Foreign tax credit and other credits	34,384	—
Interest	11,479	614
Restructuring reserves	2,167	(802)
Right of use lease assets	10,015	—
Royalties and license fees	2,156	325
Inventory reserves	2,163	841
Research and development	2,580	(5)
Other	1,317	489
	115,836	28,671
Valuation allowance	(13,834)	(7,520)
Total deferred tax assets, net	$ 102,002	$ 21,151
Depreciation	17,754	4,098
Foreign pension and other	1,269	1,062
Amortization and other	254,359	11,191
Lease liabilities	9,965	—
Outside basis in equity investment	6,776	—
Unremitted Earnings	8,228	7,857
Total deferred tax liabilities	$ 298,351	$ 24,208

The Company has $11.9 million of deferred tax assets related to state net operating losses. A partial valuation allowance of $10.6 million has been established against this amount resulting in a net $1.3 million expected future benefit. Management analyzed the expected impact of the reversal of existing taxable temporary differences, considered expiration dates, analyzed current state tax laws, and determined that $1.3 million of state net operating loss carryforwards will be realized based on the reversal of deferred tax liabilities. These state net operating losses are subject to various carryforward periods of 5 years to 20 years or an indefinite carryforward period.

The Company has $4.2 million of deferred tax assets related to foreign net operating loss carryforwards. A partial valuation allowance of $2.2 million has been established against the $4.2 million due to the expected expiration of these losses before they are able to be utilized. These foreign net operating losses are subject to various carryforward periods with the majority having an indefinite carryforward period.

In conjunction with the Combination, the Company acquired foreign tax credit deferred tax assets of $41.8 million expiring between 2019 and 2028. Foreign tax credits may be carried forward for 10 years. Management analyzed the expected impact of the utilization of pre-acquisition foreign tax credits based on projected US taxable income, overall domestic loss recapture, annual limitations due to the ownership change limitations provided by the Internal Revenue Code, and enacted tax law as of August 1, 2019. As of the opening balance sheet, management determined that foreign tax credits of $33.1 million will be realized prior to expiration and recorded an $8.7 million valuation allowance of which $7.7 million related to credits expected to expire at December 31, 2019. The Company analyzed the realizability of its foreign tax credit deferred tax assets as of the balance sheet date based on revised taxable income projections and expirations. As of December 31, 2019, the Company had net realizable foreign tax credits of $32.7 million on its balance sheet expected to be utilized between 2020 and 2026.

The Company also acquired disallowed interest deferred tax assets of $13.2 million as part of the Combination. Disallowed interest may be carried forward indefinitely. Management analyzed the expected impact of the utilization of disallowed interest carryforwards based on projected US taxable income and determined that the Company will utilize all expected future benefits by 2022. As of December 31, 2019, the Company had a net realizable disallowed interest carryforward of $10.9 million on its balance sheet.

As of December 31, 2019, the Company had deferred tax liabilities of $254.4 million primarily related to the step-up in intangibles resulting from the Combination and Norman Hay acquisition.

As part of the Combination, the Company acquired a 50% interest in the Korea Houghton Corporation joint venture and has recorded a $6.8 million deferred tax liability for its outside basis difference.

The following are the changes in the Company's deferred tax asset valuation allowance for the years ended December 31, 2019, 2018 and 2017:

	Balance at Beginning of Period	Purchase Accounting Adjustments	Additional Valuation Allowance	Allowance Utilization and Other	Effect of Exchange Rate Changes	Balance at End of Period
Valuation Allowance						
Year ended December 31, 2019	$ 7,520	$ 13,752	$ 832	$ (8,227)	$ (43)	$ 13,834
Year ended December 31, 2018	$ 7,401	$ —	$ 650	$ (471)	$ (60)	$ 7,520
Year ended December 31, 2017	$ 6,344	$ —	$ 1,127	$ (61)	$ (9)	$ 7,401

Included in the additional valuation allowance column in the table above is $13.8 million of valuation allowances established as part of purchase accounting related to the Combination.

The Company's net deferred tax assets and liabilities are classified in the Consolidated Balance Sheets as of December 31, 2019 and 2018 as follows:

	2019	2018
Non-current deferred tax assets	$ 14,745	$ 6,946
Non-current deferred tax liabilities	211,094	10,003
Net deferred tax liability	$ (196,349)	$ (3,057)

The following is a reconciliation of income taxes at the Federal statutory rate with income taxes recorded by the Company for the years ended December 31, 2019, 2018 and 2017:

	2019	2018	2017
Income tax provision at the Federal statutory tax rate	$ 6,070	$ 17,458	$ 21,229
Unremitted Earnings	1,743	7,857	—
Transition Tax	(416)	(3,118)	18,388
Revaluation of U.S. deferred tax assets and liabilities	—	—	4,470
Global intangible low taxed income	—	1,211	—
Foreign derived intangible income	(2,380)	(1,034)	—
Non-deductible acquisition expenses	1,970	1,019	4,779
Share-based compensation	(540)	259	(1,419)
Differences in tax rates on foreign earnings and remittances	920	1,081	(2,663)
Foreign tax credits	—	—	(2,761)
Research and development credit	(385)	(230)	(235)
Uncertain tax positions	899	(79)	(651)
U.S. domestic production activities deduction	—	—	(1,155)
State income tax provisions, net	(117)	196	569
Non-deductible meals and entertainment	318	415	248
Intercompany transfer of intangible assets	(5,318)	—	—
Miscellaneous items, net	(680)	15	854
Taxes on income before equity in net income of associated companies	$ 2,084	$ 25,050	$ 41,653

Pursuant to U.S. Tax Reform, the Company recorded a $15.5 million transition tax liability for U.S. income taxes on the undistributed earnings of non-U.S. subsidiaries. However, the Company may also be subject to other taxes, such as withholding taxes and dividend distribution taxes, if these undistributed earnings are ultimately remitted to the U.S. As a result of the Combination, additional third-party debt was incurred resulting in the Company re-evaluating its global cash strategy in order to meet its goal of reducing leverage in upcoming years. As of December 31, 2019, the Company has a deferred tax liability $8.2 million, which primarily represents the estimate of the non-U.S. taxes the Company will incur to ultimately remit these earnings to the U.S. It is the Company's current intention to reinvest its additional undistributed earnings of non-U.S. subsidiaries to support working capital needs and certain other growth initiatives outside of the U.S. The amount of such undistributed earnings at December 31, 2019 was approximately $255.3 million. It is currently impractical to estimate any such incremental tax expense.

As of December 31, 2019, the Company's cumulative liability for gross unrecognized tax benefits was $19.1 million. The Company had accrued approximately $3.1 million for cumulative penalties and $2.3 million for cumulative interest as of December 31, 2019. As of December 31, 2018, the Company's cumulative liability for gross unrecognized tax benefits was $7.1 million. The Company had accrued approximately $0.8 million for cumulative penalties and $0.6 million for cumulative interest as of December 31, 2018. The December 31, 2019 gross unrecognized tax benefits, cumulative penalties and cumulative interest includes the gross unrecognized tax benefits, cumulative penalties and cumulative interest of Houghton International.

The Company continues to recognize interest and penalties associated with uncertain tax positions as a component of tax expense on income before equity in net income of associated companies in its Consolidated Statements of Income. The Company recognized a credit of $0.2 million for penalties and an expense of $0.2 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2019, a credit of $0.2 million for penalties and an expense of $0.1 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2018, and a credit of $0.7 million for penalties and a credit of $0.2 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2017.

The Company estimates that during the year ending December 31, 2020, it will reduce its cumulative liability for gross unrecognized tax benefits by approximately $3.9 million due to the expiration of the statute of limitations with regard to certain tax positions. This estimated reduction in the cumulative liability for unrecognized tax benefits does not consider any increase in liability for unrecognized tax benefits with regard to existing tax positions or any increase in cumulative liability for unrecognized tax benefits with regard to new tax positions for the year ending December 31, 2020. A reconciliation of the beginning and ending amounts of unrecognized tax benefits for the years ended December 31, 2019, 2018 and 2017, respectively, is as follows:

	2019	2018	2017
Unrecognized tax benefits as of January 1	$ 7,050	$ 6,761	$ 6,240
Increase (decrease) in unrecognized tax benefits taken in prior periods	(28)	(183)	(308)
Increase in unrecognized tax benefits taken in current period	1,935	2,023	2,347
Decrease in unrecognized tax benefits due to lapse of statute of limitations	(1,029)	(1,292)	(2,116)
Increase in unrecognized tax benefits due to acquisition	11,301	—	—
(Decrease) increase due to foreign exchange rates	(132)	(259)	598
Unrecognized tax benefits as of December 31	$ 19,097	$ 7,050	$ 6,761

The amount of net unrecognized tax benefits above that, if recognized, would impact the Company's tax expense and effective tax rate is $13.3 million, $2.2 million and $2.2 million for the years ended December 31, 2019, 2018 and 2017, respectively.

The Company and its subsidiaries are subject to U.S. Federal income tax, as well as the income tax of various state and foreign tax jurisdictions. Tax years that remain subject to examination by major tax jurisdictions include Brazil from 2000, Italy from 2006, China from 2009, Canada from 2010, the Netherlands from 2013, the United Kingdom from 2014, Mexico, Spain, and Germany from 2015, the U.S. from 2016, India from fiscal year beginning April 1, 2017 and ending March 31, 2018, and various U.S. state tax jurisdictions from 2010.

As previously reported, the Italian tax authorities have assessed additional tax due from the Company's subsidiary, Quaker Italia S.r.l., relating to the tax years 2007 through 2013. The Company has filed for competent authority relief from these assessments under the Mutual Agreement Procedures ("MAP") of the Organization for Economic Co-Operation and Development for all years except 2007. During the second quarter of 2018, the Italian tax authorities assessed additional tax due from Quaker Italia, S.r.l., relating to the tax years 2014 and 2015. The Company met with the Italian tax authorities in the fourth quarter of 2018 to discuss these assessments and no resolution was agreed upon, so the Company filed an appeal with the first level of tax court in Italy. If the appeal is not successful in materially reducing the assessed tax, then the Company will further evaluate its options including potentially filing for

competent authority relief from these assessments under MAP, consistent with the Company's previous filings for 2008 through 2013. As of December 31, 2019, the Company believes it has adequate reserves for uncertain tax positions with respect to these and all other audits.

Houghton Italia, S.r.l is also currently involved in a corporate income tax audit with the Italian tax authorities covering tax years 2014 through 2017.As part of the purchase accounting related to the Houghton combination, the Company has established a $4.0 million reserve for uncertain tax positions. These amounts relate to the 2014 to 2017 audit period as well as 2018 and the 2019 short-period prior to the August 1, 2019 combination. Since these amounts relate to tax periods prior to the combination, the Company expects that it would file an indemnification claim with Houghton's former owners for any tax liabilities arising pre-Combination. As a result, a corresponding $4.0 million indemnification receivable has also been established through purchase accounting that would offset the $4.0 million in tax liabilities also booked through purchase accounting.

Note 11 – Earnings Per Share

The following table summarizes earnings per share calculations for the years ended December 31, 2019, 2018 and 2017:

	2019	2018	2017
Basic earnings per common share			
Net income attributable to Quaker Chemical Corporation	$ 31,622	$ 59,473	$ 20,278
Less: income allocated to participating securities	(90)	(253)	(137)
Net income available to common shareholders	$ 31,532	$ 59,220	$ 20,141
Basic weighted average common shares outstanding	15,126,928	13,268,047	13,204,872
Basic earnings per common share	$ 2.08	$ 4.46	$ 1.53
Diluted earnings per common share			
Net income attributable to Quaker Chemical Corporation	$ 31,622	$ 59,473	$ 20,278
Less: income allocated to participating securities	(90)	(252)	(137)
Net income available to common shareholders	$ 31,532	$ 59,221	$ 20,141
Basic weighted average common shares outstanding	15,126,928	13,268,047	13,204,872
Effect of dilutive securities	36,243	36,685	41,074
Diluted weighted average common shares outstanding	15,163,171	13,304,732	13,245,946
Diluted earnings per common share	$ 2.08	$ 4.45	$ 1.52

The Company's calculation of earnings per diluted share attributable to Quaker Chemical Corporation common shareholders for the year ended December 31, 2019 was impacted by the variability of its reported earnings and the approximately 4.3 million share issuance in connection with closing the Combination, comprising approximately 24.5% of the common stock of the Company as of December 31, 2019. Certain stock options and restricted stock units are not included in the diluted earnings per share calculation since the effect would have been anti-dilutive. The calculated amount of anti-diluted shares not included were 108 in 2019, 1,808 in 2018 and 3,671 in 2017.

Note 12 – Restricted Cash

The Company has restricted cash recorded in other assets related to proceeds from an inactive subsidiary of the Company which previously executed separate settlement and release agreements with two of its insurance carriers for an original total value of $35.0 million. The proceeds of both settlements are restricted and can only be used to pay claims and costs of defense associated with the subsidiary's asbestos litigation. The proceeds of the settlement and release agreements have been deposited into interest bearing accounts which earned $0.2 million in both the years ended December 31, 2019 and 2018, offset by $0.8 million and $1.1 million of net payments during 2019 and 2018, respectively. Due to the restricted nature of the proceeds, a corresponding deferred credit was established in other non-current liabilities for an equal and offsetting amount, and will remain until the restrictions lapse or the funds are exhausted via payments of claims and costs of defense. See Notes 18, 22 and 26 of Notes to Consolidated Financial Statements.

The following table provides a reconciliation of cash, cash equivalents and restricted cash as December 31, 2019, 2018, 2017 and 2016:

	2019	2018	2017	2016
Cash and cash equivalents	$ 123,524	$ 104,147	$ 89,879	$ 88,818
Restricted cash included in other current assets	353	—	—	—
Restricted cash included in other assets	19,678	20,278	21,171	21,883
Cash, cash equivalents and restricted cash	$ 143,555	$ 124,425	$ 111,050	$ 110,701

Note 13 – Accounts Receivable and Allowance for Doubtful Accounts

As of December 31, 2019 and 2018, the Company had gross trade accounts receivable totaling $387.7 million and $207.3 million, respectively. The following are changes in the allowance for doubtful accounts during the years ended December 31, 2019, 2018 and 2017:

	Balance at Beginning of Period	Changes to Costs and Expenses	Write-Offs Charged to Allowance	Exchange Rate Changes and Other Adjustments	Balance at End of Period
Allowance for Doubtful Accounts					
Year ended December 31, 2019	$ 5,187	$ 1,925	$ (322)	$ 4,926	$ 11,716
Year ended December 31, 2018	$ 5,457	$ 493	$ (295)	$ (468)	$ 5,187
Year ended December 31, 2017	$ 7,220	$ 137	$ (2,206)	$ 306	$ 5,457

Included in exchange rate changes and other adjustments for the year ended December 31, 2019 are the allowance for doubtful accounts of $5.0 million related to the acquired receivables in connection with the Combination and Norman Hay acquisition. See Note 2 of Notes to Consolidated Financial Statements. Included in exchange rate changes and other adjustments for the year ended December 31, 2018 is a reclassification of $0.3 million to other assets related to certain customer receivables due greater than a year. There were no similar adjustments in 2019 or 2017. Included in write-offs charged to allowance during the year ended December 31, 2017 were outstanding receivables related to certain prior year customer bankruptcies, which the Company previously reserved for, but settled during 2017.

Note 14 – Inventories

Inventories, net, as of December 31, 2019 and 2018 were as follows:

	2019	2018
Raw materials and supplies	$ 82,058	$ 48,134
Work in process, finished goods and reserves	92,892	45,956
Total inventories, net	$ 174,950	$ 94,090

Note 15 – Property, Plant and Equipment

Property, plant and equipment as of December 31, 2019 and 2018 were as follows:

	2019	2018
Land	$ 34,686	$ 10,170
Building and improvements	130,462	84,980
Machinery and equipment	225,636	151,180
Construction in progress	8,050	7,907
Property, Plant and Equipment, at cost	398,834	254,237
Less accumulated depreciation	(185,365)	(170,314)
Total Property, Plant and Equipment, net	$ 213,469	$ 83,923

As of December 31, 2019, PP&E includes $0.2 million of capital lease assets and future minimum lease payments. In connection with the Combination, $2.3 million of initial fair value assigned to certain PP&E was reclassified to prepaid expenses and other current assets as of December 31, 2019 as it is currently held-for-sale.

Note 16 – Goodwill and Other Intangible Assets

The Company completes its annual goodwill impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment in one or more of its reporting units. As described in Note 4 of Notes to Consolidated Financial Statements, during the third quarter of 2019, the Company changed its reportable segments and associated reporting units. In connection with this change, the Company performed a qualitative assessment and concluded that there was no evidence of events or circumstances that would indicate a material change from the Company's prior year quantitative impairment assessment. The Company completed its annual impairment assessment during the fourth quarter of 2019 and concluded no impairment charge was warranted. The Company has recorded no impairment charges in its past and continually evaluates financial performance, economic conditions and other relevant developments in assessing if an interim period impairment test for one or more of its reporting units is necessary.

In connection with the change in its reportable segments, noted above, the Company reallocated existing goodwill to each of the new reportable segments and associated reporting units, based on management's estimate of the relative fair value of each reporting unit. The result of this reallocation of goodwill has been recast, by reportable segment, as of December 31, 2017 and 2018 and for all activity within the periods presented. Changes in the carrying amount of goodwill for the years ended December 31, 2019 and 2018 were as follows:

	Americas	EMEA	Asia/Pacific	Global Specialty Businesses	Total
Balance as of December 31, 2017	$ 28,921	$ 18,476	$ 13,933	$ 24,704	$ 86,034
Currency translation adjustments	(457)	(1,053)	(784)	(407)	(2,701)
Balance as of December 31, 2018	28,464	17,423	13,149	24,297	83,333
Goodwill additions	188,494	114,167	130,091	91,545	524,297
Currency translation adjustments	(573)	1,428	(1,513)	233	(425)
Balance as of December 31, 2019	$ 216,385	$ 133,018	$ 141,727	$ 116,075	$ 607,205

Gross carrying amounts and accumulated amortization for definite-lived intangible assets as of December 31, 2019 and 2018 were as follows:

	Gross Carrying Amount		Accumulated Amortization	
	2019	2018	2019	2018
Customer lists and rights to sell	$ 792,362	$ 74,989	$ 49,932	$ 29,587
Trademarks, formulations and product technology	157,049	33,275	21,299	16,469
Other	6,261	5,840	5,776	5,566
Total definite-lived intangible assets	$ 955,672	$ 114,104	$ 77,007	$ 51,622

The Company recorded $26.7 million, $7.3 million and $7.4 million of amortization expense during the years ended December 31, 2019, 2018 and 2017, respectively. Amortization is recorded within SG&A in the Company's Consolidated Statements of Income. Estimated annual aggregate amortization expense for the subsequent five years is as follows:

For the year ended December 31, 2020	$ 55,977
For the year ended December 31, 2021	55,630
For the year ended December 31, 2022	55,476
For the year ended December 31, 2023	55,259
For the year ended December 31, 2024	54,728

The Company has four indefinite-lived intangible assets totaling $243.1 million as of December 31, 2019, including $242.0 million of indefinite-lived intangible assets for trademarks and tradenames associated with the Combination. Comparatively, the Company had two indefinite-lived intangible assets for trademarks and tradenames totaling $1.1 million as of December 31, 2018.

Note 17 – Investments in Associated Companies

As of December 31, 2019, the Company held a 50% investment in and had significant influence over Nippon Quaker Chemical, Ltd. ("Nippon Japan") and Kelko Quaker Chemical, S.A. ("Kelko Panama") and held a 33% investment in and had significant influence over Primex, Ltd. ("Primex"). In connection with the Combination, the Company acquired a 50% investment in Houghton Korea, which the Company also has significant influence over. See Note 2 of Notes to Consolidated Financial Statements.

The carrying amount of the Company's equity investments as of December 31, 2019 was $93.8 million, which includes investments of $70.4 million in Houghton Korea; $16.2 million in Primex; $7.0 million in Nippon Japan; and $0.2 million in Kelko Panama.

The Company also has a 50% equity interest in Kelko Venezuela. Due to heightened foreign exchange controls, deteriorating economic circumstances and other restrictions in Venezuela, during 2018 the Company concluded that it no longer had significant influence over this affiliate. Prior to this determination, the Company historically accounted for this affiliate under the equity method. As of December 31, 2019 and 2018, the Company had no remaining carrying value for its investment in Kelko Venezuela.

The following table is a summary of equity income in associated companies by investment for the years ending December 31, 2019, 2018 and 2017:

	Year Ended December 31,		
	2019	2018	2017
Houghton Korea	$ 2,337	$ -	$ -
Nippon Japan	850	713	585
Kelko Panama	55	222	195
Kelko Venezuela	-	(138)	(42)
Primex	1,822	966	2,547
Total equity in net income of associated companies	$ 5,064	$ 1,763	$ 3,285

As the Combination closed on August 1, 2019, the Company included five months of equity income from Houghton Korea in its December 31, 2019 Consolidated Statement of Income.

Note 18 – Other Non-Current Assets

Other non-current assets as of December 31, 2019 and 2018 were as follows:

	2019	2018
Restricted insurance settlement	$ 19,678	$ 20,278
Debt issuance costs	7,571	—
Indemnification assets	4,006	—
Uncertain tax positions	4,993	4,861
Supplemental retirement income program	1,782	1,491
Pension assets	—	3,656
Other	2,403	1,769
Total other assets	$ 40,433	$ 32,055

As of December 31, 2019, indemnification assets relates to tax position of certain Houghton foreign subsidiaries for which the Company expects it will incur additional tax amounts which are subject to indemnification under the terms of the Combination share and purchase agreement. These indemnification assets have a corresponding uncertain tax position recorded in other non-current liabilities. Additionally, during 2019 the Company capitalized certain third-party debt issuance costs in connection with executing the New Credit Facility for which amounts attributed to the revolver are included within the table above. See Notes 10, 20 and 22 of Notes to Consolidated Financial Statements.

As of December 31, 2018, one of the Company's U.S. pension plan's fair value of plan assets exceeded its gross benefit obligation and was therefore over-funded, which is represented by the line Pension assets in the table above. As of December 31, 2019, as a result of the plan termination expected to be finalized in early 2020, the plan was valued on a basis where plan liabilities approximate the estimated expected payouts resulting from plan termination and therefore this pension plan is no longer in an over-funded position on this basis. See also Note 21 of Notes to Consolidated Financial Statements.

Note 19 – Other Accrued Liabilities

Other accrued liabilities as of December 31, 2019 and 2018 were as follows:

	2019	2018
Non-income taxes	$ 21,176	$ 8,462
Short-term lease liabilities	11,177	-
Professional fees	11,220	3,831
Current income taxes payable	7,503	1,358
Selling expenses	6,646	3,582
Customer advances and sales return reserves	5,554	2,187
Freight	4,704	2,188
Acquisition-related accruals	3,521	-
Legal	2,362	1,067
Environmental	734	-
Accrued rent and facilities	994	763
Accrued interest	855	4,340
Other	7,159	3,330
Total other accrued liabilities	$ 83,605	$ 31,108

Note 20 – Debt

Debt as of December 31, 2019 and 2018 includes the following:

	As of December 31, 2019		As of December 31, 2018	
	Interest Rate	Outstanding Balance	Interest Rate	Outstanding Balance
Credit Facilities:				
Revolver	3.20%	$ 171,169	1.00%	$ 24,034
U.S. Term Loan	3.20%	600,000	N/A	—
EURO Term Loan	1.50%	151,188	N/A	—
Industrial development bonds	5.26%	10,000	5.26%	10,000
Bank lines of credit and other debt obligations	Various	2,608	Various	2,570
Total debt		$ 934,965		$ 36,604
Less: debt issuance costs		(14,196)		—
Less: short-term and current portion of long-term debts		(38,332)		(670)
Total long-term debt		$ 882,437		$ 35,934

Credit facilities

Prior to the Combination, the Company secured commitments from certain banks for a new credit facility (as amended, the “New Credit Facility”). Concurrent with the closing of the Combination on August 1, 2019, those banks, Bank of America N.A. as administrative agent, the Company and certain other parties closed on the New Credit Facility, replacing the Company’s previous revolving credit facility (the “Old Credit Facility”).

The New Credit Facility is comprised of a $400.0 million multicurrency revolver (“the Revolver”), a $600.0 million U.S. term loan (the “U.S. Term Loan”), each with the Company as borrower, and a $150.0 million (as of August 1, 2019) Euro equivalent term loan (the “EURO Term Loan” and together with the “U.S. Term Loan”, the “Term Loans”) with Quaker Chemical B.V., a Dutch subsidiary of the Company as borrower, each with a five-year term maturing in August 2024. Subject to the consent of the administrative agent and certain other conditions, the Company may designate additional borrowers. The maximum amount available under the New Credit Facility can be increased by up to $300.0 million at the Company’s request if there are lenders who agree to accept additional commitments and the Company has satisfied certain other conditions. Borrowings under the New Credit Facility bear interest at a base rate or LIBOR plus an applicable margin based upon the Company’s consolidated net leverage ratio. There are LIBOR replacement provisions that contemplate a further amendment if and when LIBOR ceases to be reported. Interest incurred on the outstanding borrowings under the New Credit Facility post-closing of the Combination through December 31, 2019 was approximately 3.1% per annum. In addition to paying interest on outstanding principal under the New Credit Facility, the Company is

required to pay a 0.25% commitment fee to the lenders under the Revolver in respect of the unutilized commitments thereunder. The Company has unused capacity under the Revolver of approximately $221 million, net of bank letters of credit of approximately $8 million, as of December 31, 2019. Until closing of the Combination, the Company incurred ticking fees to maintain the bank commitment, which began to accrue on September 29, 2017. Concurrent with closing of the Combination and executing the New Credit Facility, the Company paid approximately $6.3 million of ticking fees.

The New Credit Facility is subject to certain financial and other covenants. The Company's initial consolidated net debt to consolidated adjusted EBITDA ratio cannot exceed 4.25 to 1, with step downs in the permitted ratio over the course of the New Credit Facility. The Company's consolidated adjusted EBITDA to interest expense ratio cannot be less than 3.0 to 1. Such covenants are more fully defined in the New Credit Facility, of which the associated credit agreement is included as an exhibit to this Report. The New Credit Facility has limitations on the ability of the Company to pay dividends; it may not pay cash dividends if it is in default and the amount it may pay each year is limited to the greater of $50.0 million and 20% of consolidated adjusted EBITDA unless the ratio of consolidated net debt to consolidated adjusted EBITDA is less than 2.0 to 1, in which case there is no such limitation on amount. At the closing of the Combination and as of December 31, 2019, the Company was in compliance with all of the New Credit Facility covenants. The Term Loans have quarterly principal amortization during their respective five-year maturities, with 5.0% amortization of the principal balance due in years 1 and 2, 7.5% in year 3, and 10.0% in years 4 and 5, with the remaining principal amount due at maturity. The New Credit Facility is guaranteed by certain of the Company's domestic subsidiaries and is secured by first priority liens on substantially all of the assets of the Company and the domestic subsidiary guarantors, subject to certain customary exclusions. The obligations of the Dutch borrower only are guaranteed by certain foreign subsidiaries on an unsecured basis.

On March 17, 2020, the Company, the administrative agent, and certain other parties entered into an amendment (the "Amendment") to the New Credit Facility. The New Credit Facility requires the Company to deliver to the administrative agent and each lender the audited consolidated financial statements of the Company at the end of each fiscal year. Without having obtained the Amendment, failing to observe this financial statements covenant by March 17, 2020 with respect to the Company's financial statements for 2019 would have been an event of default under the New Credit Facility, thereby entitling the administrative agent and the lenders to accelerate the payment of the unpaid principal amount of all outstanding loans and all interest accrued and unpaid thereon, among other remedies. The Amendment extends the delivery dates for the foregoing financial statements to April 16, 2020.

The New Credit Facility required the Company to fix its variable interest rates on at least 20% of its total Term Loans. In order to satisfy this requirement as well as to manage the Company's exposure to variable interest rate risk associated with the New Credit Facility, in November 2019, the Company entered into $170.0 million notional amounts of three-year interest rate swaps at a base rate of 1.64% plus an applicable margin as provided in the New Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, this aggregate rate was 3.1%. See Note 25 of Notes to Consolidated Financial Statements.

The Company capitalized $23.7 million of certain third-party debt issuance costs in connection with executing the New Credit Facility. Approximately $15.5 million of the capitalized costs were attributed to the Term Loans and recorded as a direct reduction of long-term debt on the Company's Consolidated Balance Sheet. Approximately $8.3 million of the capitalized costs were attributed to the Revolver and recorded within other assets on the Company's Consolidated Balance Sheet. These capitalized costs will be amortized into interest expense over the five-year term of the New Credit Facility.

The Old Credit Facility was a $300.0 million syndicated multicurrency, unsecured revolving credit facility with a group of lenders. Borrowings under the Old Credit Facility generally bore interest at a base rate or LIBOR rate plus a margin. The Old Credit Facility had certain financial and other covenants, with the key financial covenant requiring that the Company's consolidated total debt to adjusted EBITDA ratio could not exceed 3.50 to 1. During July 2019, the Old Credit Facility was amended and restated to extend the maturity date to August 31, 2020 and was subsequently replaced by the New Credit Facility as of August 1, 2019.

Industrial development bonds

As of December 31, 2019 and 2018, the Company had fixed rate, industrial development authority bonds due in 2028. As of December 31, 2017, the Company also had a $5.0 million industrial development authority bond bearing interest at a rate of 5.60%, which matured and was paid off during the fourth quarter of 2018. These bonds have similar covenants to the credit facilities noted above.

Bank lines of credit and other debt obligations

In connection with the Combination, the Company assumed certain unsecured bank lines of credit and discounting facilities in one of its foreign subsidiaries, which are not collateralized. The Company's other debt obligations primarily consist of certain domestic and foreign low interest rate or interest-free municipality-related loans, local credit facilities of certain foreign subsidiaries and capital lease obligations. Total unused capacity under these arrangements as of December 31, 2019 was approximately $28 million.

In addition to the bank letters of credit described in the Credit facilities section above, the Company's only other off-balance sheet arrangements include financial guarantees. The Company's total bank letters of credit and guarantees outstanding as of December 31, 2019 were approximately $15 million.

At December 31, 2019, annual maturities on long-term borrowings maturing in the next five fiscal years (excluding the reduction to long-term debt attributed to capitalized and unamortized debt issuance costs) are as follows:

2020	$	38,686
2021		38,007
2022		56,661
2023		75,414
2024		716,021

The Company incurred the following debt related expenses included within Interest expense, net, in the Consolidated Statements of Income:

	Year Ended December 31,		
	2019	2018	2017
Interest expense	$ 16,788	$ 6,158	$ 3,892
Amortization of debt issuance costs	1,979	70	241
Total	$ 18,767	$ 6,228	$ 4,133

Based on the variable interest rates associated with the New Credit Facility and the Old Credit Facility, as of December 31, 2019 and 2018, the amounts at which the Company's total debt were recorded are not materially different from their fair market value.

Note 21 – Pension and Other Postretirement Benefits

The following table shows the funded status of the Company's plans' reconciled with amounts reported in the Consolidated Balance Sheets as of December 31, 2019 and 2018:

	Pension Benefits						Other Post-Retirement Benefits	
	2019			2018			2019	2018
Change in benefit obligation	Foreign	U.S.	Total	Foreign	U.S.	Total	U.S.	U.S.
Gross benefit obligation at beginning of year	$ 111,316	$ 58,734	$ 170,050	$ 118,352	$ 62,977	$ 181,329	$ 4,106	$ 4,729
Service cost	3,507	434	3,941	3,426	383	3,809	6	7
Interest cost	3,046	3,313	6,359	2,254	1,847	4,101	143	130
Employee contributions	73	—	73	73	—	73	—	—
Effect of plan amendments	30	—	30	—	—	—	—	—
Plan settlements	(1,087)	—	(1,087)	(10)	—	(10)	—	—
Benefits paid	(3,832)	(6,034)	(9,866)	(1,639)	(4,330)	(5,969)	(384)	(317)
Plan expenses and premiums paid	(129)	—	(129)	(161)	—	(161)	—	—
Transfer in of business acquisition	85,658	86,414	172,072	—	—	—	—	—
Actuarial loss (gain)	13,616	10,862	24,478	(5,561)	(2,143)	(7,704)	395	(443)
Translation differences and other	5,695	—	5,695	(5,418)	—	(5,418)	—	—
Gross benefit obligation at end of year	$ 217,893	$ 153,723	$ 371,616	$ 111,316	$ 58,734	$ 170,050	$ 4,266	$ 4,106
Change in plan assets								
Fair value of plan assets at year beginning of year	$ 94,826	$ 49,415	$ 144,241	$ 98,622	$ 51,964	$ 150,586	$ —	$ —
Actual return on plan assets	13,458	10,663	24,121	(2,670)	457	(2,213)	—	—
Employer contributions	5,223	1,087	6,310	5,269	1,574	6,843	384	317
Employee contributions	73	—	73	73	—	73	—	—
Plan settlements	(1,087)	—	(1,087)	(10)	—	(10)	—	—
Benefits paid	(3,832)	(6,034)	(9,866)	(1,639)	(4,330)	(5,969)	(384)	(317)
Plan expenses and premiums paid	(129)	(500)	(629)	(161)	(250)	(411)	—	—
Transfer in of business acquisition	81,068	65,919	146,987	—	—	—	—	—
Translation differences	5,499	—	5,499	(4,658)	—	(4,658)	—	—
Fair value of plan assets at end of year	$ 195,099	$ 120,550	$ 315,649	$ 94,826	$ 49,415	$ 144,241	$ —	$ —
Net benefit obligation recognized	$ (22,794)	$ (33,173)	$ (55,967)	$ (16,490)	$ (9,319)	$ (25,809)	$ (4,266)	$ (4,106)

	Pension Benefits						Other Post-Retirement Benefits	
	2019			2018			2019	2018
	Foreign	U.S.	Total	Foreign	U.S.	Total	U.S.	U.S.
Amounts recognized in the balance sheet consist of:								
Non-current assets	$ —	$ —	$ —	$ —	$ 3,656	$ 3,656	$ —	$ —
Current liabilities	(359)	(2,620)	(2,979)	(206)	(559)	(765)	(426)	(446)
Non-current liabilities	(22,435)	(30,553)	(52,988)	(16,284)	(12,416)	(28,700)	(3,840)	(3,660)
Net benefit obligation recognized	$ (22,794)	$ (33,173)	$ (55,967)	$ (16,490)	$ (9,319)	$ (25,809)	$ (4,266)	$ (4,106)
Amounts not yet reflected in net periodic benefit costs and included in accumulated other comprehensive loss:								
Prior service credit	$ 1,271	$ —	$ 1,271	$ 1,497	$ —	$ 1,497	$ —	$ —
Accumulated loss	(22,816)	(46,560)	(69,376)	(20,089)	(25,310)	(45,399)	(734)	(338)
AOCI	(21,545)	(46,560)	(68,105)	(18,592)	(25,310)	(43,902)	(734)	(338)
Cumulative employer contributions (below) or in excess of net periodic benefit cost	(1,249)	13,387	12,138	2,102	15,991	18,093	(3,532)	(3,768)
Net benefit obligation recognized	$ (22,794)	$ (33,173)	$ (55,967)	$ (16,490)	$ (9,319)	$ (25,809)	$ (4,266)	$ (4,106)

The accumulated benefit obligation for all defined benefit pension plans was $366.0 million ($152.9 million U.S. and $213.1 million Foreign) and $165.3 million ($57.6 million U.S. and approximately $107.7 million Foreign) as of December 31, 2019 and 2018, respectively.

Information for pension plans with an accumulated benefit obligation in excess of plan assets:

	2019			2018		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Projected benefit obligation	$ 217,893	$ 153,723	$ 371,616	$ 111,316	$ 12,975	$ 124,291
Accumulated benefit obligation	213,060	152,930	365,990	107,685	11,808	119,493
Fair value of plan assets	195,099	120,550	315,649	94,826	—	94,826

Information for pension plans with a projected benefit obligation in excess of plan assets:

	2019			2018		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Projected benefit obligation	$ 217,893	$ 153,723	$ 371,616	$ 111,316	$ 12,975	$ 124,291
Fair value of plan assets	195,099	120,550	315,649	94,826	—	94,826

Components of net periodic benefit costs – pension plans:

	2019			2018		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Service cost	$ 3,507	$ 434	$ 3,941	$ 3,426	$ 383	$ 3,809
Interest cost	3,046	3,313	6,359	2,254	1,847	4,101
Expected return on plan assets	(3,668)	(3,227)	(6,895)	(2,228)	(2,803)	(5,031)
Settlement loss	258	—	258	2	—	2
Actuarial loss amortization	757	2,348	3,105	881	2,276	3,157
Prior service (credit) cost amortization	(165)	—	(165)	(175)	59	(116)
Net periodic benefit cost	$ 3,735	$ 2,869	$ 6,603	$ 4,160	$ 1,762	$ 5,922

	2017		
	Foreign	U.S.	Total
Service cost	$ 3,219	$ 337	$ 3,556
Interest cost	2,066	1,932	3,998
Expected return on plan assets	(1,994)	(3,067)	(5,061)
Settlement loss	—	1,946	1,946
Actuarial loss amortization	862	2,396	3,258
Prior service (credit) cost amortization	(167)	63	(104)
Net periodic benefit cost	$ 3,986	$ 3,607	$ 7,593

Other changes recognized in other comprehensive income – pension plans:

	2019			2018		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Net loss (gain) arising during the period	$ 3,826	$ 3,926	$ 7,752	$ (663)	$ 453	$ (210)
Recognition of amortization in net periodic benefit cost						
Prior service credit (cost)	196	—	196	175	(59)	116
Actuarial loss	(1,015)	(2,347)	(3,362)	(883)	(2,276)	(3,159)
Effect of exchange rates on amounts included in AOCI	(61)	—	(61)	(890)	—	(890)
Total recognized in other comprehensive loss (income)	2,946	1,579	4,525	(2,261)	(1,882)	(4,143)
Total recognized in net periodic benefit cost and other comprehensive loss (income)	$ 6,681	$ 4,448	$ 11,128	$ 1,899	$ (120)	$ 1,779

	2017		
	Foreign	U.S.	Total
Net gain arising during period	$ 715	$ (1,672)	$ (957)
Recognition of amortization in net periodic benefit			
Prior service credit (cost)	167	(63)	104
Actuarial loss	(862)	(4,342)	(5,204)
Effect of exchange rates on amounts included in AOCI	2,308	—	2,308
Total recognized in other comprehensive loss	2,328	(6,077)	(3,749)
Total recognized in net periodic benefit cost and other comprehensive loss	$ 6,314	$ (2,470)	$ 3,844

Components of net periodic benefit costs – other postretirement plan:

	2019	2018	2017
Service cost	$ 6	$ 7	$ 8
Interest cost	143	130	144
Actuarial loss amortization	—	42	54
Net periodic benefit costs	$ 149	$ 179	$ 206

Other changes recognized in other comprehensive income – other postretirement benefit plans:

	2019	2018	2017
Net (gain) loss arising during period	$ 395	$ (443)	$ 295
Amortization of actuarial loss in net periodic benefit costs	—	(42)	(54)
Total recognized in other comprehensive (income) loss	395	(485)	241
Total recognized in net periodic benefit cost and other comprehensive (income) loss	$ 544	$ (306)	$ 447

Estimated amounts that will be amortized from accumulated other comprehensive loss over the next fiscal year:

	Pension Plans			Other Post-Retirement
	Foreign	U.S.	Total	Benefits
Actuarial loss	$ 889	$ 2,034	$ 2,923	$ —
Prior service credit	(164)	—	(164)	—
	$ 725	$ 2,034	$ 2,759	$ —

Weighted-average assumptions used to determine benefit obligations as of December 31, 2019 and 2018:

	Pension Benefits		Other Postretirement Benefits	
	2019	2018	2019	2018
U.S. Plans:				
Discount rate	3.06 %	4.07 %	2.98 %	4.03 %
Rate of compensation increase	6.00 %	3.63 %	N/A	N/A
Foreign Plans:				
Discount rate	1.83 %	2.47 %	N/A	N/A
Rate of compensation increase	2.58 %	2.89 %	N/A	N/A

Weighted-average assumptions used to determine net periodic benefit costs for the years ended December 31, 2019 and 2018:

	Pension Benefits		Other Postretirement Benefits	
	2019	**2018**	**2019**	**2018**
U.S. Plans:				
Discount rate	4.08 %	3.44 %	4.03 %	3.39 %
Expected long-term return on plan assets	5.75 %	5.95 %	N/A	N/A
Rate of compensation increase	5.50 %	3.63 %	N/A	N/A
Foreign Plans:				
Discount rate	2.30 %	2.33 %	N/A	N/A
Expected long-term return on plan assets	3.13 %	2.22 %	N/A	N/A
Rate of compensation increase	2.87 %	2.89 %	N/A	N/A

The long-term rates of return on assets were selected from within the reasonable range of rates determined by (a) historical real returns for the asset classes covered by the investment policy and (b) projections of inflation over the long-term period during which benefits are payable to plan participants. See Note 1 of Notes to Consolidated Financial Statements for further information.

Assumed health care cost trend rates as of December 31, 2019 and 2018:

	2019	**2018**
Health care cost trend rate for next year	5.90 %	6.20 %
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	4.50 %	4.50 %
Year that the rate reaches the ultimate trend rate	2037	2037

Assumed health care cost trend rates could have a significant effect on the amounts reported for the health care plans. A one-percentage-point change in assumed health care cost trend rates would have the following effects:

	1% Point Increase	**1% Point Decrease**
Effect on total service and interest cost	$ 11	$ (10)
Effect on postretirement benefit obligations	311	(272)

Plan Assets and Fair Value

The Company's pension plan target asset allocation and the weighted-average asset allocations as of December 31, 2019 and 2018 by asset category were as follows:

Asset Category	**Target**	**2019**	**2018**
U.S. Plans			
Equity securities	10 %	32 %	9 %
Debt securities	90 %	64 %	90 %
Other	— %	4 %	1 %
Total	100 %	100 %	100 %
Foreign Plans			
Equity securities	38 %	34 %	21 %
Debt securities	51 %	45 %	76 %
Other	11 %	21 %	3 %
Total	100 %	100 %	100 %

During the year ended December 31, 2018, the Company elected to adjust the asset allocation of the Company's primary noncontributory U.S. pension plan (the "Legacy Quaker U.S. Pension Plan") along a glide path based on the funded status of the Legacy Quaker U.S. Pension Plan. As funded status improved, the assets were allocated more heavily to debt securities with lengthened duration to match projected liability movements.

As of December 31, 2019 and 2018, "Other" consisted principally of cash and cash equivalents, and investments in real estate funds.

The following is a description of the valuation methodologies used for the investments measured at fair value, including the general classification of such instruments pursuant to the valuation hierarchy, where applicable:

Cash and Cash Equivalents

Cash and cash equivalents consist of cash and money market funds and are classified as Level 1 investments.

Commingled Funds

Investments in the U.S. pension plan and foreign pension plan commingled funds represent pooled institutional investments, including primarily collective investment trusts. These commingled funds are not available on an exchange or in an active market and these investments are valued using their net asset value ("NAV"), which is generally based on the underlying asset values of the investments held in the trusts.

As of December 31, 2019, the U.S. pension plan commingled funds were 100 percent invested in fixed income securities. As of December 31, 2019, the foreign pension plan commingled funds included approximately 32 percent of investments in equity securities, 55 percent of investments in fixed income securities, and 13 percent of other non-related investments, primarily real estate.

Pooled Separate Accounts

Investments in the U.S. pension plan pooled separate accounts consist of annuity contracts and are valued based on the reported unit value at year end. Units of the pooled separate account are not traded on an exchange or in an active market; however, valuation is based on the underlying investments of each pooled separate account and are classified as Level 2 investments. As of December 31, 2019, the U.S. pension plan pooled separate accounts included approximately 60 percent of investments in equity securities and 40 percent of investments in fixed income securities.

Fixed Income Government Securities

Investments in foreign pension plans fixed income government securities were valued using third party pricing services which are based on a combination of quoted market prices on an exchange in an active market as well as proprietary pricing models and inputs using observable market data and are classified as Level 2 investments.

Insurance Contract

Investments in the foreign pension plan insurance contract are valued at the highest value available for the Company at year end, either the reported cash surrender value of the contract or the vested benefit obligation. Both the cash surrender value and the vested benefit obligation are determined based on unobservable inputs, which are contractually or actuarially determined, regarding returns, fees, the present value of the future cash flows of the contract and benefit obligations. The contract is classified as a Level 3 investment.

Diversified Equity Securities - Registered Investment Companies

Investments in the foreign pension plans diversified equity securities of registered investment companies are based upon the quoted redemption value of shares in the fund owned by the plan at year end. The shares of the fund are not available on an exchange or in an active market; however, the fair value is determined based on the underlying investments in the fund as traded on an exchange in an active market and are classified as Level 2 investments.

Fixed Income – Foreign Registered Investment Companies

Investments in the foreign pension plans fixed income securities of foreign registered investment companies are based upon the quoted redemption value of shares in the fund owned by the plan at year end. The shares of the fund are not available on an exchange or in an active market; however, the fair value is determined based on the underlying investments in the fund as traded on an exchange in an active market and are classified as Level 2 investments.

Diversified Investment Fund - Registered Investment Companies

Investments in the foreign pension plan diversified investment fund of registered investment companies are based upon the quoted redemption value of shares in the fund owned by the plan at year end. This fund is not available on an exchange or in an active market and this investment is valued using its NAV, which is generally based on the underlying asset values of the investments held. As of December 31, 2019, the diversified investment funds included approximately 65 percent of investments in equity securities, 24 percent of investments in fixed income securities, and 11 percent of other alternative investments.

Other – Alternative Investments

Investments in the foreign pension plans include certain other alternative investments such as inflation and interest rate swaps. These investments are valued based on unobservable inputs, which are contractually or actuarially determined, regarding returns, fees, the present value of future cash flows of the contract and benefit obligations. These alternative investments are classified as Level 3 investments.

Real Estate

The U.S. and foreign pension plans' investment in real estate consists of investments in property funds. The funds' underlying investments consist of real property which are valued using unobservable inputs. These property funds are classified as a Level 3 investment.

As of December 31, 2019 and 2018, the U.S. and foreign plans' investments measured at fair value on a recurring basis were as follows:

		Fair Value Measurements at December 31, 2019 Using Fair Value Hierarchy		
U.S. Pension Assets	**Total Fair Value**	**Level 1**	**Level 2**	**Level 3**
Cash and cash equivalents	$ 450	$ 450	$ —	$ —
Pooled separate accounts	64,636	—	64,636	—
Real estate	4,060	—	—	4,060
Subtotal U.S. pension plan assets in fair value hierarchy	$ 69,146	$ 450	$ 64,636	$ 4,060
Commingled funds measured at NAV	51,404			
Total U.S. pension plan assets	$ 120,550			
Foreign Pension Assets				
Cash and cash equivalents	$ 1,502	$ 1,502	$ —	$ —
Insurance contract	92,657	—	—	92,657
Diversified equity securities - registered investment companies	8,604	—	8,604	—
Fixed income – foreign registered investment companies	3,021	—	3,021	—
Fixed income government securities	32,512	—	32,512	—
Real estate	5,521	—	—	5,521
Other - alternative investments	9,436	—	—	9,436
Sub-total of foreign pension assets in fair value hierarchy	$ 153,253	$ 1,502	$ 44,137	$ 107,614
Commingled funds measured at NAV	2,037			
Diversified investment fund - registered investment companies measured at NAV	39,809			
Total foreign pension assets	$ 195,099			
Total pension assets in fair value hierarchy	$ 222,399	$ 1,952	$ 108,773	$ 111,674
Total pension assets measured at NAV	93,250			
Total pension assets	$ 315,649			

U.S. Pension Assets	Total Fair Value	Fair Value Measurements at December 31, 2018 Using Fair Value Hierarchy		
		Level 1	Level 2	Level 3
Cash and cash equivalents	$ 450	$ 450	$ —	$ —
Subtotal U.S. pension plan assets in fair value hierarchy	$ 450	$ 450	$ —	$ —
Commingled funds measured at NAV	48,965			
Total U.S. pension plan assets	$ 49,415			
Foreign Pension Assets				
Cash and cash equivalents	$ 209	$ 209	$ —	$ —
Insurance contract	79,873	—	—	79,873
Diversified equity securities - registered investment companies	7,701	—	7,701	—
Fixed income - foreign registered investment companies	2,658	—	2,658	—
Real estate	2,382	—	—	2,382
Subtotal foreign pension assets in fair value hierarchy	$ 92,823	$ 209	$ 10,359	$ 82,255
Commingled funds measured at NAV	2,003			
Total foreign pension plan assets	$ 94,826			
Total pension assets in fair value hierarchy	$ 93,273	$ 659	$ 10,359	$ 82,255
Total pension assets measured at NAV	50,968			
Total pension assets	$ 144,241			

Certain investments that are measured at fair value using the NAV per share (or its equivalent) have not been classified in the fair value hierarchy. The fair value amounts presented for these investments in the preceding tables are intended to permit reconciliation of the fair value hierarchies to the line items presented in the statements of net assets available for benefits.

Changes in the fair value of the plans' Level 3 investments during the years ended December 31, 2019 and 2018 were as follows:

	Insurance Contract	Real Estate	Alternative Investments	Total
Balance as of December 31, 2017	$ 82,092	$ 2,428	$ —	$ 84,520
Purchases	4,707	—	—	4,707
Settlements	(1,399)	—	—	(1,399)
Unrealized (losses) gains	(1,817)	94	—	(1,723)
Currency translation adjustment	(3,710)	(140)	—	(3,850)
Balance as of December 31, 2018	79,873	2,382	—	82,255
Purchases	3,762	—	1,029	4,791
Assets acquired in business combinations	129	7,058	8,914	16,101
Sales	—	(238)	(278)	(516)
Settlements	(1,730)	—	—	(1,730)
Unrealized gains (losses)	12,199	403	(960)	11,642
Currency translation adjustment	(1,576)	(24)	731	(869)
Balance as of December 31, 2019	$ 92,657	$ 9,581	$ 9,436	$ 111,674

During the second quarter of 2017, the Legacy Quaker U.S. Pension Plan offered a cash settlement to its vested terminated participants, which allowed them to receive the value of their pension benefits as a single lump sum payment. As payments from the Legacy Quaker U.S. Pension Plan for this cash out offering exceeded the service and interest cost components of the Legacy Quaker U.S. Pension Plan expense for the year ended December 31, 2017, the Company recorded a settlement charge of approximately $1.9 million. This settlement charge represented the immediate recognition into expense of a portion of the unrecognized loss within AOCI on the balance sheet in proportion to the share of the projected benefit obligation that was settled by these payments. The gross pension benefit obligation was reduced by approximately $4.0 million as a result of these payments. The settlement charge was recognized through other expense, net, on the Company's Consolidated Statements of Income.

In the fourth quarter of 2018, the Company began the process of terminating the Legacy Quaker U.S. Pension Plan. Prior to December 31, 2005, the Legacy Quaker U.S. Pension Plan covered substantially all employees of the Company's U.S. subsidiary who had at least one year of eligible service and had attained age 21. Effective December 31, 2005, the Legacy Quaker U.S. Pension Plan was amended to freeze benefit accruals with respect to participants who were not part of a collective bargaining unit and effective after November 30, 2013, the Legacy Quaker U.S. Pension Plan was further amended to freeze benefit accruals for the remaining participants. U.S. Pension Plan participants will have their benefits either converted into a lump sum cash payment or an annuity contract placed with an insurance carrier. In order to terminate the plan in accordance with I.R.S. and pension benefit guaranty corporation requirements, the Company will be required to fully fund the Legacy Quaker U.S. Pension Plan on a termination basis and will commit to contribute the additional assets necessary, if any, to do so. The amount necessary to do so is currently estimated to be between $1 and $2 million. In addition, the Company expects to record a pension settlement charge at plan termination. This settlement charge will include the immediate recognition into expense of the unrecognized losses within AOCI on the balance sheet as of the plan termination date. The Company does not have a current estimate for this future settlement charge, however, the gross AOCI related to this plan was approximately $24 million as of December 31, 2019. The Company currently estimates that the Legacy Quaker U.S. Pension Plan termination will be completed in the first half of 2020.

Houghton Pension Plans

In connection with the Combination, the Company indirectly acquired all of Houghton's defined benefit pension plans. The pension plans cover certain U.S. salaried and hourly employees ("Houghton U.S. Plans") as well as certain employees in the U.K., France and Germany ("Houghton Foreign Plans"). The Houghton U.S. Plans provide benefits based on an employee's years of service and compensation received for the highest five consecutive years of earnings. Houghton management made the decision to freeze benefits for non-union employees as of March 31, 2009 for the Houghton U.S. Plans. The Houghton Foreign Plans provide benefits based on a formula of years of service and a percentage of compensation which varies among the Houghton Foreign Plans. Houghton management made the decision to freeze its U.K. plan benefits as of May 1, 2013. Subsequent to closing the Combination, during the year ended December 31, 2019, the Company made approximately $1.1 million of contributions to the Houghton U.S. and Houghton Foreign Plans. As of December 31, 2019, the acquired pension balance for these plans was $19.0 million, which is recorded within other current and other non-current liabilities on the Company's Consolidated Balance Sheet.

In connection with the Combination, the Company now contributes to a multiemployer defined benefit pension plan under terms of a collective bargaining union contract (the Cleveland Bakers and Teamsters Pension Fund, Employer Identification Number: 34-0904419-001). The expiration date of the collective bargaining contract is May 1, 2022. As of January 1, 2018, the last valuation date available for the multiemployer plan, total plan liabilities were approximately $592 million. As of December 31, 2018, the multiemployer pension plan had total plan assets of approximately $315 million. The Company's contribution rate to the multiemployer pension plan is specified in the collective bargaining union contract and contributions are made to the plan based on its union employee payroll. The Company contributed less than $0.1 million during the year ended December 31, 2019. The Employee Retirement Income Security Act of 1974, as amended by the Multi-Employer Pension Plan Amendments Act of 1980, imposes certain contingent liabilities upon an employer who is a contributor to a multiemployer pension plan if the employer withdraws from the plan or the plan is terminated or experiences a mass withdrawal. While the Company may also have additional liabilities imposed by law as a result of its participation in the multiemployer defined benefit pension plan, there is no liability as of December 31, 2019.

The Pension Protection Act of 2006 (the "PPA") also added special funding and operational rules generally applicable to plan years beginning after 2007 for multiemployer plans with certain classifications based on a multitude of factors (including, for example, the plan's funded percentage, cash flow position and whether the plan is projected to experience a minimum funding deficiency). The plan to which the Company contributes is in "critical" status. Plans in the "critical" status classification must adopt measures to improve their funded status through a funding improvement or rehabilitation plan which may require additional contributions from employers (which may take the form of a surcharge on benefit contributions) and/or modifications to retiree benefits. The amount of additional funds that the Company may be obligated to contribute to the plan in the future cannot be estimated as such amounts will be likely based on future levels of work that require the specific use of those union employees covered by the plan, and the amount of that future work and the number of affected employees that may be needed is not reasonably estimable.

Cash Flows

Contributions

The Company expects to make minimum cash contributions of approximately $10.0 million to its pension plans (approximately $2.7 million U.S. and $7.3 million Foreign) and approximately $0.4 million to its other postretirement benefit plan in 2020. This excludes any potential required cash contributions, if necessary, as a part of the Legacy Quaker U.S. Pension Plan settlement, described above.

Estimated Future Benefit Payments

Excluding any impact related to the PPA or the Legacy Quaker U.S. Pension Plan termination process noted above, the following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

	Pension Benefits			Other Post-Retirement
	Foreign	U.S.	Total	Benefits
2020	$ 5,600	$ 5,947	$ 11,547	$ 426
2021	6,219	5,209	11,428	400
2022	6,297	5,191	11,488	373
2023	6,740	6,054	12,794	354
2024	6,797	6,238	13,035	326
2024 to 2028	41,379	31,026	72,405	1,291

The Company maintains a plan under which supplemental retirement benefits are provided to certain officers. Benefits payable under the plan are based on a combination of years of service and existing postretirement benefits. Included in total pension costs are charges of $1.8 million, $1.6 million and $1.4 million for the years ended December 31, 2019, 2018 and 2017, respectively, representing the annual accrued benefits under this plan.

Defined Contribution Plan

The Company has a 401(k) plan with an employer match covering a majority of its U.S. employees. The plan allows for and the Company previously paid a nonelective contribution on behalf of participants who have completed one year of service equal to 3% of the eligible participants' compensation in the form of Company common stock. During the first quarter of 2017, the Company began matching both non-elective and elective 401(k) contributions in cash, rather than stock. Total Company contributions were $4.0 million, $3.1 million and $2.9 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Note 22 – Other Non-Current Liabilities

Other non-current liabilities as of December 31, 2019 and 2018 were as follows:

	2019	2018
Restricted insurance settlement	$ 19,678	$ 20,278
Non-current income taxes payable	8,500	7,644
Uncertain tax positions (includes interest and penalties)	24,609	8,097
Fair value of interest rate swaps	415	—
Environmental reserves	5,259	—
Deferred and other long-term compensation	6,625	6,886
Other	1,298	624
Total other non-current liabilities	$ 66,384	$ 43,529

Note 23 – Equity and Accumulated Other Comprehensive Loss

The Company has 30,000,000 shares of common stock authorized with a par value of $1, and 17,735,162 and 13,338,026 shares issued and outstanding as of December 31, 2019 and 2018, respectively. The change in shares issued and outstanding during 2019 was primarily related to 4,329,176 shares issued for the Combination, 42,073 shares issued for share-based compensation plans, 3,081 shares issued for the ESPP and 22,806 shares issued for the exercise of stock options and other employee and director-related share activity.

The Company is authorized to issue 10,000,000 shares of preferred stock with $1 par value, subject to approval by the Board of Directors. The Board of Directors may designate one or more series of preferred stock and the number of shares, rights, preferences, and limitations of each series. As of December 31, 2019, no preferred stock had been issued.

The Company has a share repurchase program that was approved by its Board of Directors in 2015 for the repurchase of up to $100.0 million of Quaker Chemical Corporation common stock, which the Company has not used in the three years ended December 31, 2019, 2018, and 2017. As of December 31, 2019, there was approximately $86.9 million of common stock remaining to be purchased under this share repurchase program.

The following table shows the reclassifications from and resulting balances of AOCI for the years ended December 31, 2019, 2018 and 2017:

	Currency Translation Adjustments	Defined Benefit Pension Plans	Unrealized Gain (Loss) in Available-for-Sale Securities	Derivative Instruments	Total
Balance as of December 31, 2016	$ (52,255)	$ (36,168)	$ 1,016	$ —	$ (87,407)
Other comprehensive income (loss) before reclassifications	20,362	(1,646)	2,299	—	21,015
Amounts reclassified from AOCI	—	5,154	(2,494)	—	2,660
Related tax amounts	—	(1,433)	65	—	(1,368)
Balance as of December 31, 2017	(31,893)	(34,093)	886	—	(65,100)
Other comprehensive (loss) income before reclassifications	(17,429)	1,543	(2,622)	—	(18,508)
Amounts reclassified from AOCI	—	3,085	435	—	3,520
Related tax amounts	—	(1,086)	459	—	(627)
Balance as of December 31, 2018	(49,322)	(30,551)	(842)	—	(80,715)
Other comprehensive income (loss) before reclassifications	4,754	(8,088)	2,951	(415)	(798)
Amounts reclassified from AOCI	—	3,169	(301)	—	2,868
Related tax amounts	—	937	(557)	95	475
Balance as of December 31, 2019	$ (44,568)	$ (34,533)	$ 1,251	$ (320)	$ (78,170)

All reclassifications related to unrealized gain (loss) in available-for-sale securities relate to the Company's equity interest in Primex, a captive insurance company and are recorded in equity in net income of associated companies. The amounts reported on the Consolidated Statements of Changes in Equity for non-controlling interest are related to currency translation adjustments.

Note 24 – Fair Value Measures

The Company has valued its company-owned life insurance policies at fair value. These assets are subject to fair value measurement as follows:

		Fair Value Measurements at December 31, 2019 Using Fair Value Hierarchy		
Assets	Total Fair Value	Level 1	Level 2	Level 3
Company-owned life insurance	$ 1,782	$ —	$ 1,782	$ —
Total	$ 1,782	$ —	$ 1,782	$ —

		Fair Value Measurements at December 31, 2018 Using Fair Value Hierarchy		
Assets	Total Fair Value	Level 1	Level 2	Level 3
Company-owned life insurance	$ 1,491	$ —	$ 1,491	$ —
Total	$ 1,491	$ —	$ 1,491	$ —

The fair values of Company-owned life insurance are based on quotes for like instruments with similar credit ratings and terms. The Company did not hold any Level 3 investments as of December 31, 2019 or 2018, respectively, so related disclosures have not been included.

Note 25 – Hedging Activities

The New Credit Facility required the Company to fix its variable interest rates on at least 20% of its total Term Loans. In order to satisfy this requirement as well as to manage the Company's exposure to variable interest rate risk associated with the New Credit Facility, in November 2019, the Company entered into $170.0 million notional amounts of three-year interest rate swaps at a base rate of 1.64% plus an applicable margin as provided in the New Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, this aggregate rate was 3.1%. See Note 20 of Notes to Consolidated Financial Statements. The Company has previously used derivative financial instruments primarily for the purposes of hedging exposures to fluctuations in interest rates. These interest rate swaps are designated as cash flow hedges and, as such, the contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective and reclassified to interest expense in the period during which the transaction effects earnings or it becomes probable that the forecasted transaction will not occur. The Company did not utilize derivatives designated as cash flow hedges during the years ended December 31, 2018 and 2017.

The balance sheet classification and fair values of the Company's derivative instruments, which are Level 2 measurements, are as follows:

	Consolidated Balance Sheet Location	Fair Value December 31, 2019	Fair Value December 31, 2018
Derivatives designated as cash flow hedges:			
Interest rate swaps	Other non-current liabilities	$ 415	$ —
		$ 415	$ —

The following table presents the net unrealized loss deferred to AOCI:

	December 31, 2019	December 31, 2018
Derivatives designated as cash flow hedges:		
Interest rate swaps	$ 320	$ —
	$ 320	$ —

The following table presents the net gain reclassified from AOCI to earnings:

		For the Years Ended December 31, 2019	2018	2017
Amount and location of income reclassified from AOCI into Income (Effective Portion)	Interest expense, net	$ 29	$ —	$ —

Interest rate swaps are entered into with a limited number of counterparties, each of which allows for net settlement of all contracts through a single payment in a single currency in the event of a default on or termination of any one contract. As such, in accordance with the Company's accounting policy, these derivative instruments are recorded on a net basis by counterparty within the Consolidated Balance Sheets.

Note 26 – Commitments and Contingencies

In 1992, the Company identified certain soil and groundwater contamination at AC Products, Inc. ("ACP"), a wholly owned subsidiary. In voluntary coordination with the Santa Ana California Regional Water Quality Board, ACP has been remediating the contamination, the principal contaminant of which is perchloroethylene ("PERC"). In 2004, the Orange County Water District ("OCWD") filed a civil complaint against ACP and other parties seeking to recover compensatory and other damages related to the investigation and remediation of the contamination in the groundwater. Pursuant to a settlement agreement with OCWD, ACP agreed, among other things, to operate the two groundwater treatment systems to hydraulically contain groundwater contamination emanating from ACP's site until the concentrations of PERC released by ACP fell below the current Federal maximum contaminant level for four consecutive quarterly sampling events. In 2014, ACP ceased operation at one of its two groundwater treatment systems, as it had met the above condition for closure. As of December 31, 2019, ACP believes it is close to meeting the conditions for closure of the remaining groundwater treatment system but continues to operate this system while in discussions with the relevant authorities.

As of December 31, 2019, the Company believes that the range of potential-known liabilities associated with the balance of ACP water remediation program is approximately $0.1 million to $1.0 million. The low and high ends of the range are based on the length of operation of the treatment system as determined by groundwater modeling and the required conditions noted. Costs of operation include the operation and maintenance of the extraction well, groundwater monitoring and program management.

An inactive subsidiary of the Company that was acquired in 1978 sold certain products containing asbestos, primarily on an installed basis, and is among the defendants in numerous lawsuits alleging injury due to exposure to asbestos. The subsidiary discontinued operations in 1991 and has no remaining assets other than proceeds received from insurance settlements. To date, the overwhelming majority of these claims have been disposed of without payment and there have been no adverse judgments against the subsidiary. Based on a continued analysis of the existing and anticipated future claims against this subsidiary, it is currently projected that the subsidiary's total liability over the next 50 years for these claims is approximately $0.5 million (excluding costs of defense). Although the Company has also been named as a defendant in certain of these cases, no claims have been actively pursued against the Company, and the Company has not contributed to the defense or settlement of any of these cases pursued against the subsidiary. These cases were handled by the subsidiary's primary and excess insurers who had agreed in 1997 to pay all defense costs and be responsible for all damages assessed against the subsidiary arising out of existing and future asbestos claims up to the aggregate limits of their policies. A significant portion of this primary insurance coverage was provided by an insurer that is insolvent, and the other primary insurers asserted that the aggregate limits of their policies had been exhausted. The subsidiary challenged the applicability of these limits to the claims being brought against the subsidiary. In response, two of the three carriers entered into separate settlement and release agreements with the subsidiary in 2005 and 2007 for $15.0 million and $20.0 million, respectively. The proceeds of both settlements are restricted and can only be used to pay claims and costs of defense associated with the subsidiary's asbestos litigation. In 2007, the subsidiary and the remaining primary insurance carrier entered into a Claim Handling and Funding Agreement, under which the carrier is paying 27% of defense and indemnity costs incurred by or on behalf of the subsidiary in connection with asbestos bodily injury claims. The agreement continues until terminated and can only be terminated by either party by providing a minimum of two years prior written notice. As of December 31, 2019, no notice of termination has been given under this agreement. At the end of the term of the agreement, the subsidiary may choose to again pursue its claim against this insurer regarding the application of the policy limits. The Company believes that, if the coverage issues under the primary policies with the remaining carrier are resolved adversely to the subsidiary and all settlement proceeds were used, the subsidiary may have limited additional coverage from a state guarantee fund established following the insolvency of one of the subsidiary's primary insurers. Nevertheless, liabilities in respect of claims may exceed the assets and coverage available to the subsidiary.

If the subsidiary's assets and insurance coverage were to be exhausted, claimants of the subsidiary may actively pursue claims against the Company because of the parent-subsidiary relationship. The Company does not believe that such claims would have merit or that the Company would be held to have liability for any unsatisfied obligations of the subsidiary as a result of such claims. After evaluating the nature of the claims filed against the subsidiary and the small number of such claims that have resulted in any payment, the potential availability of additional insurance coverage at the subsidiary level, the additional availability of the Company's own insurance and the Company's strong defenses to claims that it should be held responsible for the subsidiary's obligations because of the parent-subsidiary relationship, the Company believes it is not probable that the Company will incur losses. The Company has been successful to date having any claims naming it dismissed during initial proceedings. Since the Company may be in this stage of litigation for some time, it is not possible to estimate additional losses or range of loss, if any.

As a result of the closing of the Combination on August 1, 2019, the Company is now party to Houghton environmental matters related to certain domestic and foreign properties currently or previously owned, described below. The Company continually evaluates its obligations related to such matters, and based on historical costs incurred and projected costs to be incurred over the next 28 years, has estimated the present value range of costs for all of the Houghton environmental matters, on a discounted basis, to be between approximately $6 million and $7 million as of December 31, 2019, for which $6.6 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2019.

Houghton's Sao Paulo, Brazil site was required under Brazilian environmental, health and safety regulations to perform an environmental assessment as part of a permit renewal process. Initial investigations identified soil and ground water contamination in select areas of the site. The site has conducted a multi-year soil and groundwater investigation and corresponding risk assessments based on the result of the investigations. In 2017, the site had to submit a new 5-year permit renewal request and was asked to complete additional investigations to further delineate the site based on review of the technical data by the local regulatory agency, Companhia Ambiental do Estado de São Paulo ("CETESB"). Based on review of the updated investigation data, CETESB issued a Technical Opinion regarding the investigation and remedial actions taken to date. The site developed an action plan and submitted it to CETESB in 2018 based on CETESB requirements. The site intervention plan primarily requires the site, amongst other actions, to conduct periodic monitoring for methane in soil vapors, source zone delineation, groundwater plume delineation, bedrock aquifer assessment, update the human health risk assessment, develop a current site conceptual model and conduct a remedial feasibility study and provide a revised intervention plan. In December 2019, the site submitted a report on the activities completed including the revised site conceptual model and results of the remedial feasibility study and recommended remedial strategy for the site. Other

Houghton environmental matters include participation in certain payments in connection with four currently active environmental consent orders related to certain hazardous waste cleanup activities under the U.S. Federal Superfund statute. Houghton has been designated a potentially responsible party ("PRP") by the Environmental Protection Agency along with other PRPs depending on the site, and has other obligations to perform cleanup activities at certain other foreign subsidiaries. These environmental matters primarily require the Company to perform long-term monitoring as well as operating and maintenance at each of the applicable sites.

The Company believes, although there can be no assurance regarding the outcome of other unrelated environmental matters, that it has made adequate accruals for costs associated with other environmental problems of which it is aware. Approximately $0.2 million was accrued as of December 31, 2019 and 2018, respectively, to provide for such anticipated future environmental assessments and remediation costs.

The Company is party to other litigation which management currently believes will not have a material adverse effect on the Company's results of operations, cash flows or financial condition. In addition, the Company has an immaterial amount of contractual purchase obligations.

Note 27 – Quarterly Results (unaudited)

	First Quarter (1)	Second Quarter (2)	Third Quarter (3)	Fourth Quarter (4)
2019				
Net sales	$ 211,210	$ 205,869	$ 325,130	$ 391,294
Gross profit	75,767	75,161	105,057	136,132
Operating income (loss)	19,829	20,531	(14,502)	20,276
Net income (loss) attributable to Quaker Chemical Corporation	13,844	15,591	(13,053)	15,240
Net income (loss) attributable to Quaker Chemical Corporation Common Shareholders - Basic (5)	$ 1.04	$ 1.17	$ (0.80)	$ 0.86
Net income (loss) attributable to Quaker Chemical Corporation Common Shareholders - Diluted (5)	$ 1.03	$ 1.17	$ (0.80)	$ 0.86
2018				
Net sales	$ 212,055	$ 221,962	$ 222,022	$ 211,481
Gross profit	75,447	80,937	81,093	74,838
Operating income	20,231	22,563	24,919	20,068
Net income attributable to Quaker Chemical Corporation	12,732	19,246	19,690	7,805
Net income attributable to Quaker Chemical Corporation Common Shareholders - Basic (5)	$ 0.96	$ 1.44	$ 1.48	$ 0.59
Net income attributable to Quaker Chemical Corporation Common Shareholders - Diluted (5)	$ 0.95	$ 1.44	$ 1.47	$ 0.58

(1) Net income attributable to Quaker Chemical Corporation for both the first quarters of 2019 and 2018 includes: earnings of $0.3 million and a loss of $0.4 million, respectively, from the Company's equity interest in a captive insurance company; total Houghton combination and other acquisition-related expenses of $5.4 million and $6.1 million, respectively; $0.9 million and $0.6 million, respectively of charges related to the non-service component of the Company's pension and postretirement net periodic benefit cost; and currency conversion impacts related to hyper-inflationary accounting of $0.2 million in both the first quarters of 2019 and 2018.

(2) Net income attributable to Quaker Chemical Corporation for both the second quarters of 2019 and 2018 includes: earnings from the Company's equity interest in a captive insurance company of $0.4 million and $1.0 million, respectively; total Houghton combination and other acquisition-related expenses of $5.5 million and $4.5 million, respectively; $0.9 million and $0.6 million, respectively, of charges related to the non-service component of the Company's pension and postretirement net periodic benefit cost and currency conversion impacts related to hyper-inflationary accounting of income of less than $0.1 million and charges of less than $0.1 million, respectively. Net income attributable to Quaker Chemical Corporation for the second quarter of 2019 also includes a $0.4 million charge related to a one-time, uncommon, customer settlement associated with the prior sale of non-core equipment, while net income attributable to Quaker Chemical Corporation for the second quarter of 2018 includes a tax adjustment of $1.2 million related to U.S. Tax Reform.

(3) The third quarter of 2019 includes two months of Houghton's operations as the Combination occurred on August 1, 2019. Net income (loss) attributable to Quaker Chemical Corporation for both the third quarters of 2019 and 2018 includes: earnings from the Company's equity interest in a captive insurance company of $0.5 million and $0.4 million, respectively; total Houghton combination and other acquisition-related expenses of $15.1 million and $3.8 million, respectively; $0.5 million and $0.6 million, respectively, of charges related to the non-service component of the Company's pension and postretirement net periodic benefit cost; currency conversion impacts of hyper-inflationary accounting of $0.7 million and $0.5 million, respectively; and tax benefits of $0.4 million and $1.1 million, respectively, related to U.S. Tax Reform. Net income (loss) attributable to Quaker Chemical Corporation for the third quarter of 2019 also includes $10.2 million related to an expense associated with selling inventory acquired in the Combination which was adjusted to fair value as a part of purchase accounting and $24.0 million of restructuring expense associated with the Company's global restructuring program initiated as part of the Company's plan to realize cost synergies associated with the Combination. Net income (loss) attributable to Quaker Chemical Corporation for the third quarter of 2018 also includes a $0.4 million foreign currency transaction gain related to the liquidation of an inactive legal entity.

(4) The fourth quarter of 2019 includes three months of Houghton's operations and three months of Norman Hay's operations as the Company closed the Combination on August 1, 2019 and acquired Norman Hay on October 1, 2019. Net income attributable to Quaker Chemical Corporation for both the fourth quarters of 2019 and 2018 includes: earnings of $0.6 million and a loss of $0.1 million, respectively, from the Company's equity interest in a captive insurance company; total Houghton combination and other acquisition-related expenses of $12.2 million and $5.1 million, respectively; $0.5 million and $0.6 million, respectively, of charges related to the non-service component of the Company's pension and postretirement net periodic benefit cost; other income of $0.1 million related to cash proceeds from an insolvent insurance carrier with respect to previously filed recovery claims by an inactive subsidiary of the Company in both periods; and currency conversion impacts related to hyper-inflationary accounting of a charge of $0.1 million and income of less than $0.1 million, respectively. Net income attributable to the fourth quarter of 2019 also includes: $2.6 million of restructuring expense associated with the Company's global restructuring program initiated as part of the Company's plan to realize cost synergies associated with the Combination; $1.1 million of costs associated with reserving for trade accounts receivable of certain customers who filed for bankruptcy protection; and $1.5 million related to an expense associated with selling inventory acquired with Norman Hay which was adjusted to fair value as a part of purchase accounting. Net income attributable to Quaker Chemical Corporation for both the fourth quarters of 2019 and 2018 also includes certain tax adjustments, including a deferred tax benefit on an intercompany intangible asset transfer of $5.3 million in the fourth quarter of 2019 and an $8.1 incremental tax charge related to U.S. Tax Reform in the fourth quarter of 2018.

(5) The Company's calculation of income (loss) attributable to Quaker Chemical Corporation Common Shareholders Basic and Diluted for the third and fourth quarters of 2019 were impacted by the approximately 4.3 million share issuance in connection with closing the Combination, comprising approximately 24.5% of the common stock of the Company, as well as the variability of its reported earnings in those periods. Therefore, the per diluted share result for each of the four quarters of 2019, as reported on a standalone basis, does not sum to the full year per diluted share result for the year ended December 31, 2019. Whereas, for the year ended December 31, 2018, basic and diluted per share amounts of net income attributable to Quaker Chemical Corporation common shareholders for all four quarters above does not total to the full year amounts presented in the Company's consolidated financial statements due to rounding.

Note 28 – Subsequent Events

Beginning in early 2020, there has been an outbreak of coronavirus (COVID-19), initially in China and which has spread to other jurisdictions, including locations where the Company does business. The full extent of the outbreak, related business and travel restrictions and changes to behavior intended to reduce its spread are uncertain as of the date of the Report as this continues to evolve globally. Therefore, the full extent to which coronavirus may impact the Company's results of operations, liquidity or financial position is uncertain. This outbreak has already had a material disruption on the operations of the Company and its suppliers and customers. Management continues to monitor the impact that the COVID-19 pandemic is having on the Company, the specialty chemical industry and the economies in which the Company operates. The Company anticipates that its future results of operations, including the results for 2020, will be materially impacted by the coronavirus outbreak, but at this time does not currently expect that the impact from the coronavirus outbreak will have a material effect on the Company's liquidity or financial position. However, given the speed and frequency of continuously evolving developments with respect to this pandemic, the Company cannot reasonably estimate the magnitude of the impact to its results of operations, and, if the outbreak continues on its current trajectory, such impacts could grow and become material to its liquidity or financial position. To the extent that the Company's customers and suppliers continue to be materially and adversely impacted by the coronavirus outbreak, this could reduce the availability, or result in delays, of materials or supplies to or from the Company, which in turn could materially interrupt the Company's business operations.

There were no other subsequent events which would require additional disclosures to the financial statements, except for those already disclosed throughout the Notes to Consolidated Financial Statements.

Item 9. ***Changes in and Disagreements With Accountants on Accounting and Financial Disclosure.***

Not Applicable.

Item 9A. ***Controls and Procedures.***

Conclusion Regarding the Effectiveness of Disclosure Controls and Procedures

As required by Rule 13a-15(b) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), our management, including our principal executive officer and principal financial officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Exchange Act) as of the end of the period covered by this report. Based on that evaluation, our principal executive officer and our principal financial officer have concluded that our disclosure controls and procedures were not effective as of December 31, 2019 because of the material weaknesses in our internal control over financial reporting, as described below.

Notwithstanding these material weaknesses, the Company has concluded that the consolidated financial statements included in this report present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows and changes in equity for each of the years in the three-year period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

Management’s Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Rule 13a-15(f) under the Exchange Act. Internal control over financial reporting is a process designed 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.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect all misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with the policies or procedures may deteriorate.

Our management, with the participation of our principal executive officer and principal financial officer, assessed the effectiveness of the Company’s internal control over financial reporting as of December 31, 2019. In making this assessment, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control—Integrated Framework (2013) (the “COSO framework”). A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis. Through the process of evaluating risks and corresponding changes to the design of existing or the implementation of new controls in light of the significant non-recurring transactions that occurred during 2019, including the Combination, we have identified certain deficiencies in our application of the principles associated with the COSO framework that management has concluded in the aggregate constitute a material weakness. We did not effectively design and maintain controls in response to the risks of material misstatement. Specifically, changes to existing controls or the implementation of new controls have not been sufficient to respond to changes to the risks of material misstatement to financial reporting. As a result of this deficiency in the design and implementation of an effective risk assessment, this material weakness contributed to certain control deficiencies that management has concluded result in the following additional material weaknesses: (i) we did not design and maintain effective controls over the review of pricing, quantity and customer data to verify that revenue recognized at certain smaller locations was complete and accurate, and (ii) we did not design and maintain effective controls over the reliability of data used to support the reasonableness of certain assumptions in the accounting for business combinations. These control deficiencies did not result in material misstatements to the related balances and disclosures for the year ended December 31, 2019. However, these control deficiencies could have resulted in misstatements of interim or annual consolidated financial statements and disclosures that could have resulted in a material misstatement that would not be prevented or detected. Accordingly, management has concluded that these control deficiencies constitute material weaknesses. Because of these material weaknesses, management concluded that the Company did not maintain effective internal control over financial reporting as of December 31, 2019.

Management has excluded the internal controls of Houghton and its affiliated entities, as well as Norman Hay and its affiliated entities from our assessment of internal control over financial reporting as of December 31, 2019, because these entities were acquired by the Company in a purchase business combination in August 2019 and October 2019, respectively. These excluded entities are wholly owned subsidiaries, whose total assets represent approximately 18% and 2%, respectively, and whose total revenues represent approximately 26% and 2%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2019.

The effectiveness of the Company’s internal control over financial reporting as of December 31, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which is included in “Item 8. Financial Statements and Supplementary Data.”

Plan for Remediation of Material Weakness

The Company and its Board of Directors are committed to maintaining a strong internal control environment. Management has begun developing the remediation plan to address the material weaknesses described above. The initial steps the Company has taken include identifying dedicated internal resources supplemented with third-party specialists to assist with formalizing a robust and detailed remediation plan and specifically completing an updated risk assessment, including identifying and assessing those risks attendant to the significant changes within the Company as a result of becoming a larger, more complex global organization as a result of the Combination.

The Company plans to conduct a comprehensive review, and, as applicable, update its existing internal control framework to ensure that it has identified, developed and deployed the appropriate business process and information technology general controls to meet the objectives and address the risks identified through the updated risk assessment process.

The Company is still developing its full remediation plan and is in the early phase of what will be a multi-step remediation process to completely and fully remediate the material weaknesses identified and described above.

Remediation of Previously Disclosed Material Weakness

As previously disclosed under **"Item 9A. *Controls and Procedures.*"** in the Company's Annual Report on Form 10-K/A for the year ended December 31, 2018, management previously identified a control deficiency in the Company's internal control over financial reporting and determined that this deficiency was a material weakness. Specifically, the Company did not design and maintain effective internal control over certain aspects of its information technology. We did not design and maintain effective internal controls related to (i) user access controls to adequately restrict user and privileged access to certain financial applications and data to the appropriate personnel, including ensuring appropriate segregation of duties as it relates to the preparation and review of journal entries and (ii) monitoring, documenting and approving system or data changes. This control deficiency did not result in a misstatement of the Company's consolidated financial statements. However, the control deficiency could have resulted in misstatements of the interim or annual consolidated financial statements and disclosures that would have resulted in a material misstatement that would not be prevented or detected. Therefore, management had concluded that this control deficiency constituted a material weakness.

Since identifying the material weakness, the Company's management has implemented its plan to remediate this control deficiency, including updating the Company's design, documentation and implementation of certain internal controls to address the previously identified control deficiency. Management has completed its documentation, testing and evaluation of the updated internal controls and determined that, as of December 31, 2019, these controls were operating effectively and have been operating effectively for a sufficient period to conclude, and management has concluded, that the previously identified material weakness has been remediated.

Changes in Internal Control Over Financial Reporting

As required by Rule 13a-15(d) under the Exchange Act, our management, including our principal executive officer and principal financial officer, has evaluated our internal control over financial reporting to determine whether any changes to our internal control over financial reporting occurred during the fourth quarter of the year ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Based on that evaluation, no such changes to our internal control over financial reporting occurred during the fourth quarter of the year ended December 31, 2019.

Item 9B. *Other Information.*

None.

PART III

Item 10. ***Directors, Executive Officers and Corporate Governance.***

Incorporated by reference is (i) the information beginning with and including the caption "Proposal 1—Election of Directors and Nominee Biographies" in Quaker Houghton's definitive Proxy Statement relating to the 2020 Annual Meeting of Shareholders, to be filed with the Securities and Exchange Commission no later than 120 days after the close of its fiscal year ended December 31, 2019 (the "2020 Proxy Statement") to, but not including, the sub-caption "Governance Committee Procedures for Selecting Director Nominees," (ii) the information appearing in Item 4(a) of this Report, (iii) the information in the 2020 Proxy Statement beginning with and including the caption, "Delinquent Section 16(a) Reports" to, but not including, the caption "Certain Relationships and Related Transactions," (iv) the information in the 2020 Proxy Statement beginning with and including the sub-caption "Code of Conduct" to, but not including, the caption "Compensation Committee Interlocks and Insider Participation," and (v) the information in the 2020 Proxy Statement beginning with and including the sub-caption "Shareholder Nominations and Recommendations" to, but not including, the sub-caption "Board Oversight of Risk."

Item 11. ***Executive Compensation.***

Incorporated by reference is (i) the information in the 2020 Proxy Statement beginning with and including the caption "Compensation Committee Interlocks and Insider Participation" to, but not including the caption, "Proposal 2 – Advisory Vote on Compensation of our Named Executive Officers," and (ii) the information in the 2020 Proxy Statement beginning with and including the caption "Executive Compensation" to but not including the caption "Stock Ownership of Certain Beneficial Owners and Management."

Item 12. ***Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.***

Incorporated by reference is the information in the 2020 Proxy Statement beginning with and including the caption "Stock Ownership of Certain Beneficial Owners and Management" to, but not including, the caption "Delinquent Section 16(a) Reports."

Equity Compensation Plans

The following table sets forth certain information relating to the Company's equity compensation plans as of December 31, 2019. Each number of securities reflected in the table is a reference to shares of Quaker common stock.

	Equity Compensation Plan Information		
Plan Category	**Number of securities to be issued upon exercise of outstanding options, warrants and rights**	**Weighted-average exercise price of outstanding options, warrants and rights**	**Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))**
	(a)	**(b)**	**(c)**
Equity compensation plans approved by security holders	144,412	$ 137.15	754,261 (1)
Equity compensation plans not approved by security holders	—	—	—
Total	144,412	$ 137.15	754,261 (1)

(1) As of December 31, 2019, 304,900 of these shares were available for issuance as restricted stock awards under the Company's 2001 Global Annual Incentive Plan, 382,963 shares were available for issuance upon the exercise of stock options and/or as restricted stock awards and/or restricted stock unit awards under the Company's 2016 Long-Term Performance Incentive Plan, and 66,398 shares were available for issuance under the 2013 Director Stock Ownership Plan.

Item 13. ***Certain Relationships and Related Transactions, and Director Independence.***

Incorporated by reference is (i) the information in the 2020 Proxy Statement beginning with and including the caption "Certain Relationships and Related Party Transactions" to, but not including, the caption "Proposal 3—Ratification of Appointment of Independent Registered Public Accounting Firm," (ii) the information in the 2020 Proxy Statement beginning with and including the sub-caption "Director Independence" to, but not including, the sub-caption "Governance Committee Procedures for Selecting Director Nominees," and (iii) the information in the 2020 Proxy Statement beginning with and including the caption "Meetings and Committees of the Board" to, but not including, the caption "Compensation Committee Interlocks and Insider Participation."

Item 14. ***Principal Accountant Fees and Services.***

Incorporated by reference is the information in the 2020 Proxy Statement beginning with and including the sub-caption “Audit Fees” to, but not including, the statement recommending a vote for ratification of the appointment of PricewaterhouseCoopers LLP as the Company’s independent registered public accounting firm for the year ending December 31, 2020.

PART IV

Item 15. ***Exhibits and Financial Statement Schedules.***

(a) Exhibits and Financial Statement Schedules

1. Financial Statements and Supplementary Data

Financial Statements:

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2. Financial Statement Schedules

All schedules are omitted because they are not applicable or the required information is shown in the financial statements or notes thereto. Financial statements of 50% or less owned companies have been omitted because none of the companies meets the criteria requiring inclusion of such statements.

3. Exhibits - filed pursuant to, and numbered in accordance with Item 601 of Regulation S-K (all of which are under Commission File number 001-12019, except as otherwise noted):

2.1 —	Share Purchase Agreement, dated April 4, 2017, by and among Quaker Chemical Corporation, a Pennsylvania corporation, Gulf Houghton Lubricants, Ltd., an exempted company incorporated under the laws of the Cayman Islands, Global Houghton Ltd., an exempted company incorporated under the laws of the Cayman Islands, and certain members of the management of Global Houghton Ltd. and Gulf Houghton Lubricants, Ltd., as agent for the Sellers. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on April 5, 2017. ***
3.1 —	Amended and Restated Articles of Incorporation (as amended through July 24, 2019). Incorporated by reference to Exhibit 3.1 as filed by the Registrant with its quarterly report on Form 10-Q on August 1, 2019.
3.2 —	By-laws (as amended and restated, effective May 6, 2015). Incorporated by reference to Exhibit 3.2 as filed by Registrant with Form 8-K filed on May 8, 2015.
4.1 —	Registration Rights, dated August 1, 2019, issued to certain members of the management of Global Houghton Ltd. and Gulf Houghton Lubricants, Ltd. by Quaker Chemical Corporation. Incorporated by reference to Exhibit 4.5 as filed by Registrant on Form S-3 on August 29, 2019.
4.2 —	Description of Quaker Houghton common stock.*
10.1 —	Settlement Agreement and Release between Registrant, an inactive subsidiary of the Registrant, and Hartford Accident and Indemnity Company dated December 12, 2005. Incorporated by reference to Exhibit 10 (nnn) as filed by the Registrant with Form 10-K for the year 2005.
10.2 —	Settlement Agreement and Release between Registrant, an inactive subsidiary of Registrant and Federal Insurance Company dated March 26, 2007. Incorporated by reference to Exhibit 10(zzz) as filed by the Registrant with Form 10-Q for the quarter ended March 31, 2007.
10.3 —	Claim Handling and Funding Agreement between SB Decking, Inc., an inactive subsidiary of Registrant, and Employers Insurance Company of Wausau dated September 25, 2007. Incorporated by reference to Exhibit 10(ffff) as filed by the Registrant with Form 10-Q for the quarter ended September 30, 2007.
10.4 —	Settlement Agreement and Mutual Release entered into between AC Products, Inc., wholly owned subsidiary of Registrant, and Orange County Water District, effective November 8, 2007. Incorporated by reference to Exhibit 10.47 as filed by the Registrant with Form 10-K for the year ended 2007.
10.5 —	Employment Agreement by and between Registrant and Michael F. Barry dated July 1, 2008. Incorporated by reference to Exhibit 10.5 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2008. †

10.6 — Change in Control Agreement by and between Registrant and Michael F. Barry dated July 1, 2008. Incorporated by reference to Exhibit 10.6 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2008. †

10.7 — Employment Agreement by and between L. Willem Platzer and Quaker Chemical B.V., a Netherlands corporation and a subsidiary of Registrant, dated August 21, 2006. Incorporated by reference to Exhibit 10 as filed by the Registrant with Form 8-K filed on August 22, 2006. †

10.8 — Change in Control Agreement by and between Registrant and L. Willem Platzer dated April 2, 2007, effective January 1, 2007. Incorporated by reference to Exhibit 10(aaaa) as filed by the Registrant with Form 10-Q for the quarter ended March 31, 2007. †

10.9 — Memorandum of Employment by and between Registrant and Joseph Berquist dated April 1, 2010. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q for the quarter ended March 31, 2010. †

10.10 — Change in Control Agreement by and between Registrant and Joseph Berquist dated April 1, 2010. Incorporated by reference to Exhibit 10.3 as filed by the Registrant with Form 10-Q for the quarter ended March 31, 2010. †

10.11 — Employment Agreement by and between Dieter Laininger and Quaker Chemical B.V., a subsidiary of the registrant, dated June 1, 2011, effective June 15, 2011. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2011. †

10.12 — Change in Control Agreement by and between Registrant and Dieter Laininger dated May 31, 2011, effective June 15, 2011. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2011. †

10.13 — Expatriate Agreement by and between the Registrant and Dieter Laininger, dated September 27, 2017, effective August 1, 2019. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†

10.14 — Expatriate Agreement by and between the Registrant and Adrian Steeples, dated October 12, 2017, effective August 1, 2019. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†

10.15 — Form of Memorandum of Employment by and between the Registrant and certain executive officers (including Robert Traub, Jeewat Bijlani, Kym Johnson and David Slinkman). Incorporated by reference to Exhibit 10.3 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†

10.16 — Form of Change of Control Agreement by and between the Registrant and certain executive officers (including Robert Traub, Jeewat Bijlani, Kym Johnson and David Slinkman). Incorporated by reference to Exhibit 10.4 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†

10.17 — Memorandum of Employment by and between Registrant and Mary Dean Hall, dated and effective November 30, 2015. Incorporated by reference to Exhibit 10.60 as filed by the Registrant with Form 10-K for the year ended 2015.†

10.18 — Change in control agreement by and between Registrant and Mary Dean Hall, dated and effective November 30, 2015. Incorporated by reference to Exhibit 10.61 as filed by the Registrant with Form 10-K for the year ended 2015. †

10.19 — Terms and Conditions of Employment by and between Quaker Chemical Ltd and Adrian Steeples, dated December 7, 2010. *†

10.20 — Amendment to Terms and Conditions of Employment by and between Quaker Chemical Ltd and Adrian Steeples, dated June 15, 2011. *†

10.21 — Supplemental Retirement Income Program (as amended and restated effective January 1, 2008), approved November 19, 2008. Incorporated by reference to Exhibit 10.58 as filed by the Registrant with Form 10-K for the year ended 2008. †

10.22 — 2013 Director Stock Ownership Plan as approved May 8, 2013. Incorporated by reference to Appendix B to the Registrant's definitive proxy statement filed on March 28, 2013. †

10.23 — Retirement Savings Plan, as amended and restated effective January 1, 2016. Incorporated by reference to Exhibit 10.62 as filed by the Registrant with Form 10-K for the year ended 2015. †

10.24 — Global Annual Incentive Plan (as amended and restated effective February 24, 2016). Incorporated by reference to Appendix B to the Registrant's definitive proxy statement filed on March 28, 2016. †

10.25 — 2011 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 31, 2011. †

10.26 — Form of Restricted Stock Unit Agreement for executive officers and other employees under Registrant's 2011 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended March 31, 2012. †

10.27 — 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 28, 2016. †

10.28 — Form of Restricted Stock Award Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.3 as filed by Registrant with Form 8-K filed on May 6, 2016. †

10.29 — Form of Restricted Stock Unit Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.4 as filed by Registrant with Form 8-K filed on May 6, 2016. †

10.30 — Form of Stock Option Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. *†

10.31 — Financing Agreement by and among Butler County Port Authority and Registrant and Brown Brothers Harriman & Co. dated May 15, 2008. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2008.

10.32 — Butler County Port Authority Industrial Development Revenue Bond dated May 15, 2008. Incorporated by reference to Exhibit 10.7 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2008.

10.33 — Senior Secured Credit Facilities Commitment Letter, dated April 4, 2017, by and among Quaker Chemical Corporation, Bank of America, N.A., Merrill Lynch, Pierce, Fenner & Smith Incorporated, Deutsche Bank AG New York Branch and Deutsche Bank Securities Inc. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on April 7, 2017.

10.34 — Amended and Restated Multicurrency Credit Agreement by and between Registrant and Bank of America, N.A. and certain other lenders dated June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2013.

10.35 — Amendment No. 1, dated as of May 23, 2017, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on May 25, 2017.

10.36 — Amendment No. 2, dated as of May 29, 2018, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on May 30, 2018.

10.37 — Amendment No. 3, dated as of August 1, 2018, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on August 3, 2018.

10.38 — Amendment No. 4, dated as of December 14, 2018, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on December 18, 2018.

10.39 — Amendment No. 5, dated as of March 13, 2019, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on March 15, 2019.

10.40 — Amendment No. 6, dated as of July 11, 2019, to the Amended and Restated Multicurrency Credit Agreement, dated as of June 14, 2013. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K, filed on July 12, 2019.

10.41 —	Credit Agreement, dated as of August 1, 2019, among Quaker Chemical Corporation and certain of its subsidiaries, Banks of America, N.A. and each of the lenders from time to time party thereto. Incorporated by reference to Exhibit 10.3 as filed by Registrant with Form 8-K filed on August 2, 2019. ***
10.42 —	Amendment No. 1, dated as of March 17, 2020, to the Credit Agreement, dated as of August 1, 2019. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K filed on March 17, 2020.
10.43 —	Shareholder Agreement, dated August 1, 2019, among Quaker Chemical Corporation, Gulf Hungary Holding Korlátolt Felelősségű Társaság, Gulf Oil International, Ltd. and GOCL Corporation Limited. Inc. Incorporated by reference to Exhibit 10.1 as filed by Registrant with Form 8-K filed on August 2, 2019.
10.44 —	Non-Competition and Non-Solicitation Agreement, dated as of August 1, 2019, among Quaker Chemical Corporation, Gulf Houghton Lubricants Ltd., Gulf Oil International, Ltd., GOCL Corporation Limited and Gulf Oil Lubricants India, Ltd. Incorporated by reference to Exhibit 10.2 as filed by Registrant with Form 8-K filed on August 2, 2019.***
10.45 —	Escrow Agreement, dated August 1, 2019, among Quaker Chemical Corporation, Gulf Houghton Lubricants, Ltd. and Citibank N.A. Incorporated by reference to Exhibit 4.4 as filed by Registrant on Form S-3 on August 29, 2019.***
21 —	Subsidiaries and Affiliates of the Registrant.*
23 —	Consent of Independent Registered Public Accounting Firm.*
31.1 —	Certification of Chief Executive Officer of the Company pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934.*
31.2 —	Certification of Chief Financial Officer of the Company pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934.*
32.1 —	Certification of Michael F. Barry pursuant to 18 U.S.C. Section 1350.**
32.2 —	Certification of Mary Dean Hall pursuant to 18 U.S.C. Section 1350.**
101.INS —	Inline XBRL Instance Document*
101.SCH —	Inline XBRL Taxonomy Extension Schema Document*
101.CAL —	Inline XBRL Taxonomy Calculation Linkbase Document*
101.DEF —	Inline XBRL Taxonomy Definition Linkbase Document*
101.LAB —	Inline XBRL Taxonomy Label Linkbase Document*
101.PRE —	Inline XBRL Taxonomy Presentation Linkbase Document*
104 —	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101.INS) *

* Filed herewith.
** Furnished herewith.
*** Certain exhibits and schedules have been omitted, and the Company agrees to furnish supplementally to the Securities and Exchange commission a copy of any omitted exhibits and schedules upon request.
† Management contract or compensatory plan

Item 16. *Form 10-K Summary.*

The Company has elected not to include a Form 10-K summary under this Item 16.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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.

QUAKER CHEMICAL CORPORATION
Registrant

By: /s/ MICHAEL F. BARRY

Michael F. Barry
Chairman of the Board, Chief Executive Officer and President

Date: March 20, 2020

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signatures	Capacity	Date
/s/ MICHAEL F. BARRY **Michael F. Barry** **Chairman of the Board, Chief Executive Officer and President**	Principal Executive Officer and Director	March 20, 2020
/s/ MARY DEAN HALL **Mary Dean Hall** **Senior Vice President, Chief Financial Officer and Treasurer**	Principal Financial Officer	March 20, 2020
/s/ SHANE W. HOSTETTER **Shane W. Hostetter** **Vice President, Finance and Chief Accounting Officer**	Principal Accounting Officer	March 20, 2020
/s/ DONALD R. CALDWELL **Donald R. Caldwell**	Director	March 20, 2020
/s/ ROBERT E. CHAPPELL **Robert E. Chappell**	Director	March 20, 2020
/s/ MARK A. DOUGLAS **Mark A. Douglas**	Director	March 20, 2020
/s/ JEFFRY D. FRISBY **Jeffry D. Frisby**	Director	March 20, 2020
/s/ WILLIAM H. OSBORNE **William H. Osborne**	Director	March 20, 2020
/s/ ROBERT H. ROCK **Robert H. Rock**	Director	March 20, 2020
/s/ FAY WEST **Fay West**	Director	March 20, 2020
/s/ SANJAY HINDUJA **Sanjay Hinduja**	Director	March 20, 2020
/s/ RAMASWAMI SESHASAYEE **Ramaswami Seshasayee**	Director	March 20, 2020
/s/ MICHAEL SHANNON **Michael Shannon**	Director	March 20, 2020

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Exhibit 4.2

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

The following is a general description of the common stock of Quaker Chemical Corporation and does not purport to be complete. For a complete description of the terms and provisions of the common stock, refer to the Company's Amended and Restated Articles of Incorporation and Amended and Restated Bylaws, each of which is an exhibit incorporated by reference into the Annual Report on Form 10-K of which this exhibit is a part. This summary is qualified in its entirety by reference to these documents.

As used in this Exhibit 4.2 “the Company,” “we,” “us,” or “our” means only Quaker Chemical Corporation and not any of its subsidiaries or associated companies.

Our authorized common stock consists of 30,000,000 shares of common stock, par value $1.00 per share.

Voting

Except as otherwise required by law or provided in any resolution adopted by our Board of Directors (the “Board”) with respect to any series of preferred stock, the holders of the common stock exclusively possess all voting power. Each holder of common stock is entitled to one vote per share on all matters requiring a vote of the shareholders, including the election of directors. We do not have cumulative voting rights. The presence, in person or by proxy, of the shareholders entitled to cast a majority of the votes which all shareholders are entitled to cast on a matter to be voted upon at a meeting of shareholders constitute a quorum, and the acts of such quorum, at a duly organized meeting of shareholders, constitute the acts of all the shareholders.

In an election of directors that is not a contested election, each director will be elected by the vote of the majority of the votes cast with respect to that director. The majority of the votes cast means that the number of votes cast “for” a nominee must exceed the number of votes cast “against” that nominee. In a contested election of directors, the candidates receiving the highest number of votes, up to the number of directors to be elected in such election, will be elected. Shareholders do not have the right to vote against a nominee in a contested election of directors.

Dividends

Subject to any preferential rights of any outstanding series of preferred stock designated by the Board from time to time, the holders of the common stock are entitled to dividends to the extent permitted by law, and upon a voluntary or involuntary liquidation, dissolution, distribution of assets on winding up of the Company are entitled to receive pro rata all of our assets available for distribution to such holders after distribution in full of any preferential amount to be distributed to holders of shares of preferred stock. There are no restrictions that currently limit the Company’s ability to pay dividends.

Rights and Preferences

The common stock has no preemptive or conversion rights or other subscription rights and there are no sinking fund or redemption provisions applicable to the common stock. For a description of the provisions of our articles of incorporation and bylaws that could have an effect of delaying, deferring or preventing a change in control of the Company, see the description below under the heading “Possible Antitakeover Effect of Certain Statutory, Charter and Bylaw Provisions.”

The rights, preferences and privileges of the holders of our common stock in general are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future. The Company currently has no preferred stock outstanding.

Fully Paid and Nonassessable

All outstanding shares of the common stock are validly issued, fully paid and nonassessable.

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Possible Antitakeover Effect of Certain Statutory, Charter and Bylaw Provisions

Certain provisions of Pennsylvania law, and of our articles of incorporation and bylaws, may have the effect of delaying, deferring or discouraging another person from acquiring control of our Company, including takeover attempts that might result in a premium over the market price for the shares of common stock and our other securities.

Pennsylvania Business Corporation Law

Subchapter 25F of the Pennsylvania Business Corporation Law of 1988, as amended, or the PBCL, generally prohibits certain business combinations of a registered corporation with an interested shareholder (i.e., a beneficial owner of 20% or more of the voting stock) of such corporation. A “registered corporation” generally is a Pennsylvania corporation that, like our Company, has a class of shares registered under the Exchange Act. The term “business combination” is broadly defined to include most merger, consolidation and similar transactions as well as transfers of substantial amounts of assets. Subchapter 25F places a five-year moratorium on most business combinations between a registered corporation and an interested shareholder or its affiliates and associates. The five-year period begins on the date that the interested shareholder crosses the 20% threshold, known as the “share acquisition date.” Because we have not elected to “opt out” from the application of Subchapter 25F by means of an amendment to our articles of incorporation or bylaws, the provisions of Subchapter 25F would apply to any business combination involving our Company and an interested shareholder.

There are limited exceptions to the five-year moratorium on business combinations with interested shareholders. First, if either the business combination itself, or the applicable interested shareholder’s crossing the 20% threshold, is approved by the corporation’s board prior to the applicable interested shareholder’s share acquisition date, such business combination, or other business combinations with that interested shareholder, would be exempt from the application of Subchapter 25F. In addition, business combinations approved by a majority of the votes of all shareholders other than the interested shareholder, at a meeting held at least three months after the interested shareholder acquires at least 80% of the corporation’s outstanding voting stock, will likewise be exempt if, among other tests, the other shareholders receive in the business combination an aggregate amount of per share consideration equal to at least the highest per share price paid by the interested shareholder over the previous five years, plus a specified amount of interest.

Even following the expiration of the five-year moratorium, a business combination with an interested shareholder must still either be approved by a majority of the shares not held by the interested shareholder, or provide to the other shareholders per share compensation that meets the highest price per share test referred to above.

The PBCL also provides for additional anti-takeover provisions regarding registered corporations relating to:

- “control transactions,” under which shareholders can require an interested shareholder to buy their shares for “fair value,” as defined in the PBCL;

- “control share acquisitions,” under which interested shareholders lose their voting rights until such rights are restored by, among other requirements, the affirmative vote of a majority of the “disinterested shares,” as defined in the PBCL; and

- “disgorgements,” under which interested shareholders (or persons that announce an intention to become an interested shareholder) can be required to disgorge certain profits from trading in the registered corporation’s stock.

Because we have specifically opted out of these various additional PBCL provisions pursuant to bylaw amendments as provided in the relevant sections of the PBCL, none of these provisions currently would apply to us or to a non-negotiated attempt to acquire control of our Company, although such an attempt would still be subject to the various requirements in our articles of incorporation as described below. Moreover, we can reverse the “opt out” from one or more of these provisions by means of a bylaw amendment adopted by our Board, without shareholder approval, after which the PBCL provisions or provisions for which we reversed the “opt out” would then apply to an attempt to acquire control of our Company.

Under Section 1715 of the PBCL, our directors are not required to regard the interests of the shareholders as being dominant or controlling in considering our best interests. The directors may consider, to the extent they deem appropriate, factors including:

- the effects of any action upon any group affected by such action, including our shareholders, employees, suppliers, customers and creditors, and communities in which we have offices or other establishments,

- our short-term and long-term interests, including benefits that may accrue to us from our long-term plans and the possibility that these interests may be best served by our continued independence,

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- the resources, intent and conduct (past, stated and potential) of any person seeking to acquire control of us, and

- all other pertinent factors.

Articles of Incorporation

"Blank Check" Preferred Stock." Our Board is authorized by our articles of incorporation to designate and issue, without shareholder approval, preferred stock with such terms as our Board may determine. This ability to issue what is commonly referred to as "blank check" preferred stock, or rights to acquire preferred stock, may have the effect of delaying, deferring or preventing a change of control of our Company or an unsolicited acquisition proposal.

Business Combinations with Related Persons. Article 10 of our articles of incorporation ("article 10") prohibits us from engaging in a "Business Combination" with a "Related Person" unless:

- our "Continuing Directors" by a two-thirds vote have expressly approved the Business Combination either in advance of or subsequent to the acquisition of outstanding shares of our voting stock that caused the Related Person to become a Related Person; or

- each of the following conditions is satisfied:

- the aggregate amount of the cash and the fair market value, as determined by two-thirds of our Continuing Directors, of the property, securities or other consideration to be received (including, without limitation, the Company common stock or other capital stock of the Company retained by shareholders of the Company other than Related Persons or parties to such Business Combination in the event of a Business Combination in which the Company is the surviving entity) per share of our capital stock in the Business Combination by holders of capital stock, other than the Related Person involved in the Business Combination, is not less than the "Highest Per Share Price" or the "Highest Equivalent Price" paid by the Related Person in acquiring any of its holdings of our capital stock; and

- a proxy or information statement complying with the requirements of the Exchange Act, and the rules and regulations thereunder (or any subsequent provisions replacing such Act, rules or regulations) and with the provisions of article 10 has been mailed to all shareholders of the Company at least 30 days prior to the consummation of the Business Combination (whether or not the proxy or information statement is required to be mailed pursuant to such Act or subsequent provisions). The proxy or information statement contains at the front thereof, in a prominent place, the position of the Continuing Directors as to the advisability (or inadvisability) of the Business Combination and, if deemed advisable by a majority of the Continuing Directors, the opinion of an investment banking firm selected by the Continuing Directors as to the fairness of the terms of the Business Combination from the point of view of the holders of the outstanding shares of capital stock of the Company other than any Related Person.

"Business Combination" means (i) any merger or consolidation of the Company or a subsidiary of the Company into or with a Related Person, in each case irrespective of which corporation or company is the surviving entity; (ii) any sale, lease, exchange, mortgage, pledge, transfer or other disposition to or with a Related Person (in a single transaction or a series of related transactions) of all or a Substantial Part of the assets of the Company (including without limitation any securities of a subsidiary) or of a subsidiary of the Company; (iii) any sale, lease, exchange, mortgage, pledge, transfer or other disposition to or with the Company or to or with a subsidiary of the Company (in a single transaction or series of related transactions) of all or a Substantial Part of the assets of a Related Person; (iv) the issuance of any securities of the Company or of a subsidiary of the Company to a Related Person (other than an issuance of securities which is effected on a pro rata basis to all shareholders of the Company); (v) any recapitalization or reclassification of securities (including any reverse stock split) of the Company which would have the effect, directly or indirectly, of increasing the proportionate share of the outstanding Voting Stock of the Company owned by a Related Person; (vi) the adoption of any plan or proposal for the liquidation or dissolution of the Company proposed by or on behalf of a Related Person; and (vii) the acquisition by the Company or by a subsidiary of the Company of any securities of a Related Person.

"Related Person" means any individual, corporation, partnership or other person or entity (other than any subsidiary of the Company and other than any profit-sharing, employee stock ownership or other employee benefit plan of the Company or a subsidiary of the Company) which, as of the record date for the determination of shareholders entitled to notice of and to vote on any Business Combination, or immediately prior to the consummation of such transaction, together with its "Affiliates" and "Associates" (as defined in Rule 12b-2 of the General Rules and Regulations under the Securities Exchange Act of 1934 as in effect at the date of the

adoption of article 10 by the shareholders of the Company (collectively and as so in effect, the “1934 Act”)), are “Beneficial Owners” (as defined in Rule 13d-3 of the 1934 Act) in the aggregate of ten (10%) percent or more of the outstanding shares of Voting Stock of the Company, and any Affiliate or Associate of any such individual, corporation, partnership or other person or entity. Without limitation, any shares of Voting Stock of the Company that any Related Person has the right to acquire at any time (notwithstanding that Rule 13d-3 of the 1934 Act deems such shares to be beneficially owned only if such right may be exercised within 60 days) pursuant to any agreement, or upon exercise of conversion rights, warrants or options, or otherwise, will be deemed to be beneficially owned by the Related Person and to be outstanding for purposes of the definition of the term Related Person.

“Substantial Part” means assets having a fair market value, as determined by two-thirds of the Continuing Directors, of more than twenty (20%) percent of the total consolidated assets of the Company and its subsidiaries taken as a whole, as of the end of its most recent fiscal year ending prior to the time the determination is being made.

“Voting Stock” means all outstanding shares of capital stock of the Company entitled to vote generally in the election of directors and each reference to a proportion of Voting Stock refers to such proportion of the votes entitled to be cast by such shares.

“Continuing Director” means a director who was a member of the board of directors of the Company at the date of the adoption of article 10 by the shareholders of the Company, together with each director who either (i) was a member of the Company’s board of directors immediately prior to the time that the Related Person involved in a Business Combination became the Beneficial Owner of ten (10%) percent of the Voting Stock of the Company, or (ii) was designated (before his or her initial election as director) as a Continuing Director by a majority of the then Continuing Directors.

Under article 10, a Related Person is deemed to have acquired a share of the Voting Stock of the Company at the time the Related Person became the Beneficial Owner thereof. With respect to the shares owned by Affiliates, Associates or other persons whose ownership is attributed to a Related Person under the foregoing definition of Related Person, if the price paid by such Related Person for such shares is not determinable by the Continuing Directors, the price so paid will be deemed to be the higher of (i) the price paid upon the acquisition thereof by the Affiliate, Associate or other person or (ii) the market price of the shares in question at the time when the Related Person became the Beneficial Owner thereof.

“Highest Per Share Price” and “Highest Equivalent Price,” as used in article 10 mean the following: If there is only one class of capital stock of the Company issued and outstanding, the Highest Per Share Price means the highest price that can be determined to have been paid at any time by the Related Person for any share or shares of that class of capital stock. If there is more than one class of capital stock of the Company issued and outstanding, the Highest Equivalent Price means with respect to each class and series of capital stock of the Company, the amount determined by two-thirds of the Continuing Directors, on whatever basis they believe is appropriate, to be the highest per share price equivalent of the highest price that can be determined to have been paid at any time by the Related Person for any share or shares of any class or series of capital stock of the Company. In determining the Highest Per Share Price and Highest Equivalent Price, appropriate adjustments will be made for recapitalizations and for stock splits, stock dividends and like distributions or transactions, and all purchases by the Related Person will be taken into account regardless of whether the shares were purchased before or after the Related Person became a Related Person. Also, the Highest Per Share Price and the Highest Equivalent Price will include any brokerage commissions, transfer taxes and soliciting dealers’ fees paid by the Related Person with respect to the shares of capital stock of the Company acquired by the Related Person. Article 10 provides that, in the case of any Business Combination with a Related Person, the Continuing Directors should determine the Highest Equivalent Price for each class and series of the capital stock of the Company.

Classified Board of Directors. In accordance with the provisions of our articles of incorporation, our Board is divided into three classes with each class elected to serve for a three-year term and the terms of the classes staggered so that only one class of directors is elected each year. The fact that only one class of our Board’s directors is elected each year could have the effect of making it more difficult for a third party to acquire, or of discouraging a third party from attempting to acquire, control of our Company.

Removal of Directors. Our articles of incorporation provide that a director may be removed with or without cause only by the affirmative vote of the holders of at least eighty (80%) percent of the outstanding shares of capital stock of the Company entitled to vote generally in the election of directors, voting together as a single class.

Super Majority Vote Required to Amend Certain Provisions of the Articles of Incorporation. The Pennsylvania corporate law provides generally that the affirmative vote of a majority of the votes cast by all shareholders entitled to vote is required to amend a corporation’s articles of incorporation, unless the corporation’s articles of incorporation require a greater percentage. Our articles of incorporation provide that any amendment of the provisions of article 8 (relating to our Board, including the division of the Board into three classes), article 9 (relating to special meetings of shareholders) or article 10 (relating to certain transactions with related parties, including mergers, consolidations or sales or other dispositions of all or a substantial part of our assets) requires an affirmative vote of 80% of the votes entitled to be cast on the matter. The 80% shareholder vote would be in addition to any separate class vote that might

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in the future be required pursuant to the terms of any series of preferred stock that might be outstanding at the time any amendment to our articles of incorporation is submitted to shareholders.

Bylaw Provisions

Authority to Fill Board Vacancies. Under our bylaws, any vacancy on our Board, however occurring, including a vacancy resulting from an enlargement of our Board, may be filled by vote of a majority of our directors then in office, even if less than a quorum. The authority of the remaining members of our Board to fill vacancies could have the effect of making it more difficult for a third party to acquire, or of discouraging a third party from attempting to acquire, control of our Company.

Calling of Special Meeting. Our bylaws provide that special meetings of the shareholders may only be called by the chairman of the Board, the president or the Board, or by shareholders entitled to cast not less than four-fifths of the votes which all shareholders are entitled to cast at the meeting. The limited ability of our shareholders to call a special meeting of the shareholders may have the effect of making it more difficult for a third party to acquire, or of discouraging a third party from attempting to acquire, control of our Company.

Advance Notice Procedures. Our bylaws establish an advance notice procedure for shareholder proposals to be brought before an annual meeting of our shareholders, including proposed nominations of persons for election to the Board. Shareholders at an annual meeting will only be able to consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of the chairman of the Board, the president or the Board or by a shareholder who was a shareholder of record at the time of giving notice, entitled to vote at the meeting, and who has given our secretary timely written notice, in proper form, of the shareholder’s intention to bring that business before the meeting. These provisions may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed or may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect its own slate of directors or otherwise attempting to obtain control of our Company.

Amendment of the Bylaws. Our bylaws provide that our bylaws may be altered, amended or repealed by the affirmative vote of a majority of our shareholders entitled to vote or a majority of our directors then in office without prior notice to or approval by our shareholders. Accordingly, our Board could take action to amend our bylaws in a manner that could have the effect of delaying, deferring or discouraging another party from acquiring control of the Company.

These and other provisions contained in our articles of incorporation and bylaws could delay or discourage transactions involving an actual or potential change in control of us or our management, including transactions in which shareholders might otherwise receive a premium for their shares over then current prices. Such provisions could also limit the ability of shareholders to remove current management or approve transactions that shareholders may deem to be in their best interests and could adversely affect the price of our common stock.

Exhibit 10.19

STRICTLY PRIVATE & CONFIDENTIAL

7th December 2010

Mr Adrian Steeples
Pentle House
Shenstone Hill
Berkhampstead
Hertfordshire
HP4 2PA

Dear Mr Steeples,

TERMS AND CONDITIONS OF EMPLOYMENT

The following Terms and Conditions of Employment will apply to your employment with Quaker Chemical Limited ("the Company") as at the date of issue. They are given to you pursuant to the Employment Protection (Consolidation) Act 1978.

1. DATE OF COMMENCEMENT

1.1 Your period of employment commences on 1st January 2011.

1.2 Normally the first 3 months of your employment would be on a probationary basis, but as you have been employed on a temporary basis since 1st April 2010 this requirement is waived.

2. DUTIES

2.1 You will be employed in the capacity of Industry Business Manager - Metalworking and you will perform all acts, duties and obligations and comply with such orders as may be designated by the Company which are reasonably consistent with the above mentioned capacity.

2.2 You are required to comply with all the Company's rules, regulations and policies from time to time in force.

3. HOURS OF WORK

3.1 Your basic hours of work comprise 35 hours per week excluding one hour for lunch to be taken at a mutually agreed time. Normal working hours are Monday to Friday 9.00 am to 5.00 pm.

3.2 It will also be necessary for you to work additional hours by way of overtime either, as and when requested to do so by the Company, or when the proper performance of your work so requires.

3.3 You are not entitled to be paid additional remuneration for any such overtime worked. Time off in lieu of overtime worked will not be permitted.

4. PLACE OF WORK

4.1 You place of work will be your home address but you will have use of the Company's office located at Unit 6 Brunel Way, Stroudwater Business Park, Stonehouse, Glos. GL10 3SX, whenever necessary and you may be required to work at any other premises which the Company currently has or may later acquire.

5. REMUNERATION AND EXPENSES

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5.1 Your gross annual base salary will be a figure based on the 2010 basic salary of £120,000.00 plus any Inflation increase that may be applied, effective as from 1st January 2011.

In addition to your base salary you will be entitled to participate in the Global Annual Incentive Plan, which allocates a bonus fund, dependent on profits of the global corporation being above predetermined levels, which are announced at the beginning of each year. Your entitlement is up to a maximum amount of 40% of your basic salary, and is apportioned according to months worked in any year. Further details of this scheme will be provided to you in due course. Payments are made annually in March following auditing of the company's yearly results which runs from January - December.

Salaries are payable monthly in arrears by Bank Giro Credit Transfer on the last working day of the month.

5.2 You will be paid a monthly lump sum of £400, in lieu of the entitlement to a company car, payable with your monthly salary and taxed accordingly.

5.3 You will also be reimbursed for any business mileages at 19p per mile and other reasonable expenses properly incurred by you while performing your duties on behalf of the Company, subject to your producing receipts in respect of such expenses, when required by the Company.

6. HOLIDAYS

6.1 In addition to the Statutory, Bank and Public holidays normally applicable in England, you are also entitled to 28 working days paid holiday in each complete calendar year.

6.2 Holiday entitlement will accrue at a pro-rata rate for each complete month of service. If, on the termination of your employment, you have exceeded your accrued entitlement for the relevant calendar year, this excess will be deducted from your final payment. If you have holiday entitlement still owing, the Company will pay you a sum in lieu of accrued holiday. If you have holiday entitlement still owing, the Company may, at its sole discretion, require you to take your holiday during your notice period or pay you a sum in lieu of accrued holiday.

6.3 You must obtain the prior approval of your manager before booking holiday dates. Not more than two weeks may be taken at any one time, save at the Company's discretion.

6.4 Holiday entitlement for one calendar year must be taken before 1 February of the following calendar year. Failure to do so will result in forfeiture of such accrued holiday not taken.

7. SICKNESS

7.1 In the event of your being absent from work due to sickness or injury, the Company will continue to pay your basic salary (inclusive of any Statutory Sick Pay to which you may be entitled) up to the maximum specified below.

Length of Service	Sick Pay Maximum
Less than 1 year	2 weeks
1 year	1 month
2 years	6 weeks
3 years	2 months
4 years	3 months

"Sick Pay" will be based on your basic salary less any state benefits payable to you on account of your sickness or injury, less normal deductions for tax etc.

7.2 Irrespective of Clause 7.1 above, you will receive Statutory Sick Pay (SSP) when you qualify for it. This will normally be payable where:

7.2.1 you have waited three "qualifying days" (i.e. any day from Monday to Friday) in that period of incapacity from work without receiving SSP, **AND**

7.2.2 the day for which SSP is claimed is a "qualifying day".

7.3 Where Company sick pay (under Clause 7.1) and SSP are payable for the same day of sickness, you will receive the higher of the two sums.

Click here to enter text.

7.4 You will in cases of absence notify the Company on the first morning of the reason for any absence and its anticipated duration. If you are away sick for more than seven consecutive days (including Saturdays and Sundays and Bank Holidays), then a medical certificate must be produced to the Company. Thereafter medical certificates should be submitted regularly to cover the full period of absence. On each occasion a medical certificate expires and you do not anticipate you will be returning to work, you must notify the Company on the first morning following the expiry of the medical certificate.

7.5.1 You are also required to complete the Company's Absence Notification Form for all absences (regardless of duration) and submit it to the SDO Admin.

8 PENSION & LIFE INSURANCE

The Company operates a contributory occupational pension scheme, which you would be eligible to join but you have opted to take a monthly allowance of £820 in lieu of this benefit, payable with your normal monthly salary and taxed accordingly.

9. MEDICAL HEALTH

As you have already undergone a full medical examination, prior to your temporary employment, this requirement is waived.

10. PRIVATE HEALTH SCHEME

The Company also provides, at its own expense, a Private Health Scheme, which would cover only yourself, and which you would be eligible to join following your “Probationary Period”.

11. RETIREMENT

The normal age of retirement is 65 years.

12. PROTECTIVE CLOTHING

The Company issues suitable protective clothing free on loan for your use. The clothing remains the property of the Company and may not be taken off the Company's premises without permission. It must be returned to the Company on termination of your employment.

13. EXCLUSIVITY OF SERVICE

13.1 You are required to devote your full time, attention and abilities to your job duties during working hours, and to act in the best interests of the Company at all times.

13.2 You must not, without the written consent of the Company, be in any way directly or indirectly actively engaged or concerned in any other business or undertaking where this is or likely to be in conflict with the interests of the Company.

14. GRIEVANCE PROCEDURE

If you are unhappy about any aspect of your employment with the Company you should raise the matter in the first instance with your manager. If you are still unhappy, you should take up the grievance with the Regional HR Manager, who will then have the final decision.

15. DISCIPLINARY RULES AND PROCEDURE

The Company expects and will enforce reasonable standards of conduct and performance from its employees. Details of the Company's disciplinary rules and procedure can be obtained from SDO Admin.

16. CONFIDENTIAL INFORMATION

16.1 You shall not, except as authorised or required by your duties hereunder, use for your own benefit or gain or reveal to any other person(s), firm, company or other organisation whatsoever, any confidential information belonging to the Company or any Associated Company or relating to the affairs or dealings of the Company or any Associated Company (including but not limited to any trade secrets, business developments, marketing plans, financing plans, general finances, pricing structures, dealings, transactions or affairs of the Company or any Associated Company) which may come to your knowledge during your employment. You shall treat the same with complete secrecy.

This restriction shall continue to apply after the termination of your employment without limitation in time, but shall cease to apply to any information or knowledge which may subsequently come into the public domain, other than by way of unauthorised disclosure.

16.2 All records, documents, specifications, formulations, lists and other papers (together with any copies or extracts thereof) made or acquired by you in the course of your employment shall be the property of the Company and must be returned on the termination of your employment. The copyright in all such records, documents and papers shall at all times belong to the Company.

17. RESTRICTIONS ON TERMINATION OF EMPLOYMENT

17.1 The following expressions shall have the meanings set out below:

17.1.1 "The Territory" shall mean:

(i) England
(ii) Wales
(iii) Scotland
(iv) Northern Ireland
(v) Any other country where the Company develops, sells, supplies, manufactures, services or researches its products or services, or where the company is intending to within 3 months following the Termination Date of your contract to develop, sell, supply, manufacture, service or research its products or services and in respect of which the temporary employee has been responsible, whether alone or jointly with others, concerned or active on behalf of the Company during any part of the twelve months immediately preceding the Termination Date of your contract.

17.1.2 "The Products" shall mean products manufactured, supplied, serviced, researched, developed, marketed or sold by the Company as at the Termination Date with which you were materially concerned or for which you were responsible or about which you held confidential information at any time during the twelve months preceding the Termination Date.

17.1.3 “The Services” shall mean services supplied, researched, developed, marketed or sold by the Company as at the Termination Date with which you were materially concerned or for which you were responsible or about which you held confidential information at any time during the twelve months preceding the Termination Date.

17.1.4 "Termination Date" shall mean the date on which your employment terminates for whatever reason.

17.2 You will not for a period of 12 months following the Termination Date (less any time during which the Company has exercised its right to require you not to perform your duties or to perform only some of your duties under clause 19.3 below) and whether on your own behalf or on behalf of any other person, firm, company, or other organisation, and whether as an employee, principal, agent, consultant or in any other capacity whatsoever:

17.2.1 be directly or indirectly employed, engaged, or in any way involved, in the Territory, in competition with the Company in the manufacture, supply, service, development, research, marketing or sale of any product which competes with or is similar to the Products or any of them or the supply, research, development or marketing of any service which competes with or is similar to the Services or any of them; or

17.2.2 be directly or indirectly engaged in any business or employment involving or which might reasonably be expected to involve the exploitation or use of any confidential discovery, invention or improvement or any secret formula or other confidential information of which you acquired knowledge in the course of your employment; or

17.2.3 directly or indirectly solicit or assist in soliciting or accept or facilitate the acceptance of or deal with the custom or business of any person, firm, company or other organisation who in the year immediately preceding the Termination Date was:

(i) a customer of the Company with whom you had material dealings or for whom you were responsible on behalf of the Company; or

(ii) a prospective customer of the Company with whom you had material dealings or for whom you were responsible on behalf of the Company;

17.2.4 directly or indirectly induce or solicit or entice or procure any person who is a Company Employee to leave the Company’s or any Associated Company’s employment, as applicable, or be personally involved to a material extent in accepting into employment or otherwise engaging or using the services of any person who is a Company Employee. Company Employee for

this purpose means any person who was employed by the Company or any Associated Company for at least three months prior to and on the Termination Date and with whom you had material contact or dealings in performing your duties of employment or about whom you held confidential information: and

(i) who had material contact with customers or suppliers of the Company in performing his or her duties of employment with the Company or any Associated Company as applicable; or

(ii) who was either a member of the management team of the Company or any Associated Company as applicable; or

(iii) who was a member of the Research and Development Department of the Company or any Associated Company as applicable.

18. COPYRIGHT, INVENTIONS AND PATENTS

18.1 You acknowledge and agree that by virtue of the nature of your duties hereunder and the responsibilities arising you have a special obligation to further the interests of the Company within the meaning of Section 39 (1) (b) of the Patents Act 1977 ("the said Act").

18.2 Any invention, development, process or other matter or work whatsoever (collectively "the inventions") made, developed or discovered by you either alone or in concert, whilst you are employed by the Company shall forthwith be disclosed to the Company and subject to Section 39 of the said Act shall belong to and be the absolute property of the Company or such Associated Company as the Company may designate.

18.3 With respect to those rights in the inventions (collectively "Employee Rights") which do not belong to the Company pursuant to Clause 17.2, you shall at the request and cost of the Company (and notwithstanding the termination of your employment) forthwith license to the Company the Employee Rights and shall deliver to the Company all documents and other materials relating to the inventions. The Company shall pay you such compensation for the licence as the Company shall determine in its sole discretion subject to Section 40 of the said Act.

18.4 You shall at the request and cost of the company (and notwithstanding the termination of your employment) sign and execute all such documents and do all such acts as the Company may reasonably require:

18.4.1 to apply for and obtain in the sole name of the Company (unless the Company otherwise directs) patent, registered design or other protection of any nature whatsoever in respect of the Inventions in any country throughout the world and, when so obtained or vested, to renew and maintain the same;

18.4.2 to resist any objection or opposition to obtaining, and any petitions or applications for revocation of any such patent, registered design or other protection; and to bring any proceedings for infringement of any such patent, registered design or other protection.

18.5 The company shall decide, in its sole discretion, whenever to apply for patent, registered design or other protection in respect of the inventions as a secret process in which event you shall observe the obligations relating to the confidential information which are contained in Clause 15 of this Agreement.

19. DEFINITION OF "ASSOCIATED COMPANY"

In this Agreement an "Associated Company" includes any firm, company corporation or other organisation which;

19.1 is directly or indirectly controlled by the Company; or

19.2 directly or indirectly controls the Company; or

19.3 is directly or indirectly controlled by a third party who also directly or indirectly controls the Company.

20. TERMINATION OF EMPLOYMENT

20.1 Your contract of employment is terminable by yourself or by the Company on either giving three month's written notice.

20.2 The Company reserves the right to terminate your contact without any notice if it has reasonable grounds to believe you are guilty of gross misconduct or gross negligence.

20.3 During the unexpired period of your fixed term employment the Company may at its absolute discretion require you:

20.3.1 not to attend at your place of work or at any other premises of the Company or its Associated Companies; or

20.3.2 not to undertake any or any part of your duties and/or to carry out different duties of which you are reasonably capable and which are consistent with your seniority in place of your normal duties; or

20.3.3 not to communicate with any customers, suppliers, employees or officers of the Company or its Associated Companies.

20.4 During any such period when the Company exercise its discretion as set out in clause 20.3 above “Garden Leave Period” the Company will continue to pay your salary and contractual benefits excluding any bonus entitlement relating to the Garden Leave Period and all other terms of your employment with the Company will continue including without limitation your obligations of good faith, fidelity, confidentiality, your fiduciary duties and all of your express and implied obligations. Any holiday entitlement which has accrued at the start of the Garden Leave Period and any holiday entitlement which accrues during the Garden Leave period will be deemed to be taken during the Garden Leave Period.

20.5 The Company may at its discretion appoint another employee of officer to carry out some or all of your duties during any Garden Leave period.

21. SUBSTITUTION FOR ANY PREVIOUS AGREEMENT

This Agreement cancels and is in substitution for all previous letter of engagement, agreements and arrangements whether oral or in writing relating to the subject matter hereof between the Company and yourself, all of which shall be deemed to have been terminated by mutual consent.

22. PRIOR OR CURRENT THIRD PARTY AGREEMENTS

You represent and warrant that the execution of this agreement your employment hereunder and your performance of the work under this Agreement do not violate or are not prevented or constrained in any way by any prior or current agreement or contract that you may have with any third party whatsoever.

Yours sincerely

/s/ Mike Flower

Mike Flower
Finance & Site Manager
Company Secretary
QUAKER CHEMICAL LTD

I agree with the Terms and Conditions of my Employment as set out above or incorporated in the Company's written policies from time to time in force.

Signed : /s/ A. Steeples

Adrian Steeples

Date : 9/12/2010

Click here to enter text.

Exhibit 10.20

Mr A Steeples
Pentle House
Shenstone Hill
Berkhampstead
Hertfordshire
HP4 2PA

15th June 2011

Dear Adrian

Referring to recent discussions, we hereby confirm that effective from 1st July 2011 your contract of employment dated 7th December 2010 will be amended as detailed below.

Remuneration & Expenses

With effect from 1st January 2012, for the purpose of your employment, a suitable motor car will be provided. Currently company cars are leased, on a total costs contract, and for your grade you will be able to choose a category 2 car with a current maximum monthly cost of £900 exclusive of VAT.

Also with effect from 1st January 2012 the payment of £400 per month detailed in paragraph 5.2 and the reimbursement of business mileage at 19p per mile detailed in paragraph 5.3 of your original contract will be stopped.

Pension & Life Assurance

You will now be eligible to join the Company contributory occupational pension scheme, and the monthly allowance of £800 detailed in paragraph 8 of your original contract will stop with effect from the first day of the month when you join the scheme.

All other employment conditions and all company rules and practices will remain unchanged.

Would you please sign one copy of this letter, to confirm your agreement to the changes, and return it to myself.

Yours sincerely,

For agreement:

/s/ Mike Flower

Mike Flower
Finance & SDO Manager
Company Secretary
Quaker Chemical Ltd

A Steeples ______/s/ A. Steeples______

Date Signed ______19/7/2011______

Click here to enter text.

Exhibit 10.30

STOCK OPTION AGREEMENT

1. A Stock Option (the "Option") for a total of _____ shares of $1.00 par value per share Common Stock (the "Stock") of Quaker Chemical Corporation, a Pennsylvania corporation (the "Company"), is hereby granted to ___________ (the "Optionee"), subject to the terms and provisions of the Quaker 2016 Long-Term Performance Incentive Plan (the "Plan") insofar as the same are applicable to Stock Options granted thereunder. The terms and provisions of the Plan are incorporated herein by reference.

2. The Option Price as determined by the Compensation/Management Development Committee (the "Committee") which has the authority for administering the Plan for the Company is $______ per share, having been determined pursuant to Section 3.2 of the Plan, which is equal to 100% of the Fair Market Value (as defined in the Plan) of the Stock on the date of the grant of the Option.

3. Subject to the provisions of Paragraphs 4 and 5 hereof, the Option may be exercised in whole at any time or in part from time to time on or after the date the Option, or any portion thereof, first becomes exercisable. The Option terminates on the earlier of the date when fully exercised under the provisions of the Plan, the date fixed pursuant to Section 3.7(a), 3.7(b), or 3.7(c) of the Plan, or _________.

4. The Option may not be exercised if the issuance of the Stock upon such exercise would constitute a violation of any applicable Federal or state securities or other law or valid regulation. Further, exercise of an Option granted pursuant to this Agreement shall be under and subject to Paragraph 3.4 of the Plan.

5. This Option consists of Incentive Stock Options as to ______ shares and Non-Qualified Stock Options as to ______ shares and shall be exercisable in accordance with the following Schedule:

Incentive Stock Options	Exercisable on or After

Non-Qualified Stock Options	Exercisable on or After

to any shares other than those shares as to which the Option shall have been exercisable in accordance with the preceding Schedule on the date of such termination.

6. The Option may not be transferred in any manner other than by will or the laws of descent or distribution and may be exercised during the lifetime of the Optionee only by him. The terms of the Option shall be binding upon the executors, administrators, heirs, successors, and assigns of the Optionee.

7. The Option may be exercised only upon payment of the appropriate amount and delivery of the completed "Notice of Exercise," attached hereto, to the Secretary of the Company. Any attempted exercise of the Option without such delivery of the "Notice of Exercise" may be disregarded by the Company. Payment and delivery for the purposes hereof may also be accomplished by making payment and delivery to an agent duly appointed by the Company for the purposes of accepting payment and notice of exercise. Where any such appointment is made, the Company shall so advise Optionee, and Optionee may rely upon such notice until such notice is revoked or amended.

8. Optionee shall have none of the rights of a shareholder with respect to any shares of Stock subject to the Option, except as to the shares with respect to which Optionee has validly exercised the Option granted herein and tendered to the Company the full price therefor.

9. All notices required to be given hereunder shall be mailed by registered or certified mail to the Company to the attention of its Secretary, at One Quaker Park, 901 E. Hector Street, Conshohocken, Pennsylvania 19428, and to Optionee at Optionee's address as it appears on the Company's books and records unless either of said parties has duly notified the other in writing of a change in address.

Click here to enter text.

QUAKER HOUGHTON

By: ____

Michael F. Barry

Date of Grant: _______

Optionee acknowledges receipt of a copy of the Plan, and represents that he/she is familiar with the terms and provisions thereof, and hereby accepts the Option subject to the terms and provisions of the Plan insofar as they relate to Stock Options granted thereunder. Optionee agrees hereby to accept as binding, conclusive, and final all decisions or interpretations of the Committee upon any questions arising under the Plan or the Option. Optionee authorizes the Company to withhold in accordance with applicable law from any compensation payable to him/her any taxes required to be withheld by Federal, state, or local law as a result of the exercise of the Option.

OPTIONEE REPRESENTS THAT, AT THE TIME THE OPTION IS GRANTED, HE/SHE DOES NOT OWN DIRECTLY OR INDIRECTLY (AS DETERMINED UNDER SECTION 424(d) OF THE INTERNAL REVENUE CODE OF 1986, AS AMENDED), STOCK POSSESSING MORE THAN 10% OF THE TOTAL COMBINED VOTING POWER OF ALL CLASSES OF STOCK OF QUAKER CHEMICAL CORPORATION OR ANY OF ITS SUBSIDIARIES.

By: ____

Click here to enter text.

EXHIBIT 21

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Quaker Chemical Corporation	U.S.A.	100%
+* SB Decking, Inc. (formerly Selby, Battersby & Co.)	U.S.A.	100%
* AC Products, Inc.	U.S.A.	100%
* Epmar Corporation	U.S.A.	100%
* Summit Lubricants, Inc.	U.S.A.	100%
* Tecniquimia Mexicana S.A. de C.V.	Mexico	100%
* Unitek Servicios De Asesoria Especializad S.A de C.V.	Mexico	100%
+* Quaker Chemical Europe B.V.	Netherlands	100%
* Quaker Chemical B.V.	Netherlands	100%
+* Quaker Russia B.V. (formerly KWR Holdings B.V.)	Netherlands	100%
* Quaker Chemical (China) Co. Ltd.	China	100%
+* Quaker China Holdings B.V.	Netherlands	100%
* Quaker Chemical Canada Limited	Canada	100%
* Quaker Chemical Limited	United Kingdom	100%
* Quaker Chemical, S.A.	France	100%
* Quaker Chemical, S.A.	Spain	100%
+* Quaker Denmark ApS	Denmark	100%
* Quaker Chemical, S.A.	Argentina	100%
+* Quaker Chemical Participacoes, Ltda.	Brazil	100%
* Quaker Chemical Limited	Hong Kong	100%
+* Quaker Chemical Holdings South Africa (Pty) Limited	Republic of South Africa	100%
* Quaker Italia S.r.l.	Italy	100%
* Quaker Chemical S.r.l.	Italy	100%
+* Quaker Australia Holdings Pty. Limited	Australia	100%
* Quaker Shanghai Trading Company Limited	China	100%
* Quaker Chemical Industria e Comercio Ltda.	Brazil	100%
* Quaker Chemical Operacoes, Ltda.	Brazil	100%
* Quaker Chemical India Private Limited	India	100%
* Quaker Chemical (Australasia) Pty. Limited	Australia	100%
* Quaker (Thailand) Ltd.	Thailand	100%
* Quaker Chemical South Africa (Pty.) Limited	Republic of South Africa	51%
* ECLI Products, LLC	U.S.A.	100%
* Engineered Custom Lubricants GmbH	Germany	100%
* Binol AB	Sweden	100%
* Binol Biosafe OY	Finland	100%
* Quaker Chemical MEA FZE	U.A.E	100%
* Verkol S.A.U.	Spain	100%
+* Quaker Spain Holding, SLU	Spain	100%
+* Quaker Chemical Investment Management (Shanghai) Co., Ltd.	China	100%
* Wuhan Quaker Technology Co., Ltd	China	60%
* Lubricor USA, Inc.	U.S.A	100%
+* Quaker Chemical Canada Holdings, Inc.	Canada	100%
* Lubricor, Inc.	Canada	100%

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SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT, *continued*

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Houghton Argentina S.A.	Argentina	100%
* Houghton do Brazil Ltda.	Brazil	100%
* Ultraseal Asia Limited	British Virgin Islands	100%
* Houghton Canada Inc.	Canada	100%
* Commonwealth Oil Corporation	Canada	100%
+* Global Houghton Ltd.	Cayman Islands	100%
* Houghton (Shanghai) Specialty Industrial Fluids Co., Ltd	China	100%
* DA Stuart Shanghai Co	China	100%
* Surface Technology (Dalian) Co Ltd	China	100%
* Ultraseal Chongqing Limited	China	100%
* Ultraseal Machinery Dongguan Ltd	China	100%
* Ultraseal Shanghai Limited	China	100%
* Houghton CZ s.r.o	Czech Republic	100%
+* EFHCO, LLC	U.S.A.	100%
+* GH Holdings Inc.	U.S.A.	100%
+* Houghton Technical Corp.	U.S.A.	100%
+* New Houghton Brazil Inc.	U.S.A.	100%
* Houghton Denmark AS	Denmark	100%
* Houghton S.A.S.	France	100%
* SIFCO Concepts Sarl	France	100%
* Houghton Deutschland GmbH	Germany	100%
* Ultraseal Germany GmbH	Germany	100%
* Internationale Metall Impragnier GmbH	Germany	100%
* Maldaner GmbH	Germany	100%
* Sterr & Eder Industrieservice GmbH	Germany	100%
* Houghton Asia Pacific Co., Limited	Hong Kong	100%
* DA Stuart India Private Limited	India	100%
* Ultraseal India Private Ltd	India	30%
* Houghton Italia S.p.A.	Italy	100%
* Houghton Magyarország Kft	Hungary	100%
* Houghton Japan Co., Ltd.	Japan	100%
* Houghton Oil (Malaysia) Sdn, Bhd.	Malaysia	100%
+* Quaker Houghton (Finco) Ltd.	Malta	100%
+* Quaker Houghton Ltd.	Malta	100%
+* Quaker Houghton Holdings Ltd.	Malta	100%
* Houghton Mexico S.A. de C.V.	Mexico	100%
+* Houghton Europe BV	Netherlands	100%
* Houghton Benelux BV	Netherlands	100%
+* QH Europe BV	Netherlands	100%
* SIFCO Applied Surface Concepts LLC	U.S.A.	100%
* Houghton International, Inc.	U.S.A.	100%
* Houghton Polska Sp. Zo.o.	Poland	100%
* Houghton Romania S.R.L.	Romania	100%
+* GHI Asia Pacific Pte. Ltd.	Singapore	100%
* Houghton Iberica S.A.	Spain	100%
* Houghton Sverige AB	Sweden	100%
* SIFCO Concepts Sweden	Sweden	100%

Click here to enter text.

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT, ***continued***

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Houghton Taiwan Co. Limited	Taiwan	100%
* Thai Houghton 1993 Co., Ltd.	Thailand	100%
* Houghton Kimya Sanayi AS	Turkey	100%
* Houghton Ukraine ToV	Ukraine	100%
+* GHGL London Ltd.	United Kingdom	100%
+* GHG Lubricants Holdings Limited	United Kingdom	100%
+* Houghton Holdings Limited	United Kingdom	100%
* Houghton plc	United Kingdom	100%
+* Applied Surface Concepts Holdings Ltd.	United Kingdom	100%
* Norman Hay Engineering Ltd.	United Kingdom	100%
* SIFCO Applied Surface Concepts (UK) Ltd	United Kingdom	100%
* Surface Technology Holdings Ltd.	United Kingdom	100%
* Surface Technology (Leeds) Ltd	United Kingdom	100%
* Surface Technology Aberdeen Ltd	United Kingdom	100%
* Surface Technology (East Kilbride) Ltd.	United Kingdom	100%
* Surface Technology (Coventry) Ltd	United Kingdom	100%
* Ultraseal International Group Ltd	United Kingdom	100%
* MX Systems International Ltd	United Kingdom	100%
+* Quaker Houghton International LP	United Kingdom	100%
+* Quaker Houghton Holdings Limited	United Kingdom	100%
+* QH Holdings Limited	United Kingdom	100%
+* QH Chemical Limited	United Kingdom	100%
+* QH International Limited	United Kingdom	100%
+* Quaker Specialty Chemicals (UK) Limited	United Kingdom	100%
* Ultraseal USA Inc.	U.S.A.	100%
+* Wallover Enterprises, Inc.	U.S.A.	100%
* Wallover Oil Company Incorporated	U.S.A.	100%
* Wallover Oil Hamilton Inc.	U.S.A.	100%
+* Houghton Australia Pty. Ltd.	Australia	100%
* Surface Technology Australia	Australia	100%
* Lubricor Mexicana S.A. de C.V.	Mexico	100%
* Quaker Sales Europe, BV	Netherlands	100%
+* Quaker International Holdings, LLC	U.S.A.	100%
+* Quaker Chemical, CV	Netherlands	100%
* Quaker Chemical Services EURL	France	100%
+* MIH Acquisition Company, LLC	U.S.A.	100%
** Nippon Quaker Chemical, Ltd.	Japan	50%
** Kelko Quaker Chemical, S.A.	Panama	50%
** Primex, Ltd.	Barbados	33%
Kelko Quaker Chemical, S.A.	Venezuela	50%
** Korea Houghton Corporation	South Korea	50%

+ A non-operating company
* Included in the consolidated financial statements
** Accounted for in the consolidated financial statements under the equity method

EXHIBIT 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Forms S-8 (Registration Nos. 333-48130, 033-54158, 333-58676, 333-115713, 333-159513, 333-174145, 333-208188, 333-188594 and 333-211238) of Quaker Chemical Corporation of our report dated March 20, 2020 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
March 20, 2020

Click here to enter text.

EXHIBIT 31.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER OF THE COMPANY PURSUANT TO RULE 13a-14(a) OF THE SECURITIES EXCHANGE ACT OF 1934

I, Michael F. Barry, certify that:

1. I have reviewed this Annual Report on Form 10-K of Quaker Chemical Corporation;
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: March 20, 2020

/s/ MICHAEL F. BARRY

Michael F. Barry

Chief Executive Officer

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EXHIBIT 31.2

CERTIFICATION OF CHIEF FINANCIAL OFFICER OF THE COMPANY PURSUANT TO RULE 13a-14(a) OF THE SECURITIES EXCHANGE ACT OF 1934

I, Mary Dean Hall, certify that:

1. I have reviewed this Annual Report on Form 10-K of Quaker Chemical Corporation;
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: March 20, 2020

/s/ MARY DEAN HALL

Mary Dean Hall

Chief Financial Officer

Click here to enter text.

EXHIBIT 32.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350

The undersigned hereby certifies that the Form 10-K Annual Report of Quaker Chemical Corporation (the “Company”) for the annual period ended December 31, 2019 filed with the Securities and Exchange Commission (the “Report”) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 20, 2020

/s/ MICHAEL F. BARRY

Michael F. Barry

Chief Executive Officer of Quaker Chemical Corporation

Click here to enter text.

EXHIBIT 32.2

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350

The undersigned hereby certifies that the Form 10-K Annual Report of Quaker Chemical Corporation (the "Company") for the annual period ended December 31, 2019 filed with the Securities and Exchange Commission (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 20, 2020

/s/ MARY DEAN HALL

Mary Dean Hall

Chief Financial Officer of Quaker Chemical Corporation