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

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2021
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 an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒	Accelerated filer ☐
Non-accelerated filer ☐	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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes ☒ No ☐

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 computed by reference to the price at which the common equity was last sold, or the average bid and asked price of such common equity, 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, 2021): $4,210,881,271

Indicate the number of shares outstanding of each of the registrant's classes of common stock, as of the latest practicable date: 17,899,345 shares of Common Stock, $1.00 Par Value, as of January 31, 2022.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant's definitive Proxy Statement relating to the 2022 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 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. 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 the combined company for the years ended December 31, 2020 and 2021; and for the year ended December 31, 2019, the results of Legacy Quaker plus five months of Houghton's operations post-closing of the Combination on August 1, 2019.

Item 1. *Business.*

General Description

The Company was organized in 1918, incorporated as a Pennsylvania business corporation in 1930, and in August 2019 completed the Combination with Houghton to form Quaker Houghton. Quaker Houghton is the global leader in industrial process fluids. With a presence around the world, including operations in over 25 countries, the Company's customers include thousands of the world's most advanced and specialized steel, aluminum, automotive, aerospace, offshore, can, mining, and metalworking companies. Quaker Houghton develops, produces, and markets a broad range of formulated chemical specialty products and offers chemical management services (which we refer to as "Fluidcare™") for various heavy industrial and manufacturing applications throughout its four segments: Americas; Europe, Middle East and Africa ("EMEA"); Asia/Pacific; and Global Specialty Businesses.

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 of our principal product lines representing more than 10% of consolidated net sales for any of the past three years based on the Company's current product line segmentation:

	2021	2020	2019
Metal removal fluids	23.4 %	23.9 %	19.9 %
Rolling lubricants	22.2 %	21.8 %	21.9 %
Hydraulic fluids	13.6 %	13.3 %	13.0 %

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 sold through distributors and agents. The Company's employees typically 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.

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 principal, revenues are recognized on a gross reporting basis at the selling price negotiated with its customers. Where the Company acts as an agent for its customers, revenue is recognized on a net reporting basis at the amount of the administrative fee earned by the Company for ordering the goods. See Note 5 of Notes to Consolidated Financial Statements in Item 8 of this Report.

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 competitive 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 the Company's competitors differ from those of Quaker Houghton; 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 2021, Quaker Houghton's five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) accounted for approximately 10% of consolidated net sales, with its largest customer accounting for approximately 3% 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 directly 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 approximately 3,000 raw materials, including animal fats, vegetable oils, mineral oils, oleochemicals, 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 and 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, and by biodiesel consumption which is affected by the price of crude oil. Accordingly, significant fluctuations in the price of crude oil can 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. As experienced during 2021, the Company's earnings have been and could continue to 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 U.S. and in various foreign countries, some of which may prove to be material to its business, with the earliest patent expiry in 2024. The Company principally relies on its proprietary formulae and its applications know-how and experience to meet customer needs. Quaker Houghton products are identified by numerous trademarks that are registered throughout its marketing area.

Research and Development—Laboratories

The Company maintains approximately thirty separate laboratory facilities worldwide that are primarily devoted to applied research and development. In addition, the Company maintains quality control labs at each of its manufacturing facilities. Quaker Houghton research and development is directed primarily toward applied technology since the nature of the Company's business requires continual modification and improvement of formulations to provide specialty chemicals to satisfy customer requirements. If problems are encountered which cannot be resolved by local laboratories, the problem is referred to one of our ten principal laboratories, located 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, 2021, 2020 and 2019 were $44.9 million, $40.0 million and $32.1 million, respectively.

Recent Acquisition Activity

The Company has completed several recent acquisitions that expand its strategic product offerings and increase the Company's presence in its core industries. The Company's 2021 and 2022 acquisitions consist of:

- In January 2022, the Company acquired a business related to the sealing and impregnation of metal castings for the automotive sector, as well as impregnation resin and impregnation systems for metal parts for approximately $1.4 million. This business expands the Company's geographic presence in Germany as well as broadens its product offerings and service capabilities within its existing impregnation business that was initially entered into as part of its past acquisition of Norman Hay.

- In January 2022, the Company acquired a business that provides pickling inhibitor technologies for the steel industry, drawing lubricants and stamping oil for metalworking, and various other lubrication, rust preventative, and cleaner applications, for approximately $8.0 million. This business broadens the Company's product offerings within its existing metals and metalworking business in the Americas region.

- In November 2021, the Company acquired a business that provides hydraulic fluids, coolants, cleaners, and rust preventative oils for approximately $3.7 million. This business expands the Company's geographic presence in Turkey as well as broadens its product offerings within its existing metalworking business.

- In November 2021, the Company acquired Baron Industries ("Baron"), a U.S. based privately held company that provides vacuum impregnation services of castings, powder metal and electrical components for an initial payment of approximately $7.1 million. Baron expands the Company's geographic presence as well as broadens its product offerings and service capabilities within its existing impregnation business.

- In September 2021, the Company acquired the remaining interest in Grindaix-GmbH ("Grindaix"), a Germany-based, high-tech provider of coolant control and delivery systems for approximately $2.9 million. Previously, in February 2021, the Company acquired a 38% ownership interest in Grindaix for approximately $1.7 million. Grindaix expands the Company's geographic presence in Germany and broadens its product offerings and service capabilities within its equipment solutions and fluid intelligence business.

- In June 2021, the Company acquired certain assets for the Company's chemical milling maskants product line for approximately $2.8 million.

- In February 2021, the Company acquired a tin-plating solutions business for the steel end market for approximately $25.0 million. This business broadens the Company's product offerings within its existing metals business globally.

Impact of COVID-19

The global outbreak of COVID-19, and its variants, has negatively impacted all locations where the Company does business. Although the Company has now operated in this COVID-19 environment for almost two years, the full extent of the outbreak and related business impacts continue to remain uncertain and volatile. This outbreak has significantly disrupted the operations of the Company and those of its suppliers and customers. Management continues to monitor the impact that the COVID-19 pandemic is having on the Company, the overall specialty chemical industry, and the economies and markets in which the Company operates.

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 $4.2 million, $3.7 million and $4.4 million during the years ended December 31, 2021, 2020 and 2019, respectively.

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 chief operating decision maker assesses the Company's performance. The Company has four reportable segments: (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.

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. Reference is made to (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.

Number of Employees

On December 31, 2021, Quaker Houghton had approximately 4,700 full-time employees globally of whom approximately 1,200 were employed by the parent company and its U.S. subsidiaries, and approximately 3,500 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, 2021.

Core Values

Quaker Houghton considers its employees as its greatest strength in differentiating our business and strengthening our market positions. We have established core values that are inclusive of embracing diversity and creating a culture where we learn from and are inspired by the many cultures, backgrounds and knowledge of our team members. The Company's goal is to have an organization that is inclusive of all its people and is representative of the communities in which we operate.

The Company's core values are (i) live safe; (ii) act with integrity; (iii) drive results; (iv) exceed customer expectations; (v) embrace diversity; and (vi) do great things together. Our core values embody who we are as a company, guide our decisions and inspire us. Our commitment to these values, in words and actions, builds a safer, stronger Quaker Houghton, and these values guide the Company's internal conduct and its relationship with the outside world. By fostering a culture and environment that exemplifies our core values, we gain, as a company, unique perspectives, backgrounds and varying experiences to ensure continued long-term success. The Company respects and values all of its employees and believes inclusion, diversity and equality are essential pillars to drive the Company's success.

Sustainability Report

We report our progress on Environmental, Social, and Governance ("ESG") milestones in our sustainability report, which is published annually and is available free of charge on our corporate website at home.quakerhoughton.com/sustainability. The Company's 2020 Sustainability Report reflects the most recent available data on a variety of topics, including specific information

relating to the Company's: (i) environmental footprint and climate change commitments; (ii) diversity initiatives; (iii) safety initiatives and performance; and (iv) training courses our employees have completed. Information in these sustainability reports and on our website are not incorporated by reference in this Report and, accordingly, should not be considered part of this Report.

Environmental Strategy

In 2020, we established the Board Sustainability Committee, which has specific responsibility to assist the Board of Directors (the "Board") in its assessment, evaluation, and oversight of the Company's sustainability programs and initiatives pertaining to the Company's business, operations, and employees. In formulating our environmental strategy, our Executive Leadership Team ("ELT") and Board consider certain risks and uncertainties that may materially impact our financial condition and results of operations. These risks and uncertainties are further described in Item 1A of this Report.

In 2021, we set a target to achieve carbon neutrality in our global operations by 2030 and net zero emissions across our entire value chain by 2050. The Company established 15 long-term goals, based on the results of the Company's 2020 materiality assessment, which was completed with input from customers, investors, suppliers, and internal stakeholders. Our 15 long-term goals are closely aligned with the United Nations Sustainable Development Goals. We also identified short- and medium-term milestones that may help support the achievement of our 2030 targets.

Talent Management and Retention

Maintaining a robust pipeline of talent is crucial to our continued success and is a key aspect of succession planning efforts across the organization. Our ELT and human resources teams are responsible for attracting and retaining top talent by facilitating an environment where employees want to show up to work and do great things together. To achieve sustained high performance, management invests in the development, safety, and wellbeing of our employees. Among other metrics, we measure training hours, turnover, time to hire, and diversity hiring to assess our progress in these areas.

Additionally, we regularly evaluate our compensation and benefits packages for our employees, including health and wellness benefits, paid-time off policies, monetary compensation, and educational reimbursements, to ensure that our total compensation and benefits packages are aligned with our business strategy, organizational culture, and diversity and inclusion philosophy while ensuring that we remain competitive in the markets we serve while following local and statutory wage and benefits laws and guidelines.

Diversity, Equity, and Inclusion

As a global company, we want to build an organization that is inclusive of all people and representative of the communities in which we operate. Quaker Houghton provides equal employment opportunities and does not discriminate based on age, ethnicity, gender identity, disability / medical, race, religion, or sexual orientation. We believe that diversity and inclusion are embodied by having working norms and cultural familiarities whereby employees feel included, engaged, and rewarded, regardless of their background or where they sit in the organization.

Inclusion and diversity begin with the Board and ELT. The Board is comprised of twelve individuals with diverse experience and credentials, selected for their business acumen and ability to challenge and add value to management. Our current Board composition includes two female and four racially diverse directors out of a total of twelve directors. For additional information on the Company's leadership, refer to Item 4(a) Information about our Executive Officers and Item 10. Directors, Executive Officers and Corporate Governance.

We published our workforce demographics in our Sustainability Report. By publicly disclosing our workforce demographics, we increase transparency in the composition of our workforce as well as facilitate accountability in achieving progress in our diversity goals, including ensuring that diverse candidates are actively considered for roles throughout the organization.

Workplace Safety

We are committed to maintaining a strong safety culture and to emphasizing the importance of our employees' role in identifying, mitigating and communicating safety risks. We maintain policies and operational practices that communicate a culture where all levels of employees are responsible for safety. We believe that the achievement of superior safety performance is both an important short-term and long-term strategic goal in managing our operations. We emphasize ten "lifesaving" rules which make a significant difference in preventing serious injuries and fatalities. We also require all employees to regularly complete safety training. Additionally, our ELT is closely involved in our safety programs and conducts regular reviews of safety performance metrics and reviews the Company's safety performance during Company-wide meetings.

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, including statements regarding the potential effects of the COVID-19 pandemic and global supply chain constraints on the Company's business, results of operations, and financial condition, our expectation that we will maintain sufficient liquidity and remediate any of our material weaknesses in internal control over financial reporting, and statements regarding the impact of increased raw material costs and pricing initiatives 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 and other acquisitions;
- the impacts on our business as a result of the COVID-19 pandemic and any projected global economic rebound or anticipated positive results due to Company actions taken in response;
- cost increases in prices of raw materials and the impacts of constraints and disruptions in the global supply chain;
- our current and future results and plans including our sustainability goals; 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 2021 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 slowdowns and shutdowns, including as is currently being experienced by many automotive industry companies as a result of supply chain disruption. Other major risks and uncertainties include, but are not limited to, the primary and secondary impacts of the COVID-19 pandemic, including actions taken in response to the pandemic by various governments, which could exacerbate some or all of the other risks and uncertainties faced by the Company, as well as the potential for significant increases in raw material costs, supply chain disruptions, customer financial instability, worldwide economic and political disruptions such as the current conflict between Russia and Ukraine, foreign currency fluctuations, significant changes in applicable tax rates and regulations, future terrorist attacks and other acts of violence. Furthermore, the Company is subject to the same business cycles as those experienced by our customers in the steel, automobile, aircraft, industrial equipment, and durable goods industries. The ultimate impact of COVID-19 on our business will depend on, among other things, the extent and duration of the pandemic, the severity of the disease and the number of people infected with the virus including new variants, the continued uncertainty regarding global availability, administration, acceptance and long-term efficacy of vaccines, or other treatments for COVID-19 or its variants, the longer-term effects on the economy of the pandemic, including the resulting market volatility, and by the measures taken by governmental authorities and other third parties restricting day-to-day life and business operations and the length of time that such measures remain in place, as well as laws and other governmental programs implemented to address the pandemic or assist impacted businesses, such as fiscal stimulus and other legislation designed to deliver monetary aid and other relief. Other factors could also adversely affect us, including those related to the Combination and other acquisitions and the integration of 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, which appears 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.*

There are many factors that may affect our business and results of operations, including the following risks relating to: (1) the demand for our products and services and our ability to grow our customer base; (2) our business operations, including internal and external factors that may impact our operational continuity; (3) our international operations; (4) our supply chain; (5) domestic and foreign taxation and government regulation and oversight; and (6) more general risk factors that may impact our business.

Risks Related to the Demand for our Products and Services and our Customer Base

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 the leader in industrial process fluids, the Company is subject to the same business cycles as those experienced by our customers that participate in the steel, automobile, aircraft, industrial equipment, aerospace, aluminum and durable goods industries. Because demand for our products and services is largely derived from the global demand for their products, we are subject to uncertainties related to downturns in our customers' businesses and unanticipated shutdowns or curtailments of our customers' production, including as a result of adverse changes affecting national, regional and global economies or increased competitive pressure within our customers' industries. Our customers may experience deterioration of their businesses, cash flow shortages and difficulty obtaining financing, leading them to delay or cancel plans to purchase products, and they may not be able to fulfill their obligations in a timely fashion. We have limited ability to adjust our costs contemporaneously with changes in sales; thus, a significant sudden 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. Further, our suppliers and other business partners may experience similar conditions, which could impact their ability to fulfill their obligations to us and also result in material adverse effects 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 there are many companies with significant financial resources and/or customer relationships that compete with us to provide similar products and services. Some competitors may be able to offer more favorable or flexible pricing and service terms or, due to their larger size or greater access to resources, may be better able to adapt to changes in conditions in our industries, fluctuations in the costs of raw materials or changes in global economic conditions, potentially resulting in reduced profitability and/or a loss of market share for us. The pricing decisions of our competitors could lead us to decrease our prices which could negatively affect our margins and profitability. In addition, our competitors could potentially consolidate their businesses and gain scale or better position their product offerings, which could have a negative impact on our profitability and market share. Competition in our industry historically has also been based on the ability to provide products that meet the needs of the customer and render technical services and laboratory assistance, which our competitors may be able to accomplish more effectively than we are able to do. 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 and we could lose market share to our competitors.

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 2021, the Company's top five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) together accounted for approximately 10% of our consolidated net sales, with the largest customer accounting for approximately 3% 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 cyclical 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 at one or more of these locations or other major sites of a significant customer could have a material adverse effect on our business.

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 competitive position and 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. 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 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 fail to gain traction or never become profitable. In any event, ongoing investments in research and development for the future do not yield an immediate beneficial impact on our operating results and therefore could result in higher costs without a proportional increase in revenues.

In addition, our customers use our specialty chemicals for a broad range of applications. Changes in our customers' products or processes or changes in regulatory, legislative or industry requirements may lead our customers to reduce consumption of the specialty chemicals that we produce or make them unnecessary or less attractive. Customers may also adopt alternative materials or processes that do not require our products. An example of such evolving customer demands and industry trends is the movement towards light weighting of materials and electric vehicles. Should a customer decide to use a different material due to price, performance or other considerations, we may not be able to supply a product that meets the customer's new requirements. Consequently, it is important that we develop new products to replace the products that mature and decline in use. Despite our efforts, 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. Moreover, new products may have lower margins than the products they replace. Our business, results of operations, cash flows and margins could be materially adversely affected if we are unable to manage successfully the maturation or obsolescence of our existing products and the introduction of new products.

Risks Related to Business Operations, Including Internal and External Factors that May Impact Our Operational Continuity

Our ability to profitably operate our consolidated company as anticipated requires us to effectively identify and consummate the strategic acquisitions we identify and to successfully integrate these acquisitions into our consolidated operations. An inability to appropriately capitalize on growth, including organic growth and future acquisitions, could adversely affect our liquidity, financial position and results of operations.

We have completed several acquisitions over the past several years as discussed in Note 2 of the Notes to the Consolidated Financial Statements included in Item 8 of this Report. Acquired companies may have significant latent liabilities that may not be discovered before they are acquired and may not be reflected in the price we pay. Acquisitions also could have a dilutive effect on our financial results and while they generally result in goodwill, goodwill could be impaired in the future resulting in a charge to earnings.

Our ability to implement our growth strategy may be limited by our ability to identify appropriate acquisition or joint venture candidates, our financial resources, including available cash and borrowing capacity, and our ability to negotiate and complete suitable arrangements. Further, the success of our growth depends on our ability to navigate risks such as those listed above and successfully integrate acquisitions, including, but not limited to, our ability to:

- successfully execute the integration or consolidation of the acquired or additional business into our 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 retaining legacy business and other related attributes;
- adequately address challenges arising from the increased scope, geographic diversity and complexity of our operations; and
- further penetrate existing, and expand into new, markets with the product capabilities acquired in acquisitions.

If we fail to successfully integrate acquisitions into our existing business, our financial condition and results of operations could be adversely affected. We may fail to obtain the benefits we anticipate from our recently completed or future acquisitions or joint ventures and we may not create the appropriate infrastructure to support such additional growth from organic or acquired businesses, which could also have a material adverse effect on our liquidity, financial position and results of operations.

Gulf and its wholly-owned subsidiary, QH Hungary Holdings Limited, have a significant minority stake in the Company and the contractual ability to nominate certain directors of the Company, which may enable them to influence the direction of our business and significant corporate decisions.

As a result of the Combination, Gulf and its wholly-owned subsidiary, QH Hungary Holdings Limited (together, the "Gulf Affiliates"), have become our largest shareholders. If they were to make available for sale a portion of their 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, the Gulf Affiliates currently have the right to designate three individuals for election to the Board and this right, together with their share ownership, gives them substantial influence over our business, including 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 the Gulf Affiliates may make some future actions more difficult without their support. The Gulf Affiliates, however, among other provisions in the shareholders agreement, have agreed that

for so long as any of their designees are on the Board, and for six months thereafter, they 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 their rights to designees on the Board). Nevertheless, 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.

Failure to comply with any material provision of our principal 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 in connection with the closing of the Combination. Our principal credit facility requires the Company to comply with certain provisions and covenants, and, while we do not currently consider these provisions and covenants to be overly restrictive, they could become more difficult to comply with as business or financial conditions change. We are also subject to interest rate risk due to the variable interest rates within the credit facility and if interest rates rise significantly, these interest costs would increase as well.

Our principal credit facility contains provisions that are customary for facilities of its type, including affirmative and negative covenants, financial covenants and events of default, including restrictions on (a) the incurrence of additional indebtedness, (b) investments in and acquisitions of other businesses, lines of business and divisions, (c) the making of dividends or capital stock purchases and (d) dispositions of assets. We may declare dividends and make share repurchases in annual amounts not exceeding the greater of $50 million annually and 20% of consolidated EBITDA (earnings before interest, taxes, depreciation and amortization) if we are otherwise in compliance with the credit facility and we may also distribute certain other amounts to our shareholders if we satisfy a consolidated net leverage ratio. Other financial covenants contained in our principal credit facility include a consolidated interest coverage test and a consolidated net leverage test. Customary events of default in the credit facility include, among others, 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 our principal facility, we could become in default. The occurrence of an event of default under the 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 principal credit facility permits interest on certain borrowings to be calculated based on the London Interbank Offered Rate ("LIBOR"). The LIBOR benchmark has been subject of national, international, and other regulatory guidance and proposals for reform and will cease to be provided with certain rates as of December 31, 2021 through June 30, 2023. In December 2021, the Company entered into the Second Amendment to Credit Agreement ("Second Amendment") with Bank of America N.A., to provide an update for the use of a non-U.S. dollar ("non-USD") currency LIBOR successor rate. 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 related 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 using short-term repurchase agreements, backed by Treasury securities. At this time, it remains uncertain what rate will succeed LIBOR. 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. 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 but may affect the level of interest payments on our portion of indebtedness that bear interest at variable rates.

Risks Related to our International Operations

Our global presence 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 our non-U.S. operations. Our success as a global business depends, in part, upon our ability to succeed across different legal, regulatory, economic, social and political conditions by developing, implementing and maintaining policies and strategies that are effective in all of the locations where we do business. Risks inherent in our global operations include:

- increased transportation and logistics costs, or restrictions on transportation of materials;
- increased cost or decreased availability of raw materials;
- trade protection measures including import and export controls, trade embargoes, and trade sanctions between countries or regions we serve that could result in our losing access to customers and suppliers in those countries or regions;
- unexpected adverse changes in export duties, quotas and tariffs and difficulties in obtaining export licenses;

- termination or substantial modification of international trade agreements that may adversely affect our access to raw materials and to markets for our products;
- our agreements with counterparties in countries outside the U.S. may be difficult for us to enforce and related receivables may take longer or be difficult for us to collect;
- difficulties of staffing and managing dispersed international operations;
- less protective foreign intellectual property laws, and more generally, legal systems that may be less developed and predictable than those in the U.S.;
- limitations on ownership or participation in local enterprises as well as the potential for expropriation or nationalization of enterprises;
- the impact of widespread public health crises, such as the COVID-19 pandemic;
- instability in or adverse changes to the economic, political, social, legal or regulatory conditions in a country or region where we do business, including hyperinflationary conditions or as a result of terrorist activities, or as a result of political and/or military conflict; and
- complex and dynamic local tax regulations, including changes in foreign laws and tax rates or U.S. laws and tax rates with respect to foreign income that may unexpectedly increase the rate at which our income is taxed, impose new and additional taxes on remittances, repatriation or other payments by subsidiaries, or cause the loss of previously recorded tax benefits.

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 and financial condition.

Additionally, on January 31, 2020, the United Kingdom's ("U.K.") ended its membership in the European Union ("EU") (commonly referred to as "Brexit"). The U.K. and the EU entered into a trade and cooperation agreement effective January 1, 2021, but uncertainty remains regarding its implications and implementation, and whether any new trade agreements with other countries or territories will be agreed upon and implemented and how any such agreements may impact our business. The long-term economic, legal, political and social implications of Brexit, including regarding data protection in the U.K. and the free movement of goods, services, and people between the U.K., the EU, and elsewhere, also remains unclear, and the precise impact of the Brexit decision will only become clearer as Brexit progresses. Brexit has caused and could cause further 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. 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. Brexit could also lead to calls for similar referendums in other European jurisdictions which could cause increased economic volatility in the European and global markets. Uncertainty around these and related issues could lead to adverse effects on the economy of the U.K. or in 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.

Our non-U.S. operations generate significant revenues and earnings. Fluctuations in foreign currency exchange rates may affect product demand and may adversely affect the profitability in U.S. dollars of the products and services we provide in international markets where payment for our products and services is made in the local currency. 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 our non-U.S. subsidiaries, which use their local currencies as their functional currency, accounted for approximately 60% to 70% of our consolidated net sales. 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.

Risks Relating to Our Supply Chain

If we are unable to obtain price increases or contract concessions sufficient to offset increases in the costs of raw materials, this can continue to result in a loss of sales, gross profit, and/or market share and can have a material adverse effect on our liquidity, financial position and results of operations. Conversely, if we fail to adjust prices in a declining raw material cost environment, we could lose sales, gross profit, and/or market share which could have a material adverse effect on our liquidity, financial position and results of operations.

Quaker Houghton uses approximately 3,000 different raw materials, including animal fats, vegetable oils, mineral oils, oleochemicals, 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, and 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 specific 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.

We generally attempt to pass through changes in the prices of raw materials to our customers, but we may be unable to do so (or may be delayed in doing so). In addition, raising prices we charge to our customers in order to offset increases in the prices we pay for raw materials could cause us to suffer a loss of sales volumes. Although we have been successful in recovering a substantial amount of raw material cost increases while retaining our customers as experienced in 2021, there can be no assurance that we will be able to continue to offset higher raw material costs or retain customers in the future. 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 as described within Item 7 of this Report.

Lack of availability of raw materials and issues associated with sourcing from single suppliers and 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 supply shortages for certain raw materials. In addition, we source some materials from a single supplier or from suppliers in jurisdictions that have experienced political or economic instability. Even if we have multiple suppliers of a particular raw material, there are occasionally shortages. Any significant disruption in supply could affect our ability to obtain raw materials or satisfactory substitutes or could increase the cost of such raw materials or substitutes, 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 or disruptions within our supply chain or in transportation could have a material adverse effect on our liquidity, financial position and results of operations.

Our manufacturing facilities are located throughout the world. While we have some redundant capabilities, if one of our facilities is forced to shut down or curtail operations because of damage or other factors, including natural disasters, labor difficulties or widespread public health crises, such as the ongoing COVID-19 pandemic, we may not be able to timely supply our customers. This could result in a loss of sales over an extended period or permanently. While the Company seeks to mitigate this risk through business continuity and contingency planning and other measures, 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. In addition, the coronavirus pandemic has caused, and may in the future cause, significant travel disruptions, quarantines and/or closures, which could result in disruptions to our manufacturing and production operations at our facilities, as well as those of our suppliers and customers. Any losses due to these events may not be covered by our existing insurance policies or may be subject to certain deductibles.

We could be similarly adversely affected by other disruptions to our supply chain and transportation network. The Company relies heavily on railroads, ships, and over-the-road shipping methods to transport raw materials to its manufacturing facilities and to transport finished products to customers. The costs of transporting our products could be negatively affected by factors outside of our control, including shipping container shortages or global imbalances in shipping capabilities, transportation disruptions or rate increases, increased border controls or closures, extreme weather events, tariffs, rising fuel costs and capacity constraints. Significant delays or increased costs affecting our supply chain, such as we experienced in 2021 could materially affect our financial condition and results of operations. Disruptions at our suppliers have recently and could in the future lead to short term or longer term increases in raw material or energy costs and/or reduced availability of materials or energy, potentially affecting our financial condition and results of operations.

Risks Relating to Domestic and Foreign Taxation and Government Regulation and Oversight

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. 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 or in how they are interpreted or enforced, including matters such as transfer pricing. 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. See Note 10 and Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report for a discussion of certain income and non-income tax audits and inspections. Any of these factors or similar tax-related risks could cause our effective tax rate and tax-related payments, including any such payments related to tax liabilities of businesses we have acquired, 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.

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 legal matters, including tax and environmental matters. See Note 10 and Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report, which describes uncertain tax positions and tax audits and inspections, as well as 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. An adverse result in one or more pending or ongoing 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.

We are subject to government regulation in all of the jurisdictions in which we conduct our business. Changes in the regulatory environments in which we operate, particularly, but not limited to, the U.S., Mexico, Brazil, China, India, Thailand, Australia, 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 the U.S. or foreign markets, and/or could otherwise increase the cost of doing business. While we seek to mitigate these risks through a variety of actions, including receiving Responsible Care Certification, ongoing employee training, and employing 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") regulations or other similar laws and regulations could result in our inability to sell certain 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. In addition, the U.S. Toxic Substances Control Act ("TSCA") requires chemicals to be assessed against a risk-based safety standard and that unreasonable risks identified during risk evaluation be eliminated. This regulation and other pending initiatives at the U.S. state level, as well as initiatives in Canada, Asia and other regions, could potentially require toxicological testing and risk assessments of a wide variety of chemicals, including chemicals used or produced by us. These assessments may result in heightened concerns about the chemicals involved and additional requirements being placed on their production, handling, labeling or use. These concerns and additional requirements could also increase the cost incurred by our customers to use our chemical products and otherwise limit their use which could lead to a decrease in demand for these products. A decrease in demand due to these issues could have an adverse impact on our business and results of operation.

Further, 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. These and similar laws generally prohibit companies and their officers, directors, employees and third-party intermediaries, business partners and agents, from making improper payments or providing other improper items of value to government officials or other persons. While we have policies and procedures and internal controls designed to address compliance with such laws, including employee training programs, we cannot guarantee 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 these 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.

The shipment of goods, services and technology across international borders subjects us to extensive trade laws and regulations. Our import activities are governed by the unique customs laws and regulations in each of the countries where we operate. Moreover, many countries, including the U.S., control the export and re-export of certain goods, services and technology and impose related

export record-keeping and reporting obligations. Governments may also impose economic sanctions against certain countries, persons and entities that may restrict or prohibit transactions involving such countries, persons and entities, which may limit or prevent our conduct of business in certain jurisdictions.

The laws and regulations concerning import activity, export record-keeping and reporting, export control and economic sanctions are complex and constantly changing. These laws and regulations can cause delays in shipments and unscheduled operational downtime. Moreover, any failure to comply with applicable legal and regulatory trading obligations could result in criminal and civil penalties and sanctions such as fines, imprisonment, debarment from governmental contracts, seizure of shipments and loss of import and export privileges. In addition, investigations by governmental authorities as well as legal, social, economic and political issues in these countries could have a material adverse effect on our business, results of operations and financial condition. We are also subject to the risks that our employees, joint venture partners and agents outside of the U.S. may fail to comply with other applicable laws.

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

Increased public and stakeholder awareness and concern regarding global climate change, biodiversity loss, and other environmental risks may result in more extensive international, regional and/or federal requirements or industry standards to reduce or mitigate the effects of these changes. 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. Though we are closely following developments in this area and changes in the regulatory landscape in the U.S., we cannot predict how or when those challenges may ultimately impact our business. While certain climate change initiatives may result in new business opportunities for us in the area of alternative fuel technologies and emissions control, compliance with these initiatives may also result in additional costs to us including, among other things, increased production costs, additional taxes, reduced emission allowances or additional restrictions on production or operations.

In addition, the potential physical impacts of climate change and biodiversity loss are highly uncertain and will be particular to the circumstances developing in various geographical regions. These may include extreme weather events and long-term changes in temperature levels and water availability as well as damaged ecosystems. The physical risks of climate change and biodiversity loss may impact our facilities, our customers and suppliers, and the availability and costs of materials and natural resources, sources and supply of energy, product demand and manufacturing. In particular, climate change serves as a risk multiplier increasing both the frequency and severity of natural disasters that may affect our business operations.

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 or biodiversity loss, our business, capital expenditures, results of operations, financial condition and competitive position could be negatively impacted.

We are subject to stringent labor and employment laws in many 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 many 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 our employees are represented by works councils or are governed by collective bargaining agreements and we are often required to consult with and seek the consent or advice of such representatives. These regulations and laws, together with our obligations 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. While the Company believes it has generally positive relations with its labor unions and employees, there is no guarantee the Company will be able to successfully negotiate new or renew labor agreements without work stoppages, labor difficulties or unfavorable terms. If we were to experience any extended interruption of operations at any of our facilities because of strikes or other work stoppages, our results of operations and financial condition could be materially and adversely affected.

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 U.S. and in various foreign countries, some of which are material to our business. However, we rely principally on our proprietary formulae and the applications know-how 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, and the use of appropriate trade secret protections, it is possible that competitors or other unauthorized third parties may obtain, copy, use, disclose or replicate our formulae, products, and processes. Similarly, third parties may assert claims against us and our customers and distributors alleging our products infringe upon third-party intellectual property rights. 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, trade brands and other intellectual property could subject us to increased competition and a failure to protect, defend or enforce our intellectual property rights could negatively impact our liquidity, financial position and results of operations.

General Risk Factors

Our business could be adversely affected by environmental, health and safety laws and regulations or by potential product, service or other related liability claims.

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. Some customers have and may in the future require us to represent that our products conform to certain product specifications provided by them. Any failure to comply with such specifications could result in claims or legal action against us. Any of the foregoing 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 manufacturing, handling, use, storage, and transportation of chemical materials and products, including historical operations at our current and former facilities. 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 the jurisdictions in which we operate, we are subject to numerous U.S. and non-U.S. national, federal, state and local environmental, health and safety laws and regulations, including those governing the discharge of pollutants into the air and water, the management and disposal of hazardous substances and wastes and the cleanup of contaminated properties. We currently use, and in the past have used, hazardous substances at many of our facilities, and we have in the past been, and may in the future be, subject to claims relating to exposure to hazardous materials. We also have generated, and continue to generate, hazardous wastes at a number of our facilities. Liabilities associated with the investigation and cleanup of hazardous substances, as well as personal injury, property damages or natural resource damages arising from the release of, or exposure to, such hazardous substances, may be imposed in many situations without regard to violations of laws or regulations or other fault, and may also be imposed jointly and severally (so that a responsible party may be held liable for more than its share of the losses involved, or even the entire loss). These liabilities may also be imposed on many different entities, including, for example, current and prior property owners or operators, as well as entities that arranged for the disposal of the hazardous substances. The liabilities may be material and can be difficult to identify or quantify. 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.

Further, some of the raw materials we handle are subject to government regulation that affect the manufacturing processes, handling, uses and applications of our products. In addition, our production facilities and a number of our distribution centers require numerous operating permits. Due to the nature of these requirements and changes in our operations, our operations may exceed limits under permits or we may not have the proper permits to conduct our operations.

Ongoing compliance with environmental laws, regulations and permits that impact registration/approval requirements, transportation and storage of raw materials and finished products, and storage and disposal of wastes could require us to make changes in manufacturing processes or product formulations and could have a material adverse effect on our results of operations. We may incur substantial costs, including fines, damages, criminal or civil sanctions and remediation costs, or experience interruptions in our operations, including as a result of revocation, non-renewal or modification of the Company's operating permits and revocation of the Company's product registrations, for violations arising under these laws or permit requirements. Any such revocation, modification or non-renewal may require the Company to cease or limit the manufacture and sale of its products at one or more of its facilities, which may limit or prevent the Company's ability to meet product demand or build new facilities and may have a material adverse effect on the Company's business, financial position, results of operations and cash flows. Additional information may arise in the future concerning the nature or extent of our liability with respect to identified sites, and additional sites may be identified for which we are alleged to be liable, that could cause us to materially increase our environmental accrual or the upper range of the costs we believe we could reasonably incur for such matters. Increased compliance costs may not affect competitors in the same way that they affect us due to differences in product formulations, manufacturing locations or other factors, and we could be at a competitive disadvantage, which might adversely affect our financial performance.

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 agreed to indemnify the purchasers for certain types of matters, including 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, even if we were not aware of the contamination. We may not have insurance coverage for such indemnity obligations. Further, we cannot predict the nature or amount of any indemnity or other obligations we may have to pay the applicable purchaser. These payments may be costly and may adversely affect our financial condition and results of operations.

Our insurance may not fully cover all potential exposures.

We maintain product, property, business interruption, casualty, and other general liability insurance, but this may not cover all risks associated with the hazards of our business and these coverages are subject to limitations, including deductibles and coverage limits. We may incur losses beyond the limits, or outside the coverage, of our insurance policies, including liabilities for

environmental remediation. In addition, from time to time, various types of insurance for companies in the specialty chemical industry have not been available on commercially acceptable terms and, in some cases, have not been available at all. We are potentially at additional risk if one or more of our insurance carriers fail. Additionally, severe disruptions in the domestic and global financial markets could adversely impact the ratings and survival of some of our insurers. Future downgrades in the ratings of enough insurers could adversely impact both the availability of appropriate insurance coverage and its cost. In the future, we may not be able to obtain coverage at current levels, if at all, and our premiums may increase significantly on coverage that we maintain.

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 would 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. See Note 16 of Notes to Consolidated Financial Statements included in Item 8 of this Report.

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 obtain, process, analyze, manage, transmit, and store electronic information in our day-to-day operations. We also rely on our technology infrastructure in all aspects of our business, including to interact with customers and suppliers, fulfill orders and bill, collect and make payments, ship products, provide support to customers, and fulfill contractual obligations. 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. Security breaches could result in unauthorized disclosure of confidential information or personal data belonging to our employees, partners, customers or suppliers for which we may incur liability. Cybersecurity threats, attempted intrusions and other incidents, such as these, are becoming more sophisticated and frequent. Security breaches and cyber incidents have, from time to time, occurred and may occur in the future. Although the breaches and cyber incidents experienced to date have not had a material impact, 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.

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. Implementing and complying with these laws and regulations may be more costly or take longer than we anticipate or could otherwise affect our business operations.

Breaches, cyber incidents and disruptions, or failure to comply with laws and regulations related to information security or privacy could result in legal claims or proceedings against us by governmental entities or individuals, significant fines, penalties or judgements, disruption of our operations, remediation requirements, changes to our business practices, and damage to our reputation. 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.

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, including for our senior executive officers. However, there can be no assurance that these mitigating factors will be adequate to attract or retain qualified management or other key personnel. Failure to retain key employees, failure to successfully transition key roles, or the inability to hire, train, retain and manage qualified personnel could also adversely affect our business.

Increasing scrutiny and changing expectations from stakeholders with respect to our ESG practices may impose additional costs on us or expose us to new or additional risks.

Companies across all industries are facing increasing scrutiny from stakeholders related to their ESG practices. Investor advocacy groups, institutional investors, investment funds, and other influential investors are also increasingly focused on ESG practices and in recent years have placed increasing importance on the implications and social cost of their investments. Regardless of the industry, investors' increased focus and activism related to ESG and similar matters may impact access to capital, as investors may decide to reallocate capital or to not commit capital as a result of their assessment of a company's ESG practices.

We face pressures from certain stakeholders to prioritize and promote sustainable practices and reduce our carbon footprint. Our stakeholders may pressure us to implement ESG procedures or standards beyond those we have in place in order to continue engaging with us, to remain invested in us, or before they will make further investments in us. Additionally, we may face reputational challenges in the event our ESG procedures or standards do not meet the standards set by certain constituencies. We have adopted certain practices as highlighted in the Company's Sustainability Report, including with respect to environmental stewardship.

Further, as we work to align with the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures and the Sustainability Accounting Standards Board, we continue to expand our disclosures in these areas. This is consistent with our commitment to executing on a strategy that reflects the economic, social, and environmental impact we have on the world while advancing and complementing our business strategy. Our disclosures on these matters and standards we set for ourselves or a failure to meet these standards, may influence our reputation and the value of our brand. It is possible that our stakeholders might not be satisfied with our ESG efforts or the speed of their adoption. If we do not meet our stakeholders' expectations, our business and/or our ability to access capital could be harmed. Any harm to our reputation resulting from setting these standards or our failure or perceived failure to meet such standards could adversely affect our business, financial performance, and growth.

Additionally, adverse effects upon our customers' industries related to the worldwide social and political environment, including uncertainty or instability resulting from climate change or biodiversity loss, changes in political leadership and environmental policies, changes in geopolitical-social views toward fossil fuels and renewable energy, concern about the environmental impact of climate change or biodiversity loss, and investors' expectations regarding ESG matters, may also adversely affect demand for our services. Any long-term material adverse effect on our customers or their industries could have a significant financial and operational adverse impact on our business.

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 ongoing COVID-19 pandemic, or other uncommon global events such as the current conflict between Russia and Ukraine, 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, which may be amplified by ongoing global climate change and biodiversity loss, may directly impact our physical facilities and/or those of our suppliers or customers. In addition, 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. In addition, available insurance coverage may not be sufficient to cover all of the damage incurred or, if available, may be prohibitively expensive. 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.

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.

The COVID-19 pandemic and its impact on business and economic conditions have negatively affected our business, results of operations and financial condition and the extent and duration of those effects is uncertain.

The COVID-19 pandemic that began in the first quarter of 2020 and the resulting impacts significantly disrupted the global economy and financial markets and adversely affected the Company's operations as well as those of its suppliers and customers. The Company experienced material disruptions as a result of COVID-19 globally which negatively impacted all locations where the Company does business.

Although the Company has now operated in this COVID-19 environment for almost two years, the full extent of the outbreak and related business impacts continue to remain uncertain and volatile. This outbreak has significantly disrupted the operations of the Company and those of its suppliers and customers. During the pandemic, the Company initially experienced volume declines and lower net sales as compared to pre-COVID-19 levels. In addition, the COVID-19 pandemic and responses to the pandemic have at times significantly disrupted the global supply chain and have had a significant impact on raw material prices. These impacts may continue to occur and may become more significant and could continue to result in disruptions in our supply chain and our difficulty in procuring or inability to procure raw materials necessary for the manufacturing of our products. The impact of the COVID-19 pandemic and responses to it has increased and could continue to increase the costs of making and distributing our products or result in delays in delivering, or an inability to deliver, them to our customers.

Given the continuously evolving developments with respect to this pandemic, the Company cannot, as of the date of this Report, reasonably estimate the magnitude or the full extent of the impact to its future results of operations or to the ability of it or its customers to resume more normal operations, even as certain restrictions are lifted. The prolonged pandemic and resurgences of the

outbreak including as new variants continue to emerge, and continued restrictions on day-to-day life and business operations as well as increased border controls or closures and transportation disruptions, may result in volume declines and lower net sales in future periods.

To the extent that the Company's customers and suppliers continue to be significantly and adversely impacted by COVID-19, this could reduce the availability, or result in delays, of materials or supplies to or from the Company, which in turn could significantly interrupt the Company's business operations. Given this ongoing uncertainty, the Company cautions that its future results of operations could be significantly adversely impacted by COVID-19. Further, management continued to evaluate how COVID-19 related circumstances, such as remote work arrangements, illness or staffing shortages and travel restrictions have affected financial reporting processes and systems, internal control over financial reporting, and disclosure controls and procedures. While the circumstances have presented and are expected to continue to present challenges, and have necessitated additional time and resources to be deployed to sufficiently address the challenges brought on by the pandemic, at this time, management does not believe that COVID-19 has had a material impact on financial reporting processes, internal controls over financial reporting, or disclosure controls and procedures.

Although we have implemented business continuity and emergency response plans as well as health and safety measures to permit us to continue to provide services and products to customers and support our operations, there can be no assurance that the continued spread of COVID-19 and its variants and efforts to contain the virus (including, but not limited to, vaccines and treatments, voluntary and mandatory quarantines, restrictions on travel, limiting gatherings of people, reduced operations and extended closures of many businesses and institutions) will not further impact our business, results of operations and financial condition. However, given the unprecedented and continually evolving developments with respect to this pandemic, the Company cannot, as of the date of this Report, reasonably estimate with certainty the full extent of the impact to its future results of operations or to the ability of it or its customers to resume more normal operations. A further prolonged outbreak or resurgence and period of continued restrictions on day-to-day life and business operations would likely result in volume declines and lower net sales in future periods as well.

The ultimate significance of COVID-19 impacts on our business will depend on, among other things, the extent and duration of the pandemic, the severity of the disease and the number of people infected with the virus, the development and continued uncertainty regarding availability, continued administration and long-term efficacy of vaccines or other treatments, including on new strains or mutations of the virus, the longer-term effects on the economy, including market volatility, and the measures taken by governmental authorities and other third parties restricting day-to-day life and the length of time that such measures remain in place, as well as laws and other governmental programs implemented to address the pandemic or assist impacted businesses, such as fiscal stimulus and other legislation designed to deliver monetary aid and other relief.

Epidemic diseases could negatively affect various aspects of our business, make it more difficult to meet our obligations to our customers, and could result in reduced demand from our customers. These could have a material adverse effect on our business, financial condition, results of operations, or cash flows.

Our business could be adversely affected by the effects of a widespread outbreak of contagious disease, similar to the COVID-19 pandemic. A significant outbreak of contagious diseases in the human population could result in a widespread health crisis that could adversely affect the economies and financial markets of many countries, resulting in an economic downturn that could affect demand for our products and likely impact our operating results. To the extent that the Company's customers and suppliers are materially and adversely impacted by a widespread outbreak of contagious disease, 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 ultimate impact on our business of a widespread outbreak of a contagious disease will depend on, among other things, the extent and duration of the outbreak, the severity of the disease and the number of people infected, the development and continued uncertainty regarding availability, administration and long-term efficacy of a vaccine or other treatments, the longer-term effects on the economy, including market volatility, and the measures taken by governmental authorities and other third parties restricting day-to-day life and the length of time that such measures remain in place, as well as laws and other governmental programs implemented to address the outbreak or assist impacted businesses, such as fiscal stimulus and other legislation designed to deliver monetary aid and other relief.

We have previously identified material weaknesses in our internal control over financial reporting that could have resulted 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 disclosed under "Item 9A. Controls and Procedures" of this Report, during the course of preparing our audited financial statements for the Company's annual report on Form 10-K for 2019 and 2020, we, in conjunction with our independent registered public accounting firm, identified certain material weaknesses. 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.

During 2020 and 2021, the Company dedicated multiple internal resources and supplemented those internal resources with various third-party specialists to assist with the formalization of a robust and detailed remediation plan. In undertaking remediation activities, the Company has established a global network of personnel to assist local management in understanding control performance and documentation requirements. In order to sustain this network, the Company conducts periodic trainings and hosts discussions to address questions on a current basis. As of December 31, 2021, the Company has remediated all of the previously identified material weaknesses and concluded that the Company's internal control over financial reporting is effective.

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.

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

None.

Item 2. ***Properties.***

Quaker Houghton's corporate headquarters and a laboratory facility are located in its Americas segment's Conshohocken, Pennsylvania location. The Company's other principal facilities in its America's segment are located in Carrollton, Georgia; Zion, Illinois; Detroit, Michigan; Dayton, Ohio; Middletown, Ohio; Strongsville, Ohio; 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; Dortmund, Germany; Barcelona, Spain; Navarra, Spain; 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; 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; Waukegan, Illinois; Zion, Illinois; Madison Heights, Michigan; Lewisburg, Tennessee; and Coventry, U.K. With the exception of the Conshohocken, Santa Fe Springs, Madison Heights, Lewisburg, Aurora, Karlshamn, Rayong, Coventry, and Sydney sites, which are leased, the remaining principal facilities are owned by the Company and, as of December 31, 2021, were mortgage free. Quaker Houghton also leases sales, laboratory, manufacturing, and warehouse facilities in other locations.

Quaker Houghton's principal facilities consist of various manufacturing, administrative, warehouse, and laboratory buildings. Most of the buildings 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 155 at each location with capacities ranging from 1,000 to 82,000 gallons, and processing or manufacturing vessels ranging in capacity from 2 to 29,000 gallons.

Each of Quaker Houghton'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 Andrew E. Tometich) have been employed by the Company or by Houghton for at least 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 David A. Will, is appointed annually to a one year term. Mr. Will is considered an executive officer in his capacity as principal accounting officer for purposes of this Item 4(a).

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Andrew E. Tometich, 55 Chief Executive Officer and President	Mr. Tometich, who has been employed by the Company since October 13, 2021, has served as Chief Executive Officer and President since December 1, 2021. Prior to joining the Company, Mr. Tometich served as Executive Vice President, Hygiene, Health and Consumable Adhesives at H.B. Fuller from August 2019 until September 17, 2021. Before that, Mr. Tometich was Senior Vice President, Specialty Materials Business at Corning Incorporated from September 2017 until August 2019 and President, Performance Silicones Business Unit at The Dow Chemical Company from June 2016 until February 2017 after having positions of increasing responsibility at Dow Corning Corporation and its subsidiaries from 1989 through 2016.
Joseph A. Berquist, 50 Executive Vice President, Chief Strategy Officer, and Managing Director, Global Specialty Businesses	Mr. Berquist, who has been employed by the Company since 1997, has served as Executive Vice President, Chief Strategy Officer, and Managing Director, Global Specialty Businesses since September 9, 2021. Prior to that role, he served as Senior Vice President, Global Specialty Businesses and Chief Strategy Officer from August 2019 to September 8, 2021. Mr. Berquist served as Vice President and Managing Director – North America from April 2010 until July 2019.
Jeewat Bijlani, 45 Senior Vice President, Managing Director - Americas	Mr. Bijlani has served as Senior Vice President, Managing Director - Americas since he joined the Company in August 2019. Prior to joining the Company, Mr. Bijlani served as President, Americas and Global Strategic Businesses of Houghton from March 2015 until July 2019.
Shane W. Hostetter, 40 Senior Vice President, Chief Financial Officer	Mr. Hostetter, who has been employed by the Company since July 2011, has served as Senior Vice President, Chief Financial Officer since April 19, 2021. Prior to that role, he served as Vice President, Finance and Chief Accounting Officer from August 2019 until April 18, 2021. He served as Global Controller and Principal Accounting Officer from September 2014 until July 2019.
Dieter Laininger, 58 Senior Vice President, Managing Director - Asia / Pacific	Mr. Laininger, who has been employed by the Company since 1991, has served as Senior Vice President, Managing Director – Asia / Pacific since August 2019. He served as Vice President and Managing Director – Asia / Pacific from April 2018 until July 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 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 2019.
Wilbert Platzer, 60 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 2019. He previously served as Vice President, Global Operations, EHS and Procurement from April 2018 until July 2019. Prior to that role, Mr. Platzer served as Vice President and Managing Director – EMEA from January 2006 through March 2018.

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Dr. David Slinkman, 57 Senior Vice President, Chief Technology Officer	Dr. Slinkman has served as Senior Vice President, Chief Technology Officer since he joined the Company in August 2019. Prior to joining the Company, Dr. Slinkman served as Vice President of Technology of Houghton from March 2012 until July 2019.
Adrian Steeples, 61 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 2019. He previously served as Vice President and Managing Director – EMEA from April 2018 until July 2019. Prior to that role, he served as Vice President and Managing Director - Asia/Pacific from July 2013 through March 2018.
Robert T. Traub, 57 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 2019. He previously served as Vice President, General Counsel and Corporate Secretary from April 2015 until July 2019.
David A. Will, 37 Vice President, Global Controller and Principal Accounting Officer	Mr. Will, who has been employed by the Company since 2014, has served as Vice President, Global Controller, and Principal Accounting Officer since April 19, 2021. Prior to that role, Mr. Will served as the Corporate Controller from August 2019 until April 18, 2021. Before that, he served as the Global Assistant Controller from December 2014 to August 2019.

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 $1.62 per share of outstanding common stock or $29.0 million during the year ended December 31, 2021 and $1.56 per share of outstanding common stock or $27.8 million during the year ended December 31, 2020. In February and May 2021, our Board declared quarterly cash dividends of $0.395 per share of outstanding common stock, payable to shareholders of record in April 2021 and July 2021, respectively. Subsequently, our Board declared quarterly dividends of $0.415 per share of outstanding common stock in August and November 2021, respectively, payable to shareholders of record in October 2021 and January 2022, 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 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 Credit Facility. Reference is made to the "Liquidity and Capital Resources" disclosure contained in Item 7 of this Report.

As of January 17, 2022, 17,899,286 shares of Quaker common stock were issued and outstanding and were held by 649 shareholders of record. Each share of common stock is 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 2021 for the period covered by this report:

Issuer Purchases of Equity Securities

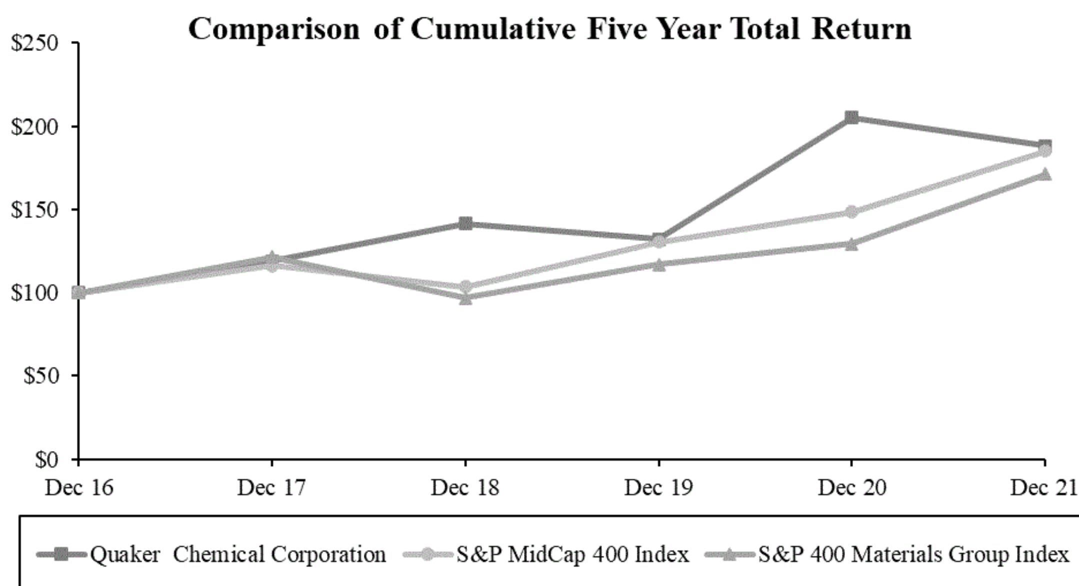
Period	(a) Total Number of Shares Purchased (1)	(b) Average Price Paid Per Share (2)	(c) Total Number of Shares Purchased as part of Publicly Announced Plans or Programs	(d) Approximate Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs (3)
October 1 - October 31, 2021	-	$ -	-	$ 86,865,026
November 1 - November 30, 2021	-	$ -	-	$ 86,865,026
December 1 - December 31, 2021	-	$ -	-	$ 86,865,026
Total	-	$ -	-	$ 86,865,026

(1) The Company did not acquire any shares of the Company's common stock from employees during the fourth quarter of 2021. All shares that would be acquired from employees are related to the 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 Company did not acquire any shares of the Company's common stock from employees during the fourth quarter of 2021. The price that would be paid for shares acquired from employees pursuant to employee benefit and share-based compensation plans is 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, restricted stock award, or restricted stock unit was granted.

(3) On May 6, 2015, the Board of Directors of the Company approved, and the Company announced, 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 it 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, 2021.

Stock Performance Graph: The following graph compares the cumulative total return (assuming reinvestment of dividends) from December 31, 2016 to December 31, 2021 for (i) Quaker's common stock, (ii) the S&P MidCap 400 Index (the "MidCap Index"), and (iii) the S&P 400 Materials Group Index (the "Materials Group Index"). The graph assumes the investment of $100 on December 31, 2016 in each of Quaker's common stock, the stocks comprising the MidCap Index and the Materials Group Index, respectively.



	12/31/2016	12/31/2017	12/31/2018	12/31/2019	12/31/2020	12/31/2021
Quaker	$ 100.00	$ 119.03	$ 141.53	$ 132.11	$ 205.30	$ 188.21
MidCap Index	100.00	116.24	103.36	130.44	148.26	184.97
Materials Group Index	100.00	121.55	96.79	116.99	129.45	171.17

Item 6. ***Selected Financial Data.***

Reserved.

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

As used in this Annual Report on Form 10-K (the "Report"), the terms "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. 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 the combined company for the years ended December 31, 2020 and 2021; and for the year ended December 31, 2019, the results of Legacy Quaker plus five months of Houghton's operations post-closing of the Combination on August 1, 2019.

Executive Summary

Quaker Houghton is the 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 U.S.

Overall, the Company's 2021 performance was highlighted by the continued recovery from the impacts of COVID-19 in 2020 as well as the ongoing execution of integration activities and synergy realization, which led to record net sales and adjusted EBITDA in 2021 despite the continued escalation in raw material cost headwinds and global supply chain pressures. Specifically, net sales of $1,761.2 million in 2021 increased 24% compared to $1,417.7 million in 2020, primarily due to higher volumes of approximately 13%, including additional net sales from acquisitions of 4%, increases from selling price and product mix of approximately 8% and the positive impact from foreign currency translation of 3%. The increase in sales volumes compared to 2020 was primarily a result of continued new business wins and the year-over-year improvement in end market conditions since the beginning of the COVID-19 pandemic in early 2020, partially offset by lower automotive sales due to semiconductor shortages and delayed shipments due to supply chain challenges that occurred towards the end of 2021. The increase in selling price and product mix is primarily the result of the Company's broad price increases implemented during 2021 to help offset the unprecedented increases in raw material costs as well as global supply chain and logistics cost pressures the Company has experienced throughout 2021.

The Company's net income and earnings per diluted share of $121.4 million and $6.77 in 2021, respectively, increased compared to $39.7 million and $2.22 per diluted share, respectively, in 2020. Excluding non-recurring items, including 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 $122.8 million and $6.85, respectively, compared to $85.2 million and $4.78, respectively, in 2020. The increase in the Company's current year earnings drove a 23% higher adjusted EBITDA to a full year record of $274.1 million compared to $222.0 million in 2020, primarily due to the significant increase in net sales year-over-year as well as higher realized cost synergies from the Combination, partially offset by lower gross margins driven by higher raw material and input costs and the impacts of disruptions in the global supply chain experienced in 2021 as well as higher selling, general and administrative expenses ("SG&A") including the impact of higher sales on direct selling expenses and additional SG&A from recent acquisitions.

The Company's 2021 operating performance in each of its four reportable segments: (i) Americas; (ii) EMEA; (iii) Asia/Pacific; and (iv) Global Specialty Businesses, reflect similar drivers to that of its consolidated performance. All four segments had higher net sales compared to 2020 reflecting the continued rebound in 2021 from the negative impacts of COVID-19 on the Company's end markets as well as continued success of winning new business in each of the Company's segments during 2021. Each of the Company's geographic segments benefited from higher organic sales volumes in 2021 while all of the Company's segments also benefitted from additional net sales from acquisitions, the positive impact from foreign currency translation due to the strengthening of most major currencies against the U.S. dollar, and from increases in selling price and product mix. As reported, each of the Company's reportable segment operating earnings were higher compared to 2020 reflecting the increase in net sales including the benefits of acquisitions and other factors mentioned; however, all of the Company's segment's operating earnings were negatively impacted by persistent raw material inflation, higher logistics, labor and manufacturing costs, impacts of disruptions to the global supply chain as well as higher SG&A which were a result of an increase in direct selling expenses associated with year-over-year inflation increases and increases due to the increase in net sales as well as the lower levels of prior year SG&A as a result of temporary cost saving measures implemented in response to COVID-19. 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 7, below.

The Company generated net operating cash flow of $48.9 million in 2021 compared to $178.4 million in 2020. The decrease in net operating cash flow year-over-year was primarily driven by a significant change in working capital compared to the prior year, mainly increases in accounts receivable, due to higher net sales and in inventory, due to higher costs as well as building inventories in response to global supply chain and logistics pressures. 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 7, below.

Overall, the Company's 2021 results were good and reflected the Company's ability to navigate through persistent raw material cost pressures, supply chain challenges and automotive semiconductor shortages. Increases in net sales in all segments were driven by the continued year-over-year improvement in the Company's end-markets and increased customer demand from lower levels experienced during 2020 as a result of COVID-19; however, each segment was negatively impacted by the significant escalation of

raw material costs as well as higher levels of SG&A compared to the prior year which included certain temporary cost saving measures adopted during the onset of COVID-19. Continued strong customer demand in 2021 coupled with ongoing new business wins and the execution of integration activities and synergy realization helped to partially offset the negative impacts from the continued escalation of raw material costs and continued supply chain pressures.

As the Company looks toward 2022, the business is well positioned to continue to outpace market growth rates and deliver value-added solutions and services to its customers. Demand remains healthy across most of our end markets; however, the Company expects raw material cost pressures and supply chain disruptions to persist throughout 2022. To mitigate these headwinds, the Company continues to implement further price actions and is actively managing its cost structure. The Company believes these actions will begin to drive a recovery in margins as it progresses through 2022. The Company remains committed to advancing its customer intimate strategy and sustainability program and delivering earnings growth in 2022 and beyond.

On-going impact of COVID-19

The global outbreak of COVID-19 has negatively impacted all locations where the Company does business. Although the Company has now operated in this COVID-19 environment for almost two years, the full extent of the outbreak and related business impacts continue to remain uncertain and volatile, and therefore the full extent to which COVID-19 may impact the Company's future results of operations or financial condition is uncertain. This outbreak has significantly disrupted the operations of the Company and those of its suppliers and customers. During the pandemic, the Company initially experienced volume declines and lower net sales as compared to pre-COVID-19 levels, as further described in this section. Management continues to monitor the impact that the COVID-19 pandemic is having on the Company, the overall specialty chemical industry and the economies and markets in which the Company operates. The prolonged pandemic and resurgences of the outbreak including as new variants continue to emerge, and continued restrictions on day-to-day life and business operations as well as increased border controls or closures and transportation disruptions may result in volume declines and lower net sales in future periods. To the extent that the Company's customers and suppliers continue to be significantly and adversely impacted by COVID-19, this could reduce the availability, or result in delays, of materials or supplies to or from the Company, which in turn could significantly interrupt the Company's business operations. Given this ongoing uncertainty, the Company cautions that its future results of operations could be significantly adversely impacted by COVID-19. Further, management continues to evaluate how COVID-19-related circumstances, such as remote work arrangements, illness or staffing shortages and travel restrictions have affected financial reporting processes and systems, internal control over financial reporting, and disclosure controls and procedures. While the circumstances have presented and are expected to continue to present challenges, and have necessitated additional time and resources to be deployed to sufficiently address the challenges brought on by the pandemic, at this time, management does not believe that COVID-19 has had a material impact on financial reporting processes, internal controls over financial reporting, or disclosure controls and procedures.

The Company's top priority, especially during this pandemic, is to protect the health and safety of its employees and customers, while working to ensure business continuity to meet customers' needs. The Company continues to take steps to protect the health and wellbeing of its people in affected areas through various actions, including enabling work at home where needed and practicable, and employing social distancing standards, implementing travel restrictions where applicable, enhancing onsite hygiene practices, and instituting visitation restrictions at the Company's facilities. The Company has not and does not expect that it will incur material expenses implementing these health and safety policies. All of the Company's more than 30 production facilities worldwide are open and operating and are deemed as essential businesses in the jurisdictions where they are operating. The Company believes that to date it has been able to meet the needs of all its customers across the globe despite the current economic challenges. The Company's fiscal year 2021 showed year-over-year improvement from the prior fiscal year and continued a trend of gradual volume improvement which began in the second half of 2020. The Company continues to expect that the impacts from COVID-19 will gradually decline subject to the effective containment of the virus and its variants and successful distribution and acceptance of the available vaccines and treatments. However, the incidence of reported cases of COVID-19 or a variant in several geographies where the Company has significant operations remains high and continues to evolve and it remains highly uncertain as to how long the global pandemic and related economic challenges will last and when our customers' businesses will recover to pre-COVID-19 levels. The Company took various actions to temporarily conserve cash and reduce costs since the onset of the pandemic and these temporary initiatives were designed and implemented so that the Company could successfully manage through the challenging COVID-19 situation while continuing to protect the health of its employees, meet customers' needs, maintain the Company's long-term competitive advantages and above-market growth, and enable it to continue to effectively integrate Houghton. While the actions taken to date to protect our workforce, to continue to serve our customers with excellence and to conserve cash and reduce costs, have been effective thus far, further actions to respond to the pandemic and its effects may be necessary as conditions continue to evolve.

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 thereof 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 $12.3 million and $13.1 million as of December 31, 2021 and 2020, respectively. The Company recorded expense to increase its provision for doubtful accounts by $0.7 million, $3.6 million and $1.9 million for the years ended December 31, 2021, 2020 and 2019, 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 $0.1 million, $0.4 million and $0.2 million for the years ended December 31, 2021, 2020 and 2019, 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. The Company would record an impairment charge to an investment if it concluded that 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, 2021 was $95.3 million, which included four investments: $21.5 million for a 32% interest in Primex, Ltd. (Barbados); $7.1 million for a 50% interest in Nippon Quaker Chemical, Ltd. (Japan); $0.3 million for a 50% interest in Kelko Quaker Chemical, S.A. (Panama); and $66.4 million for a 50% interest in Korea Houghton Corporation (Korea). 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 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, 2021 and 2020, 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 to be sustained upon audit based upon the technical merits of the tax position. For tax positions that are determined to be more likely than not to be 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.

Pursuant to the Tax Cuts and Jobs Act ("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. As of December 31, 2021, $7.0 million in installment have been paid with the remaining $8.5 million to be paid through installments in future years. 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, 2021, the Company has a deferred tax liability of $8.4 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, 2021 was approximately $377.4 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. The Company completes its annual goodwill and indefinite-lived intangible asset impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment. The Company's consolidated goodwill at both December 31, 2021 and 2020 was $631.2 million. The Company completed its annual impairment assessment over goodwill during the fourth quarter of 2021 by performing a qualitative assessment. Based on the assessment performed, the Company concluded that there was no evidence of events or circumstances that would indicate a material change from the Company's prior year quantitative assessment by reporting unit and, therefore, no impairment charges were warranted. The Company's consolidated indefinite-lived intangible assets at December 31, 2021 and 2020 were $196.9 million and $205.1 million, respectively, which primarily consists of Houghton and Fluidcare™ trademarks and tradename. The Company completed its annual indefinite-lived intangible asset impairment assessment during the fourth quarter of 2021, and determined that no impairment charge was warranted. The determination of estimated fair value of these indefinite-lived intangible assets is based on a relief from royalty valuation method, which requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to royalty rates, as well as revenue growth rates and terminal growth rates. The Company's impairment assessment concluded that the carrying value of acquired Houghton and Fluidcare™ trademarks and tradename intangible assets exceeded fair value by approximately 61%. See Note 16 of Notes to Consolidated Financial Statements in Item 8 of this Report.

As previously disclosed, as of March 31, 2020, the Company concluded that the impact of COVID-19 did not represent a triggering event with regards to any of the Company's indefinite-lived and long-lived assets, except for the Company's Houghton and Fluidcare™ trademarks and tradename indefinite-lived intangible assets. In the first quarter of 2020, as a result of the impact of COVID-19 driving a decrease in projected legacy Houghton net sales during that year and the impact of the sales decline on projected future legacy Houghton net sales as well as an increase in the weighted average cost of capital assumption utilized in the quantitative impairment assessment, the Company concluded that the estimated fair values of the Houghton and Fluidcare™ trademarks and tradename intangible assets were less than their carrying values. As a result, an impairment charge of $38.0 million was recorded during the first quarter of 2020 to write down the carrying values of these intangible assets to their estimated fair values.

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 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, 2021:

	1/2 Percentage Point Increase			1/2 Percentage Point Decrease		
(dollars in millions)	**Foreign**	**U.S.**	**Total**	**Foreign**	**U.S.**	**Total**
Discount rate (1)	$ (0.2)	$ 0.2	$ 0.0	$ 0.3	$ (0.2)	$ 0.1
Expected rate of return on plan assets (2)	0.5	0.2	0.7	(0.5)	(0.2)	(0.7)

(1) The weighted-average discount rate used to determine net periodic benefit costs for the year ended December 31, 2021 was 1.4% for Foreign plans and 2.7% 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, 2021 was 2.1% for Foreign plans and 5.8% 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, 2021, the Company had cash, cash equivalents and restricted cash of $165.2 million. Total cash, cash equivalents and restricted cash was $181.9 million at December 31, 2020. The $16.7 million decrease in cash, cash equivalents and restricted cash was the net result $49.1 million of cash used in investing activities, $13.5 million of cash used in financing activities and approximately $3.1 million of negative impacts due to the effect of foreign currency translation on cash, partially offset by $48.9 million of cash provided by operating activities.

Net cash flows provided by operating activities were $48.9 million in 2021 compared to $178.4 million in 2020. The Company's current year net operating cash flow decrease was primarily driven by a significant change in working capital which more than offset the Company's higher earnings in 2021. The significant increase in current year net sales resulted in a large increase in accounts receivable in 2021 as compared to a significant decrease during 2020 as net sales and the associated accounts receivables significantly declined in 2020 due to the negative impact from COVID-19. In addition, the Company has experienced an increase in inventory in 2021 as a result of continued rising raw material costs as well as a build in inventory to ensure the Company has appropriate stock to meet customer demands in response to ongoing stress on the global supply chain.

Net cash flows used in investing activities were $49.1 million in 2021 compared to $71.4 million in 2020. This $22.3 million decrease in cash outflows used in investing activities was due to lower cash payments related to acquisitions during 2021 as a result of the level of acquisition activity in each year and higher cash proceeds from the disposition of assets, which includes the sale of certain held-for-sale real property assets related to the Combination. Capital expenditures also increased to $21.5 million in 2021 compared to $17.9 million in 2020 due to the continued strategic and integration related capital investments the Company has and continues to make.

Net cash flows used in financing activities were $13.5 million in 2021 compared to $75.3 million in 2020. The $61.8 million decrease in net cash outflows from financing activities was primarily driven by an increase in borrowings in the current year under the Company's revolving credit facility compared to repayments in the prior year which was driven by significant working capital investment in the current year described above. In addition, the Company paid $28.6 million of cash dividend during 2021, a $1.0 million or 4% increase in cash dividends compared to the prior year due to cash dividend per share increases. Finally, during 2020, the Company used $1.0 million to purchase the remaining noncontrolling interest in one of its South African affiliates. Prior to this buyout, this South African affiliate made a distribution to the prior noncontrolling affiliate shareholder of approximately $0.8 million in 2020. There were no similar noncontrolling interest activities in 2021.

The Company's primary credit facility (the "Credit Facility") is comprised of a $400.0 million multicurrency revolver (the "Revolver"), a $600.0 million 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 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 Credit Facility bear interest at a base rate or LIBOR plus an applicable margin based upon the Company's consolidated net leverage ratio. On December 10, 2021, the Company amended the Credit Facility to include an update to provide for the use of a non-USD currency LIBOR successor rate. The weighted average interest rate incurred on the outstanding borrowings under the Credit Facility during the year ended and as of December 31, 2021 was approximately 1.6%. In addition to paying interest on outstanding principal under the Credit Facility, the Company is required to pay a commitment fee ranging from 0.2% to 0.3% depending on the Company's consolidated net leverage ratio to the lenders under the Revolver in respect of the unutilized commitments thereunder.

The Credit Facility is subject to certain financial and other covenants. The Company's initial consolidated net debt to consolidated adjusted EBITDA ratio could not exceed 4.25 to 1, with step downs in the permitted ratio over the term of the Credit Facility. As of December 31, 2021, the consolidated net debt to consolidated adjusted EBITDA ratio may not exceed 3.75 to 1. The Company's consolidated adjusted EBITDA to interest expense ratio may not be less than 3.0 to 1 over the term of the agreement. The Credit Facility also prohibits the payment of cash dividends if the Company is in default or if the amount of the dividends paid annually exceeds 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. As of December 31, 2021 and 2020, the Company was in compliance with all of the Credit Facility covenants. The Term Loans have quarterly principal amortization during their five year terms, 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 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 are guaranteed only by certain foreign subsidiaries on an unsecured basis.

The 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 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 Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, and as of December 31, 2021, the aggregate interest rate on the swaps, including the fixed base rate plus an applicable margin, was 3.1%.

The Company capitalized $23.7 million of certain third-party debt issuance costs in connection with executing the 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 are being amortized into interest expense over the five year term of the Credit Facility.

As of December 31, 2021, the Company had Credit Facility borrowings outstanding of $889.6 million. As of December 31, 2020, the Company had Credit Facility borrowings outstanding of $887.1 million. The Company has unused capacity under the Revolver of approximately $184 million, net of bank letters of credit of approximately $4 million, as of December 31, 2021. The Company's other debt obligations are primarily industrial development bonds, bank lines of credit and municipality-related loans, which totaled $11.8 million and $12.1 million as of December 31, 2021 and 2020, respectively. Total unused capacity under these arrangements as of December 31, 2021 was approximately $26 million. The Company's total net debt as of December 31, 2021 was $736.2 million.

The Company estimates that it realized full year cost synergies related to the Combination in 2021 of approximately $75 million compared to $58 million in 2020. The Company has fully achieved its annual target Combination cost synergies of approximately $80 million going forward. The Company incurred $18.6 million of total Combination, integration and other acquisition-related expenses in 2021, which includes $0.7 million of accelerated depreciation and is net of a $5.4 million gain on the sale of certain held-for-sale real property assets and $0.6 million of other income related to an indemnification asset, described in the Non-GAAP Measures section of this Item below. The Company had aggregate net cash outflows of approximately $20.6 million related to the Combination, integration and other acquisition-related expenses during 2021. Comparatively, in 2020, the Company incurred $30.3 million of total Combination, integration and other acquisition-related expenses, including $0.8 million of accelerated depreciation, a $0.6 million loss on the sale of held-for-sale assets, an $0.8 million of other income related to an indemnification asset, and aggregate net cash outflows related to these costs were approximately $29.4 million. While the Company has incurred significant integration costs in 2019, 2020 and 2021, the Company expects to incur additional integration and operating costs as well as higher capital expenditures to further optimize its footprint, processes and other functions over the next several years.

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 and recorded $26.7 million in restructuring and related charges in 2019. The Company recognized an additional $1.4 million and $5.5 million of restructuring and related charges in 2021 and 2020, respectively, as a result of the QH Program. The QH Program includes restructuring and associated severance costs to reduce total headcount by approximately 400 people globally and plans for the closure of certain manufacturing and non-manufacturing facilities. In connection with the plans for closure of certain manufacturing and non-manufacturing facilities, the Company made a decision to make available for sale certain facilities during the second quarter of 2020. During the first quarter of 2021 and fourth quarter of 2020, certain of these facilities were sold and the Company recognized a gain on disposal of $5.4 million and a loss on disposal of $0.6 million, respectively, included within other income (expense), net on the Consolidated Statement of Income. The exact timing and total costs associated with the QH Program will depend on a number of factors and is subject to change; however, reductions in headcount and site closures have continued, and the Company currently expects additional headcount reductions and site closures to occur into 2022 and estimates that the anticipated cost synergies realized under the QH Program will approximate one-times restructuring costs incurred. The Company made cash payments related to the settlement of restructuring liabilities under the QH Program during 2021 of approximately $5.3 million compared to $15.7 million in 2020.

During the first quarter of 2020, the Company completed the termination of the Legacy Quaker U.S. Pension Plan and funded the plan on a termination basis with approximately $1.8 million, subject to final true up adjustments. In the third quarter of 2020, the Company finalized the amount of liability and related annuity payments and received a refund in premium of $1.6 million. In addition, the Company recorded a non-cash pension settlement charge at plan termination of approximately $22.7 million in the first quarter of 2020.

As of December 31, 2021, the Company's gross liability for uncertain tax positions, including interest and penalties, was $28.7 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 $7.3 million as a result of offsetting benefits in other tax jurisdictions. During the year ended 2021, the Company recorded $13.1 million of non-income tax credits for certain of its Brazilian subsidiaries. The Company expects to utilize these credits to offset certain Brazilian federal tax payments over approximately two years, which began in the fourth quarter of 2021. See Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report.

During the third quarter of 2021, two of the Company's locations suffered property damage as a result of flooding and fire. The Company maintains property insurance for all of its facilities globally. The Company, its insurance adjuster and insurance carrier are actively managing the remediation and restoration activities associated with both of these events and at this time the Company has concluded, based on all available information and discussions with its insurance adjuster and insurance carrier, that the losses incurred during 2021 will be covered under the Company's property insurance coverage, net of an aggregate deductible of $2.0 million. The Company has received payments from its insurers of $2.1 million and has recorded an insurance receivable associated with these events of $0.7 million as of December 31, 2021. The Company and its insurance carrier continue to review the impact on operations as it relates to a potential business interruption insurance claim; however, as of the date of this report, the Company cannot reasonably estimate any probable amount of business interruption insurance claim recoverable, therefore the Company has not recorded a gain contingency for a possible business interruption insurance claim as of December 31, 2021. See Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report.

The Company believes that its existing cash, anticipated cash flows from operations and available additional liquidity will be sufficient to support its operating requirements and fund its business objectives for at least the next twelve months and beyond, including but not limited to, payments of dividends to shareholders, costs related to the Combination and other acquisitions and as well as ongoing integration and optimization, pension plan contributions, capital expenditures, other business opportunities (including potential acquisitions), implementing actions to achieve the Company's sustainability goals and other potential contingencies. The Company's liquidity is affected by many factors, some based on normal operations of our business and others related to the impact of the pandemic on our business and on global economic conditions as well as industry uncertainties, which we cannot predict. We also cannot predict economic conditions and industry downturns or the timing, strength or duration of recoveries. We may seek, as we believe appropriate, additional debt or equity financing which would provide capital for corporate purposes, working capital funding, additional liquidity needs or to fund future growth opportunities, including possible acquisitions and investments. The timing and amount of potential capital requirements cannot be determined at this time and will depend on a number of factors, including the actual and projected demand for our products, specialty chemical industry conditions, competitive factors, and the condition of financial markets, among others.

The following table summarizes the Company's contractual obligations as of December 31, 2021, and the effect such obligations are expected to have on its liquidity and cash flows in future periods. Pension and postretirement plan contributions beyond 2021 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, 2021.

(dollars in thousands)	Payments due by period						
Contractual Obligations	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027 and Beyond**
Long-term debt	$ 900,633	$ 56,759	$ 75,553	$ 758,045	$ 122	$ 80	$ 10,074
Interest obligations	39,975	14,287	13,184	10,751	526	526	701
Capital lease obligations	868	219	212	196	176	65	-
Operating leases	41,395	11,346	9,041	7,017	5,292	4,197	4,502
Purchase obligations	3,652	3,197	416	39	-	-	-
Transition tax	8,500	-	1,529	3,099	3,872	-	-
Pension and other postretirement plan contributions	13,347	13,347	-	-	-	-	-
Other long-term liabilities (See Note 22 of Notes to Consolidated Financial Statements)	12,040	-	-	-	-	-	12,040
Total contractual cash obligations	$ 1,020,410	$ 99,155	$ 99,935	$ 779,147	$ 9,988	$ 4,868	$ 27,317

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 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 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 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, interest expense, net, and taxes on income before equity in net income of associated companies, in each case 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.

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,		
	2021	2020	2019
Operating income	$ 150,466	$ 59,360	$ 46,134
Houghton combination, integration and other acquisition-related expenses (a)	24,611	30,446	35,945
Restructuring and related charges (b)	1,433	5,541	26,678
Fair value step up of acquired inventory sold (c)	801	226	11,714
Executive transition costs (d)	2,986	-	-
Inactive subsidiary's non-operating litigation costs (e)	819	-	-
Customer bankruptcy costs (f)	-	463	1,073
Facility remediation costs, net (g)	1,509	-	-
Charges related to the settlement of a non-core equipment sale (h)	-	-	384
Indefinite-lived intangible asset impairment (i)	-	38,000	-
Non-GAAP operating income	$ 182,625	$ 134,036	$ 121,928
Non-GAAP operating margin (%) (r)	10.4%	9.5%	10.8%

EBITDA, Adjusted EBITDA, Adjusted EBITDA Margin and Non-GAAP Net Income Reconciliations	For the years ended December 31,		
	2021	2020	2019
Net income attributable to Quaker Chemical Corporation	$ 121,369	$ 39,658	$ 31,622
Depreciation and amortization (a)(p)	87,728	84,494	45,264
Interest expense, net (a)	22,326	26,603	16,976
Taxes on income before equity in net income of associated companies (q)	34,939	(5,296)	2,084
EBITDA	266,362	145,459	95,946
Equity income in a captive insurance company (j)	(4,993)	(1,151)	(1,822)
Houghton combination, integration and other acquisition-related expenses (a)	17,917	29,538	35,361
Restructuring and related charges (b)	1,433	5,541	26,678
Fair value step up of acquired inventory sold (c)	801	226	11,714
Executive transition costs (d)	2,986	-	-
Inactive subsidiary's non-operating litigation cost (e)	819	-	-
Customer bankruptcy costs (f)	-	463	1,073
Facility remediation costs, net (g)	2,066	-	-
Charges related to the settlement of a non-core equipment sale (h)	-	-	384
Indefinite-lived intangible asset impairment (i)	-	38,000	-
Pension and postretirement benefit (income) costs, non-service components (k)	(759)	21,592	2,805
Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery (l)	-	(18,144)	(60)
Brazilian non-income tax credits (m)	(13,087)	-	-
Currency conversion impacts of hyper-inflationary economies (n)	564	450	1,033
Adjusted EBITDA	$ 274,109	$ 221,974	$ 173,112
Adjusted EBITDA margin (%) (r)	15.6%	15.7%	15.3%
Adjusted EBITDA	$ 274,109	$ 221,974	$ 173,112
Less: Depreciation and amortization - adjusted (a)	87,002	83,732	44,680
Less: Interest expense, net - adjusted (a)	22,326	26,603	14,896
Less: Taxes on income before equity in net income of associated companies - adjusted (o)(q)	41,976	26,488	24,825
Non-GAAP net income	$ 122,805	$ 85,151	$ 88,711

Non-GAAP Earnings per Diluted Share Reconciliations

	For the years ending December 31,		
	2021	2020	2019
GAAP earnings per diluted share attributable to Quaker Chemical Corporation common shareholders	$ 6.77	$ 2.22	$ 2.08
Equity income in a captive insurance company per diluted share (j)	(0.28)	(0.07)	(0.12)
Houghton combination, integration and other acquisition-related expenses per diluted share (a)	0.79	1.31	2.05
Restructuring and related charges per diluted share (b)	0.07	0.23	1.34
Fair value step up of acquired inventory sold per diluted share (c)	0.03	0.01	0.58
Executive transition costs per diluted share (d)	0.13	-	-
Inactive subsidiary's non-operating litigation costs per diluted share (e)	0.04	-	-
Customer bankruptcy costs per diluted share (f)	-	0.02	0.05
Facility remediation costs, net per diluted share (g)	0.09	-	-
Charges related to the settlement of a non-core equipment sale per diluted share (h)	-	-	0.02
Indefinite-lived intangible asset impairment per diluted share (i)	-	1.65	-
Pension and postretirement benefit costs, non-service components per diluted share (k)	(0.04)	0.79	0.14
Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery per diluted share (l)	-	(0.78)	0.00
Brazilian non-income tax credits per diluted share (m)	(0.46)	-	-
Currency conversion impacts of hyper-inflationary economies per diluted share (n)	0.03	0.02	0.07
Impact of certain discrete tax items per diluted share (o)	(0.32)	(0.62)	(0.38)
Non-GAAP earnings per diluted share (s)	$ 6.85	$ 4.78	$ 5.83

(a) Houghton combination, integration and other acquisition-related expenses include certain legal, financial, and other advisory and consultant costs incurred in connection with post-closing integration activities including internal control readiness and remediation, as well as due diligence, regulatory approvals and closing the Combination. These costs are not indicative of the future operating performance of the Company. Approximately $0.6 million, $1.5 million and $9.4 million for the years ended December 31, 2021, 2020 and 2019, 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 2021, 2020 and 2019, the Company recorded $0.7 million, $0.8 million, and $0.6 million, respectively, of accelerated depreciation related to certain of the Company's facilities, which is included in the caption "Houghton combination, integration 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. During 2019, the Company incurred $2.1 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. During 2021 and 2020, the Company recorded $0.6 million and $0.8 million, respectively, of other income related to an indemnification asset. During 2021 and 2020, the Company recorded a gain of $5.4 million and a loss of $0.6 million, respectively, on the sale of certain held-for-sale real property assets related to the Combination. Each of these items are included in the caption "Houghton combination, integration and other acquisition expenses" in the reconciliation of GAAP earnings per diluted share attributable to Quaker Chemical Corporation common shareholders to Non-GAAP earnings per diluted share as well as the reconciliation of Net Income attributable to Quaker Chemical Corporation to Adjusted EBITDA and Non-GAAP net income See Note 2 and Note 9 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(b) Restructuring and related charges represent 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, which appears in Item 8 of this Report.

(c) Fair value step up of inventory sold relates to expense associated with selling inventory of acquired businesses which was adjusted to fair value as part of purchase accounting. This increases to costs of goods sold ("COGS") are not indicative of the future operating performance of the Company.

(d) Executive transition costs represent the costs related to the Company's search, hiring and transition to a new CEO in connection with the executive transition that look place in 2021. These expenses are not indicative of the future operating performance of the Company.

(e) Inactive subsidiary's non-operating litigation costs represents the charges incurred by an inactive subsidiary of the Company and are a result of the termination of restrictions on insurance settlement reserves. These charges are not indicative of the future operating performance of the Company. See Note 26 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(f) Customer bankruptcy costs represent the cost associated with a specific reserve for trade accounts receivable related to a customer 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, which appears in Item 8 of this Report.

(g) Facility remediation costs, net, presents the gross costs associated with remediation, cleaning and subsequent restoration costs associated with the property damage to certain of the Company's facilities, net of insurance recoveries received. These charges are non-recurring and are not indicative of the future operating performance of the Company. See Note 26 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(h) 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.

(i) Indefinite-lived intangible asset impairment represents the non-cash charge taken to write down the value of certain indefinite-lived intangible assets associated with the Combination. The Company has no prior history of goodwill or intangible asset impairments and this charge is not indicative of the future operating performance of the Company. See Note 16 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(j) 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 32% 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.

(k) Pension and postretirement benefit (income) 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. The year ended December 31, 2020 includes a $22.7 million settlement charge for the Company's termination of the Legacy Quaker U.S. Pension Plan. See Note 21 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(l) Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery represents income associated with the gain on the termination of restrictions on insurance settlement reserves and the 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, which appears in Item 8 of this Report.

(m) Brazilian non-income tax credits represent indirect tax credits related to certain of the Company's Brazilian subsidiaries prevailing in a legal claim as well as the Brazil Supreme Court ruling on these non-income tax matters. The non-income tax credit is non-recurring and not indicative of the future operating performance of the Company. See Note 26 of Note to Consolidated Financial Statements, which appears in Item 8 of this Report.

(n) 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's Argentine Houghton subsidiary also applies hyper-inflationary accounting. During 2021, 2020 and 2019, the Company incurred non-deductible, pre-tax charges related to the Company's Argentine affiliates. 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, which appears in Item 8 of this Report.

(o) The impacts of certain discrete tax items includes the impact of changes in certain valuation allowances recorded on certain of the Company's foreign tax credits, tax law changes in foreign jurisdictions, changes in withholding tax rates, the tax impacts of non-income tax credits associated with certain of the Company's Brazilian subsidiaries and the associated impact on previously accrued for distributions at certain of the Company's Asia/Pacific subsidiaries, the one-time deferred tax benefit recorded on the transfer of intangible assets between the Company's subsidiaries as well as the offsetting impact and amortization of a deferred

tax benefit the Company recorded during 2020 and 2019 related to similar intercompany intangible asset transfers. Additionally, the 2019 amounts include certain transition tax adjustments related to adjustments to adopt U.S. Tax Reform. See Note 10 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.

(p) Depreciation and amortization for the years ended December 31, 2021, 2020 and 2019 includes $1.2 million, $1.2 million and $0.4 million, respectively, of amortization expense recorded within equity in net income of associated companies in the Company's Consolidated Statements of Income, which is attributable to the amortization of the fair value step up for the Company's 50% interest Korea Houghton Corporation as a result of required purchase accounting.

(q) 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. Houghton combination, integration and other acquisition-related expenses described in (a) resulted in incremental taxes of $4.2 million for 2021, $6.9 million for 2020, and $6.7 million for 2019. Restructuring and related charges described in (b) resulted in incremental taxes of $0.3 million for 2021, $1.4 million for 2020 and $6.2 million for 2019. Fair value step up of inventory sold described in (c) resulted in incremental taxes of $0.2 million, less than $0.1 million and $2.9 million for 2021, 2020 and 2019, respectively. Executive transition expenses described in (d) resulted in incremental taxes of $0.7 million for 2021. Inactive subsidiary non-operating litigation costs described in (e) resulted in incremental taxes of $0.2 million for 2021. Customer bankruptcy costs described in (f) resulted in incremental taxes of $0.1 million in 2020 and $0.3 million in 2019. Facility remediation costs, net described in (g) results in incremental taxes of $0.5 million for 2021. Charges related to the settlement of a non-core equipment sale described in (h) resulted in incremental taxes of $0.1 million for 2019. Indefinite-lived intangible asset impairment described in (i) resulted in incremental taxes of $8.7 million for 2020. Pension and postretirement benefit (income) costs, non-service components described in (k) resulted in a reduction of taxes of $0.1 million for 2021 and incremental taxes of $7.5 million for 2020, and $0.7 million for 2019. Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery described in (l) resulted in a reduction of taxes of $4.2 million in 2020 and less than $0.1 million in 2019. Brazilian non-income tax credits described in (m) resulted in a reduction of taxes of $4.8 million for 2021. The impact of certain discrete items described in (o) resulted in a tax benefit of $5.8 million for 2021, incremental taxes of $11.2 million for 2020, and a reduction of taxes of $5.7 million in 2019.

(r) 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.

(s) 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 commitments or obligations as of December 31, 2021. The Company's only off-balance sheet commitments or obligations outstanding as of December 31, 2021 represented approximately $6 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 Consolidated Financial Statements in Item 8 of this Report.

Operations

Consolidated Operations Review – Comparison of 2021 with 2020

Net sales were $1,761.2 million in 2021 compared to $1,417.7 million in 2020. The net sales increase of approximately $343.5 million or 24% year-over-year was primarily due to higher sales volumes of 13%, which includes additional net sales from recent acquisitions of 4%, increases from selling price and product mix of 8% and the positive impact of foreign currency translation of 3%. The increase in organic sales volumes compared to 2020 was primarily the result of the continued year-over-year improvement in end market conditions from the prior year impacts of COVID-19 and continued market share gains. Sales from acquisitions is primarily driven by the Company's acquisition of Coral Chemical Company ("Coral") in December 2020 and the tin-plating solutions business acquired in February 2021. The increase from selling price and product mix includes the impact of current year selling price increases implemented in response to the increases in raw material costs experienced in 2021. The positive impact from foreign currency translation is primarily the result of the strengthening of the Chinese renminbi, euro, Mexican peso, the Canadian dollar and the British pound against the U.S. dollar year-over-year.

COGS were $1,166.5 million in 2021 compared to $904.2 million in 2020. The increase in COGS of 29% was driven by the associated COGS on the increase in net sales described above, and continued increases in the Company's global raw material costs compared to the prior year and the impacts of supply constraints in the current year.

Gross profit in 2021 of $594.6 million increased $81.2 million or approximately 16% from 2020, due primarily to the increase in net sales noted above. The Company's reported gross margin in 2021 was 33.8% compared to 36.2% in 2020. The lower current year gross margin is primarily attributable to increased raw materials and other costs that began in the fourth quarter of 2020 and have continued throughout 2021 and the impacts of constraints on the world's global supply chain partially offset by the Company's ongoing pricing initiatives.

SG&A in 2021 increased $38.1 million compared to 2020 due primarily to the impact of sales increases on direct selling costs, year-over-year inflation increases, additional SG&A from recent acquisitions and higher SG&A due to foreign currency translation, partially offset by lower incentive compensation year-over-year as well as the benefits of additional realized cost synergies associated with the Combination year-over-year. In addition, SG&A was lower in the prior year period as a result of temporary cost saving measures the Company implemented in response to COVID-19. While the Company continues to manage costs during the on-going pandemic, it has incurred higher SG&A year-over-year as the global economy continues to gradually rebound.

During 2021 and 2020, the Company incurred $23.9 million and $29.8 million, respectively, of Combination, integration and other acquisition-related expenses primarily for professional fees related to Houghton integration and other acquisition-related activities. See the Non-GAAP Measures section of this Item, above.

The Company initiated a restructuring program during 2019 as part of its global plan to realize cost synergies associated with the Combination. The Company incurred restructuring and related charges for reductions in headcount and site closures under this program, net of adjustments to initial estimates for severance, of an expense of $1.4 million and $5.5 million during 2021 and 2020, respectively. See the Non-GAAP Measures section of this Item, above.

Operating income in 2021 was $150.5 million compared to $59.4 million in 2020. Excluding Combination, integration and other acquisition-related expenses, restructuring and related charges and other non-core items, the Company's current year non-GAAP operating income of $182.6 million increased compared to $134.0 million in the prior year, primarily due to the increase in net sales described above and the benefits from cost savings related to the Combination offset by an increase in SG&A as well as the significant increases in raw material costs year-over-year. The Company estimates that it realized cost synergies associated with the Combination of approximately $75 million during 2021 compared to approximately $58 million during 2020.

The Company had other income, net, of $18.9 million in 2021 compared to other expense, net, of $5.6 million in 2020. The year-over-year change was primarily a result of other income related to certain non-income tax credits recorded by the Company's Brazilian subsidiaries, the gain on the sale of certain held-for-sale real property assets and lower foreign currency transaction losses in 2021 as compared to the prior year. The Company had non-service components of pension and postretirement benefit income in the current year compared to an expense in the prior year as a result of the $22.7 million pension settlement charge directly related to the termination of the Legacy Quaker U.S. pension plan partially offset by a $18.1 million gain related to the lapse of restrictions over certain cash that was previously designated solely for the settlement of asbestos claims at an inactive subsidiary, all of which are described in the Non-GAAP Measures section of this Item, above.

Interest expense, net, decreased $4.3 million compared to 2020 driven by lower current year average borrowings outstanding as a result of the additional revolver borrowings drawn during part of 2020 at the onset of the pandemic to add additional liquidity, coupled with a decline in overall interest rates year-over-year, as the weighted average interest rate incurred on borrowings under the Company's credit facility was approximately 1.6% during 2021 compared to approximately 2.2% during 2020.

The Company's effective tax rates for 2021 and 2020 were an expense of 23.8% and benefit of 19.5%, respectively. The Company's higher current year effective tax rate is driven by a higher level of pre-tax earnings and mix of earnings, as well as deferred tax expense related to the planned repatriation of non-U.S. earnings. In addition, the rate was impacted by certain one-time charges and benefits related to an intercompany intangible asset transfer and related royalty income recognition offset by changes in the valuation allowance for foreign tax credits. Comparatively, the prior year effective tax rate was impacted by the tax effect of certain one-time tax charges and benefits related to a 2020 intercompany intangible asset transfer, additional charges for uncertain tax positions relating to certain foreign tax audits, and the tax impact of the Company's termination of its Legacy Quaker U.S. pension plan. Excluding the impact of these items as well as all other non-core items in each year, described in the Non-GAAP Measures section of this Item, above, the Company estimates that the 2021 and 2020 effective tax rates would have been approximately 26% and 25%, respectively. The higher estimated current year tax rate was primarily driven by a higher level of pre-tax earnings and the impact of changes in mix of earnings, deferred taxes related to the planned repatriation of non-U.S. earnings, and provision to return adjustments in the prior period. The Company may experience continued 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, the treatment of certain acquisition-related costs and the timing and amount of certain share-based compensation-related tax benefits, among other factors. In addition, the foreign tax credit valuation allowance, or absence thereof, is based on a number of variables, including forecasted earnings, which may vary.

Equity in net income of associated companies increased $2.0 million in 2021 compared to 2020, primarily due to higher current year income from the Company's interest in a captive insurance company partially offset by lower earnings from the Company's 50% interest in a joint venture in Korea compared to the prior year. See the Non-GAAP Measures section of this Item, above.

Net income attributable to noncontrolling interest was less than $0.1 million in 2021 compared to $0.1 million in 2020 primarily a result of the first quarter of 2020 acquisition of the remaining ownership interest in one of the Company's South African affiliates.

Foreign exchange positively impacted the Company's yearly results by approximately 6% driven by the positive impact from foreign currency translation on earnings as well as lower foreign exchange transaction losses in the current year as compared to the prior year.

Consolidated Operations Review – Comparison of 2020 with 2019

Net sales were $1,417.7 million in 2020 compared to $1,133.5 million in 2019. The net sales increase of 25% year-over-year includes additional net sales from acquisitions, primarily Houghton and Norman Hay, of $408.6 million. Excluding net sales related to acquisitions, the Company's prior year net sales would have declined approximately 11% which reflects a decrease in sales volumes of 9%, a negative impact from foreign currency translation of 1% and a decrease from selling price and product mix of 1%. The primary driver of the volume decline in the prior year was the negative impact of COVID-19 on global production levels.

COGS were $904.2 million in 2020 compared to $741.4 million in 2019. The increase in COGS of 22% was primarily due to the inclusion of a full year of Houghton and Norman Hay COGS and $0.8 million of accelerated depreciation charges in 2020, partially offset by lower prior year COGS on the decline in net sales due to COVID-19 and 2019 charges of $11.7 million to increase acquired inventory to its fair value, described in the Non-GAAP Measures section of this Item above.

Gross profit in 2020 increased $121.3 million or 31% from 2019 due primarily to additional gross profit from Houghton and Norman Hay. The Company's reported gross margin in 2020 was 36.2% compared to 34.6% in 2019, which included the inventory fair value step up described above. Excluding one-time increases to COGS in both periods, the Company estimates that its gross margins for 2020 and 2019 would have been 36.3% and 35.7%, respectively. The estimated increase in gross margin year-over-year was primarily due to lower COGS as a result of the Company's progress on Combination-related logistics, procurement and manufacturing cost savings initiatives, partially offset by the lower sales volumes on certain fixed manufacturing costs.

SG&A in 2020 increased $96.9 million compared to 2019 due primarily to additional SG&A from Houghton and Norman Hay, partially offset by the impact of COVID-19 cost savings actions, including lower travel expenses, and the benefits of realized costs savings associated with the Combination.

During 2020, the Company incurred $29.8 million of Combination, integration and other acquisition-related expenses, primarily for professional fees related to Houghton integration and other acquisition-related activities. Comparatively, the Company incurred $35.5 million of similar expenses in 2019, primarily due to various professional fees related to integration planning and regulatory approval as well as professional fees associated with closing the Combination. 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 recorded additional restructuring and related charges of $5.5 million during 2020 compared to $26.7 million during 2019 under this program. See the Non-GAAP Measures section of this Item, above.

During the first quarter of 2020, the Company recorded a $38.0 million non-cash impairment charge to write down the value of certain indefinite-lived intangible assets associated with the Combination. This non-cash impairment charge is related to certain acquired Houghton trademarks and tradenames and is primarily the result of the negative impacts of COVID-19 on their estimated fair values. There were no additional impairment charges in the remainder of 2020 or in 2019. See the Critical Accounting Policies and Estimates section as well as the Non-GAAP Measures section, of this Item, above.

Operating income in 2020 was $59.4 million compared to $46.1 million in 2019. Excluding Combination, integration and other acquisition-related expenses, restructuring and related charges, the non-cash indefinite-lived intangible asset impairment charge, and other expenses that are not indicative of the Company's future operating performance, the Company's non-GAAP operating income during 2020 of $134.0 million increased compared to $121.9 million in 2019, primarily due to additional operating income from Houghton and Norman Hay and the benefits from costs savings initiatives related to the Combination, partially offset by the current year negative impact due to COVID-19.

The Company's other expense, net, was $5.6 million in 2020 compared to $0.3 million in 2019. The year-over-year increase in other expense, net was primarily due to the first quarter of 2020 non-cash settlement charge of $22.7 million associated with the termination of the Legacy Quaker U.S. Pension Plan, partially offset by a fourth quarter of 2020 gain of $18.1 million related to the lapsing of restrictions over certain cash that was previously designated solely for the settlement of asbestos claims at an inactive subsidiary of the Company, which are both described in the Non-GAAP Measures section of this Item, above. Additionally, the increase year-over-year in other expense, net, includes higher foreign currency transaction losses in 2020.

Interest expense, net, increased $9.6 million in 2020 compared to 2019 primarily due to a full year of borrowings under the Company's Credit Facility to finance the closing of the Combination on August 1, 2019, partially offset by lower overall interest rates in the 2020.

The Company's effective tax rates for 2020 and 2019 were a benefit of 19.5% and an expense of 7.2%, respectively. The Company's 2020 effective tax rate was impacted by the tax effect of certain one-time tax charges and benefits, including deferred tax benefits related to an intercompany intangible asset transfer, as well as changes in the valuation allowance for foreign tax credits, additional charges for uncertain tax positions relating to certain foreign tax audits, and the tax impact of the Company's termination of its Legacy Quaker U.S. pension plan. Comparatively, the 2019 effective tax rate was primarily impacted by certain non-deductible costs associated with the Combination as well as a deferred tax benefit related to a separate intercompany intangible asset transfer. Excluding the impact of all non-core items in each year, described in the Non-GAAP measures section of this Item, above, the Company estimates that its effective tax rates for 2020 and 2019 were approximately 25% and 22%, respectively. The year-over-year increase is driven primarily by higher U.S. income taxes resulting from a change in certain deductions and the taxability of foreign earnings in the U.S., partially offset by a change in the mix of earnings.

Equity in net income of associated companies increased $2.3 million in 2020 compared to 2019, primarily due to additional earnings from our 50% interest in a joint venture in Korea partially offset by lower earnings from the Company's interest in a captive insurance company. See the Non-GAAP Measures section of this Item, above.

Net income attributable to noncontrolling interest was $0.1 million in 2020 compared to $0.3 million in 2019 primarily a result of the first quarter of 2020 acquisition of the remaining ownership interest in one of the Company's South African affiliates.

Foreign exchange negatively impacted the Company's 2020 results by approximately $0.38 per diluted share, primarily due to higher foreign exchange transaction losses year-over-year and, to a lesser extent, an aggregate negative impact from foreign currency translation on earnings.

Reportable Segments Review - Comparison of 2021 with 2020

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. The Company has four reportable 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.

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, such as certain corporate and administrative costs, Combination, integration and other acquisition-related expenses, Restructuring and related charges, and COGS related to acquired inventory sold, which is adjusted to fair value as part of purchase accounting, are not included in segment operating earnings. Other items not specifically identified with the Company's reportable segments include interest expense, net, and other income (expense), net.

Americas

Americas represented approximately 33% of the Company's consolidated net sales in 2021. The segment's net sales were $572.6 million, an increase of $122.5 million or 27% compared to 2020. The increase in net sales was driven by a benefit in selling price and product mix of 11%, increases in organic volumes of approximately 10%, additional net sales from acquisitions of 5%, and the positive impact of foreign currency translation of 1%. The current year organic volume increase was driven by the continued improvement in end market conditions compared to the prior year which was impacted by COVID-19. The increase in selling price and product mix is primarily driven by price increases implemented to help offset the significant increases in raw material and other input costs incurred during 2021. The foreign exchange impact was primarily driven by the strengthening of the Mexican peso against the U.S. dollar, as this exchange rate averaged 20.27 in 2021 compared to 21.34 during 2020. This segment's operating earnings were $124.9 million, an increase of $28.5 million or 30% compared to 2020. The increase in segment operating earnings reflects the higher net sales, described above, partially offset by lower gross margins driven by the continued raw material cost increases and global supply chain and logistics pressures coupled with higher SG&A including an increase in direct selling costs associated with higher net sales, SG&A from acquisitions and an increase in SG&A as the prior year included temporary cost savings measures implemented in response to the onset of the COVID-19 pandemic.

EMEA

EMEA represented approximately 27% of the Company's consolidated net sales in 2021. The segment's net sales were $480.1 million, an increase of $96.9 million or 25% compared to 2020. The increase in net sales was driven by a benefit from selling price and product mix of 10%, increases in organic volumes of approximately 9%, the positive impact of foreign currency translation of 4%, and additional net sales from acquisitions of 2%. The increase in selling price and product mix is primarily driven by price increases implemented to offset the significant increase in raw material and other input costs incurred during 2021. The current year volume increase was driven by the continued improvement in end market conditions compared to the prior year which was heavily impacted by COVID-19. The foreign exchange impact was primarily driven by the strengthening of the euro against the U.S. dollar as this exchange rate averaged 1.18 in 2021 compared to 1.14 in 2020. This segment's operating earnings were $85.2 million, an increase of $16.0 million or 23% compared to 2020. The increase in segment operating earnings reflects the higher net sales described above, partially offset by lower current year gross margins driven by the continued raw material cost increases and global supply chain and logistics pressures as well as higher SG&A including increases in direct selling costs associated with higher net sales as well as increases as the prior year included temporary cost savings measures implemented in response to the onset of the COVID-19 pandemic.

Asia/Pacific

Asia/Pacific represented approximately 22% of the Company's consolidated net sales in 2021. The segment's net sales were $388.2 million, an increase of approximately $72.9 million or 23% compared to 2020. The increase in net sales year-over-year was driven by increases in volumes of approximately 15%, the positive impact of foreign currency translation of 5%, increases from selling price and product mix of 2% and additional net sales from acquisitions of 1%. The current year volume increase was driven by the continued improvement in end market conditions compared to the prior year which was impacted by COVID-19. The foreign

exchange impact was primarily due to the strengthening of the Chinese renminbi against the U.S. dollar as this exchange rate averaged 6.45 in 2021 compared to 6.90 in 2020. This segment's operating earnings were $96.3 million, an increase of $8.0 million or 9% compared to 2020. The increase in segment operating earnings was driven by the higher net sales described above, partially offset by lower gross margins driven by the continued raw material cost increases and global supply chain and logistics pressures as well as higher direct selling costs associated with higher net sales and an increase in SG&A as the prior year included temporary cost savings measures implemented in response to the onset of the COVID-19 pandemic.

Global Specialty Businesses

Global Specialty Businesses represented approximately 18% of the Company's consolidated net sales in 2021. The segment's net sales were $320.2 million, an increase of $51.2 million or 19% compared to 2020. The increase in net sales was driven by increases in selling price and product mix, including Norman Hay, of 14%, additional net sales from acquisitions of 8%, and the positive impact of foreign currency translation of 2% partially offset by volume declines of approximately 5%. Both the changes in selling price and product mix and sales volumes were primarily driven by higher amounts of shipments of a lower priced product in the Company's mining business in the prior year. The foreign exchange impact was a result of similar strengthening of certain currencies in EMEA and Americas as described above. This segment's operating earnings were $90.6 million, an increase of $10.9 million or 14% compared to 2020. The increase in segment operating earnings reflects the higher net sales, described above, partially offset by lower gross margins in the current year coupled with higher SG&A, including an increase in direct selling costs associated with higher net sales, SG&A from acquisitions and an increase in SG&A as the prior year included temporary cost savings measures implemented in response to the onset of the COVID-19 pandemic.

Reportable Segments Review – Comparison of 2020 with 2019

Americas

Americas represented approximately 32% of the Company's consolidated net sales in 2020. The segment's net sales were $450.2 million, an increase of $58.0 million or 15% compared to 2019. The increase in net sales reflects additional net sales from acquisitions of $120.4 million, primarily a result of the inclusion of seven additional months of Houghton net sales, as the Combination closed on August 1, 2019. Excluding net sales from acquisitions, the segment's net sales decreased by approximately 16% due to lower volumes of 12% and a negative impact of foreign currency translation of 4%. The volume decline was driven by the economic slowdown that began in late March and continued throughout 2020 due to the impacts of COVID-19. The foreign exchange impact was primarily due to the weakening of the Brazilian real and the Mexican peso against the U.S. dollar, as these exchange rates averaged 5.10 and 21.34, respectively, in 2020 compared to 3.94 and 19.24, respectively in 2019. This segment's operating earnings were $96.4 million, an increase of $18.1 million or 23% compared to 2019. The increase in segment operating earnings reflects the inclusion of a full year of Houghton net sales, noted, above, and the impacts on gross margins and SG&A due to the Combination's cost synergies and costs savings actions related to COVID-19 year-over-year, partially offset by the impact of COVID-19 on sales volumes and higher COGS and SG&A due to seven additional months of Houghton in 2020.

EMEA

EMEA represented approximately 27% of the Company's consolidated net sales in 2020. The segment's net sales were $383.2 million, an increase of $97.6 million or 34% compared to 2019. The increase in net sales reflects additional net sales from acquisitions of $117.9 million, primarily a result of the inclusion of seven additional months of Houghton net sales, as the Combination closed on August 1, 2019. Excluding net sales from acquisitions, the segment's net sales decreased year-over-year by approximately 7% due to lower volumes of 10%, partially offset by a positive impact of foreign currency translation of 2% and increases in selling price and product mix of 1%. The current year volume decline was driven by the economic slowdown that began in late March and continued throughout 2020 due to the impacts of COVID-19. The foreign exchange impact was primarily due to the strengthening of the euro against the U.S. dollar as this exchange rate averaged 1.14 in 2020 compared to 1.12 in 2019. This segment's operating earnings were $69.2 million, an increase of $22.1 million or 47% compared to 2019. The increase in segment operating earnings reflects the inclusion of a full year of Houghton net sales, noted, above, and the impacts on gross margins and SG&A due to the Combination's cost synergies and costs savings actions related to COVID-19 year-over-year, partially offset by the impact of COVID-19 on sales volumes and higher COGS and SG&A due to seven additional months of Houghton in 2020.

Asia/Pacific

Asia/Pacific represented approximately 22% of the Company's consolidated net sales in 2020. The segment's net sales were $315.3 million, an increase of $67.5 million or 27% compared to 2019. The increase in net sales reflects the inclusion of seven additional months of Houghton net sales of $79.7 million, as the Combination closed on August 1, 2019. Excluding Houghton net sales, the segment's net sales decreased by approximately 5% year-over-year was due to lower volumes of 3% and decreases in selling price and product mix of 3% partially offset by the positive impact of foreign currency translation of 1%. The current year volume decline was driven by the economic slowdown that began in the first quarter of 2020 in China and in late March throughout the rest of the region due to the impacts of COVID-19. The foreign exchange impact was primarily due to the strengthening of the Chinese renminbi against the U.S. dollar. While this exchange rate averaged 6.90 in each of 2020 and 2019, respectively, post the closing of the Combination, this exchange rate strengthened in the last 5 months of 2020 to average 6.72 compared to 7.06 in the last 5 months of 2019, partially offset by the weakening of the Indian rupee against the U.S. dollar as this exchange rate averaged 73.95 in 2020 compared to 70.35 in 2019. This segment's operating earnings were $88.4 million, an increase of $20.8 million or 31% compared to

2019. The increase in segment operating earnings reflects the inclusion of incremental Houghton net sales, noted, above, and the impacts on gross margins and SG&A due to the Combination's cost synergies and costs savings actions related to COVID-19 year-over-year, partially offset by the impact of COVID-19 on sales volumes and higher COGS and SG&A due to seven additional months of Houghton in 2020.

Global Specialty Businesses

Global Specialty Businesses represented approximately 19% of the Company's consolidated net sales in 2020. The segment's net sales were $269.0 million, an increase of $61.1 million or 29% compared to 2019. The increase in net sales reflects the inclusion of seven additional months of Houghton net sales and nine additional months of Norman Hay net sales, totaling $90.6 million, as the Combination closed on August 1, 2019 and the Norman Hay acquisition closed on October 1, 2019. Excluding Houghton and Norman Hay net sales, the segment's net sales decreased by approximately 14% year-over-year due to lower volumes of 7%, decreases in selling price and product mix of 5% and a negative impact from foreign currency translation of 2%. The current year volume decline was primarily due to a decrease in the Company's specialty coatings business driven by Boeing's decision to temporarily stop production of the 737 Max aircraft and volume declines due to the economic slowdown resulting from COVID-19. Partially offsetting these volume declines, and contributing to the decrease in selling price and product mix, were higher shipments of a lower priced product in the Company's mining business compared to 2019. The foreign exchange impact was primarily due to the weakening of the Brazilian real against the U.S. dollar described in the Americas section, above. This segment's operating earnings were $79.7 million, an increase of $20.8 million or 35% compared to 2019. The increase in segment operating earnings reflects the inclusion of incremental Houghton and Norman Hay net sales, noted above, coupled with an increase in gross margin due to the Company's progress on Combination-related logistics, procurement and manufacturing cost savings initiatives, partially offset by higher SG&A, including seven additional months of Houghton and nine additional months of Norman Hay SG&A in 2020.

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. In 2020, the Santa Ana Regional Water Quality Control Board asked that ACP conduct some additional indoor and outdoor soil vapor testing on and near the ACP site to confirm that ACP continues to meet the applicable local standards and ACP has begun the testing program. Such testing began in 2020 and continued into 2021. As of December 31, 2021, 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, 2021, the Company believes that the range of potential-known liabilities associated with the balance of the 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.

The Company is party to environmental matters related to certain domestic and foreign properties. The Company'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, among 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 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 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. The Company 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 27 years, has estimated the present value range of costs for these environmental matters, on a discounted basis, to be between approximately $5.0 million and $6.0 million as of December 31, 2021, for which $5.6 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2021. Comparatively, as of December 31, 2020, the Company had $6.0 million accrued with respect to these matters.

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 $0.4 million and $0.1 million were accrued as of December 31, 2021 and 2020, 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. The current economic environment associated with COVID-19 has led to significant volatility and uncertainty with each of these market risks. See Item 1A. "Risk Factors." of this Report for additional discussions of the current and potential risks associated with the COVID-19 pandemic. Except as otherwise disclosed below, the market risks discussed below did not change materially from December 31, 2020.

Interest Rate Risk. The Company's exposure to changes in interest rates relates primarily to its borrowings under the Credit Facility. Borrowings under the Credit Facility bear interest at a specified benchmark plus an applicable margin based upon the Company's consolidated net leverage ratio and the currency of the borrowing. In December 2021, the Company entered into the Second Amendment to provide an update for the use of a non-USD currency LIBOR successor rate. At this time, it remains uncertain what rate will succeed LIBOR for loans denominated in U.S. dollars. As a result of the variable interest rates applicable under the Credit Facility, including with respect to any future successor rate if interest rates rise significantly, the cost of debt to the Company could increase as well. This could 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, 2021, the Company had outstanding borrowings under the Credit Facility of approximately $889.6 million. The variable interest rate incurred on the outstanding borrowings under the Credit Facility during the year ended December 31, 2021 was approximately 1.6%. If interest rates had changed by 10% during 2021, the Company's interest expense for the period ended December 31, 2021 on its credit facilities, including the Credit Facility borrowings outstanding post-closing of the Combination, would have correspondingly increased or decreased by approximately $0.8 million.

The 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 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 Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps and as of December 31, 2021, the aggregate interest rate on the swaps, including the fixed base rate plus an applicable margin, 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 2021 revenues and pre-tax earnings would have correspondingly decreased or increased by approximately $98.8 million and $11.7 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 70% 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 $17.6 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 $0.7 million, $3.6 million and $1.9 million for the years ended December 31, 2021, 2020 and 2019, 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 $0.1 million, $0.4 million and $0.2 million for the years ended December 31, 2021, 2020 and 2019, 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, 2021 and 2020, 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, 2021, 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, 2021, 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, 2021 and 2020, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2021 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

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 on Internal Control over Financial Reporting appearing under Item 9A. 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 Baron Industries and Grindaix GmbH from its assessment of internal control over financial reporting as of December 31, 2021 because they were acquired by the Company in purchase business combinations during 2021. We have also excluded Baron Industries and Grindaix from our audit of internal control over financial reporting. Baron Industries and Grindaix are wholly-owned subsidiaries whose total assets and total revenues excluded from management's assessment and our audit of internal control over financial reporting for each entity represent less than 1% of the related consolidated financial statement amounts as of and for the year ended December 31, 2021.

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 matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates 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 matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Houghton Trademarks and Tradename – Annual Impairment Assessment

As described in Note 16 to the consolidated financial statements, the Company's consolidated other intangible assets, net balance was $1,027.8 million as of December 31, 2021, and the indefinite-lived intangible asset was $196.9 million, which substantially relates to the Houghton trademarks and tradename. Management completes its annual indefinite-lived intangible asset impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment. Management completed its annual impairment assessment during the fourth quarter of 2021 for the Houghton trademarks and tradename and concluded no impairment charge was warranted. The determination of estimated fair value of the Houghton trademarks and tradename is based on a relief from royalty valuation method, which requires management's judgment and often involves the use of significant estimates and assumptions with respect to the weighted average cost of capital and royalty rates, as well as revenue growth rates and terminal growth rates.

The principal considerations for our determination that performing procedures relating to the Houghton trademarks and tradename annual impairment assessment is a critical audit matter are (i) the significant judgment by management when determining the fair value of the Houghton trademarks and tradename; (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to the royalty rate, revenue growth rates, and terminal growth rates; and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

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 indefinite-lived intangible assets annual impairment assessment, including controls over the valuation of the Houghton trademarks and tradename. These procedures also included, among others (i) testing management's process for determining the fair value estimate; (ii) evaluating the appropriateness of the relief from royalty valuation method; (iii) testing the completeness and accuracy of underlying data used in the method; and (iv) evaluating the reasonableness of significant assumptions related to the royalty rate, revenue growth rates and terminal growth rates. Evaluating management's assumptions related to the royalty rate, revenue growth rates, and terminal growth rates involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the legacy Houghton business; (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 relief from royalty valuation method and the royalty rate assumption.

/s/PricewaterhouseCoopers LLP
Philadelphia, Pennsylvania
March 1, 2022

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,		
	2021	**2020**	**2019**
Net sales	$ 1,761,158	$ 1,417,677	$ 1,133,503
Cost of goods sold (excluding amortization expense - See Note 16)	1,166,518	904,234	741,386
Gross profit	594,640	513,443	392,117
Selling, general and administrative expenses	418,856	380,752	283,828
Indefinite-lived intangible asset impairment	-	38,000	-
Restructuring and related charges	1,433	5,541	26,678
Combination, integration and other acquisition-related expenses	23,885	29,790	35,477
Operating income	150,466	59,360	46,134
Other income (expense), net	18,851	(5,618)	(254)
Interest expense, net	(22,326)	(26,603)	(16,976)
Income before taxes and equity in net income of associated companies	146,991	27,139	28,904
Taxes on income before equity in net income of associated companies	34,939	(5,296)	2,084
Income before equity in net income of associated companies	112,052	32,435	26,820
Equity in net income of associated companies	9,379	7,352	5,064
Net income	121,431	39,787	31,884
Less: Net income attributable to noncontrolling interest	62	129	262
Net income attributable to Quaker Chemical Corporation	$ 121,369	$ 39,658	$ 31,622
Per share data:			
Net income attributable to Quaker Chemical Corporation common shareholders – basic	$ 6.79	$ 2.23	$ 2.08
Net income attributable to Quaker Chemical Corporation common shareholders – diluted	$ 6.77	$ 2.22	$ 2.08

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,		
	2021	2020	2019
Net income	$ 121,431	$ 39,787	$ 31,884
Other comprehensive (loss) income, net of tax			
Currency translation adjustments	(46,952)	41,601	4,779
Defined benefit retirement plans			
Net gain (loss) arising during the period, other	9,210	8,827	(6,289)
Amortization of actuarial loss	1,078	2,308	2,458
Amortization of prior service gain	7	(69)	(151)
Current period change in fair value of derivatives	2,226	(3,278)	(320)
Unrealized (loss) gain on available-for-sale securities	(2,945)	2,091	2,093
Other comprehensive (loss) income	(37,376)	51,480	2,570
Comprehensive income	84,055	91,267	34,454
Less: Comprehensive income attributable to noncontrolling interest	(78)	(37)	(287)
Comprehensive income attributable to Quaker Chemical Corporation	$ 83,977	$ 91,230	$ 34,167

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

QUAKER CHEMICAL CORPORATION
CONSOLIDATED BALANCE SHEETS
(Dollars in thousands, except par value)

	December 31, 2021	December 31, 2020
ASSETS		
Current assets		
Cash and cash equivalents	$ 165,176	$ 181,833
Accounts receivable, net	430,676	372,974
Inventories, net	264,531	187,764
Prepaid expenses and other current assets	59,871	50,156
Total current assets	920,254	792,727
Property, plant and equipment, net	197,520	203,883
Right of use lease assets	36,635	38,507
Goodwill	631,194	631,212
Other intangible assets, net	1,027,782	1,081,358
Investments in associated companies	95,278	95,785
Deferred tax assets	16,138	16,566
Other non-current assets	30,959	31,796
Total assets	$ 2,955,760	$ 2,891,834
LIABILITIES AND EQUITY		
Current liabilities		
Short-term borrowings and current portion of long-term debt	$ 56,935	$ 38,967
Accounts payable	226,656	191,821
Dividends payable	7,427	7,051
Accrued compensation	38,197	43,300
Accrued restructuring	4,087	8,248
Accrued pension and postretirement benefits	1,548	1,466
Other accrued liabilities	95,617	92,107
Total current liabilities	430,467	382,960
Long-term debt	836,412	849,068
Long-term lease liabilities	26,335	27,070
Deferred tax liabilities	179,025	192,763
Non-current accrued pension and postretirement benefits	45,984	63,890
Other non-current liabilities	49,615	55,169
Total liabilities	1,567,838	1,570,920
Commitments and contingencies (Note 26)	-	-
Equity		
Common stock, $1 par value; authorized 30,000,000 shares; issued and outstanding 2021 – 17,897,033 shares; 2020 – 17,850,616 shares	17,897	17,851
Capital in excess of par value	917,053	905,171
Retained earnings	516,334	423,940
Accumulated other comprehensive loss	(63,990)	(26,598)
Total Quaker shareholders' equity	1,387,294	1,320,364
Noncontrolling interest	628	550
Total equity	1,387,922	1,320,914
Total liabilities and equity	$ 2,955,760	$ 2,891,834

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,		
	2021	2020	2019
Cash flows from operating activities			
Net income	$ 121,431	$ 39,787	$ 31,884
Adjustments to reconcile net income to net cash provided by operating activities:			
Amortization of debt issuance costs	4,749	4,749	1,979
Depreciation and amortization	86,550	83,246	44,895
Equity in undistributed earnings of associated companies, net of dividends	(8,971)	4,862	(2,115)
Acquisition-related fair value adjustments related to inventory	801	229	11,714
Deferred income taxes	(12,506)	(38,281)	(24,242)
Uncertain tax positions (non-deferred portion)	(922)	1,075	958
Non-current income taxes payable	-	-	856
Deferred compensation and other, net	(5,325)	(471)	(6,789)
Share-based compensation	11,038	10,996	4,861
(Gain) loss on disposal of property, plant, equipment and other assets	(4,695)	871	(58)
Insurance settlement realized	-	(1,035)	(822)
Indefinite-lived intangible asset impairment	-	38,000	-
Gain on inactive subsidiary litigation and settlement reserve	-	(18,144)	-
Combination and other acquisition-related expenses, net of payments	(1,974)	860	(14,414)
Restructuring and related charges	1,433	5,541	26,678
Pension and other postretirement benefits	(6,330)	16,535	46
(Decrease) increase in cash from changes in current assets and current liabilities, net of acquisitions:			
Accounts receivable	(67,473)	17,170	19,926
Inventories	(84,428)	(3,854)	10,844
Prepaid expenses and other current assets	(21,174)	927	(4,640)
Change in restructuring liabilities	(5,266)	(15,745)	(8,899)
Accounts payable and accrued liabilities	37,998	22,308	(8,915)
Estimated taxes on income	3,997	8,763	(1,373)
Net cash provided by operating activities	48,933	178,389	82,374
Cash flows from investing activities			
Investments in property, plant and equipment	(21,457)	(17,901)	(15,545)
Payments related to acquisitions, net of cash acquired	(42,417)	(56,230)	(893,412)
Proceeds from disposition of assets	14,744	2,702	103
Insurance settlement interest earned	-	44	222
Net cash used in investing activities	(49,130)	(71,385)	(908,632)
Cash flows from financing activities			
Payments of long-term debt	(38,011)	(37,615)	-
Proceeds from term loan debt	-	-	750,000
Borrowings (repayments) on revolving credit facilities, net	53,031	(11,485)	147,135
Repayments on other debt, net	(776)	(661)	(8,798)
Financing-related debt issuance costs	-	-	(23,747)
Dividends paid	(28,599)	(27,563)	(21,830)
Stock options exercised, other	890	3,867	1,370
Purchase of noncontrolling interest in affiliates	-	(1,047)	-
Distributions to noncontrolling affiliate shareholders	-	(751)	-
Net cash (used in) provided by financing activities	(13,465)	(75,255)	844,130
Effect of foreign exchange rate changes on cash	(3,057)	6,591	1,258
Net (decrease) increase in cash, cash equivalents and restricted cash	(16,719)	38,340	19,130
Cash, cash equivalents and restricted cash at the beginning of the period	181,895	143,555	124,425
Cash, cash equivalents and restricted cash at the end of the period	$ 165,176	$ 181,895	$ 143,555
Supplemental cash flow disclosures:			
Cash paid during the year for:			
Income taxes, net of refunds	$ 34,775	$ 20,253	$ 15,499
Interest	19,298	23,653	19,553
Non-cash activities:			
Change in accrued purchases of property, plant and equipment, net	$ 2,132	$ (1,376)	$ 1,978

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	Noncontrollin interest	Total
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 declared ($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
Cumulative effect of an accounting change	-	-	(911)	-	-	(911)
Balance as of January 1, 2020	17,735	888,218	412,068	(78,170)	1,604	1,241,455
Net income	-	-	39,658	-	129	39,787
Amounts reported in other comprehensive income (loss)	-	-	-	51,572	(92)	51,480
Dividends declared ($1.56 per share)	-	-	(27,786)	-	-	(27,786)
Acquisition of noncontrolling interest	-	(707)	-	-	(340)	(1,047)
Distributions to noncontrolling affiliate shareholders	-	-	-	-	(751)	(751)
Shares issued upon exercise of stock options and other	66	6,714	-	-	-	6,780
Share-based compensation plans	50	10,946	-	-	-	10,996
Balance as of December 31, 2020	17,851	905,171	423,940	(26,598)	550	1,320,914
Net income	-	-	121,369	-	62	121,431
Amounts reported in other comprehensive (loss) income	-	-	-	(37,392)	16	(37,376)
Dividends declared ($1.62 per share)	-	-	(28,975)	-	-	(28,975)
Shares issued upon exercise of stock options and other	17	1,677	-	-	-	1,694
Share-based compensation plans	29	10,205	-	-	-	10,234
Balance as of December 31, 2021	$ 17,897	$ 917,053	$ 516,334	$ (63,990)	$ 628	$ 1,387,922

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.

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 expected credit losses with its existing accounts receivable. The Company adopted ASU 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* on a modified retrospective basis, effective January 1, 2020.

The Company recognizes an allowance for credit losses, which represents the portion of the receivable that the Company does not expect to collect over its contractual life, considering past events and reasonable and supportable forecasts of future economic conditions. The Company's allowance for credit losses on its trade accounts receivable is based on specific collectability facts and circumstances for each outstanding receivable and customer, the aging of outstanding receivables, and the associated collection risk the Company estimates for certain past due aging categories, and also, the general risk to all outstanding accounts receivable based on historical amounts determined to be uncollectible. The Company does not have any off-balance-sheet credit exposure related to its customers. See Note 13 of Notes to Consolidated Financial Statements.

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.

Right of use lease assets and lease liabilities: 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 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 Property, plant and equipment ("PP&E"), current portion of long-term debt and long-term debt on the Consolidated Balance Sheet.

Long-lived assets: PP&E is 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 $3.6 million and $2.3 million of net costs were capitalized in PP&E on the Company's Consolidated Balance Sheets at December 31, 2021 and 2020, 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 on a straight-line basis over their estimated useful lives, generally for periods ranging from 3 to 24 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 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.

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 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.

The Company does not have standard payment terms for all customers, 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. Therefore, the Company does not adjust the promised amount of consideration for the effects of a significant financing component as 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, the Company expenses costs to obtain a contract as incurred when the expected period of benefit, and therefore the amortization period, is one year or less. In addition, the Company excludes 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. 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.

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.

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.

See Note 5 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 $44.9 million, $40.0 million and $32.1 million for the years ended December 31, 2021, 2020 and 2019, 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, 2021 and 2020, 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, covering a portion of its employees in the U.S. and certain other countries, including the Netherlands, the United Kingdom ("U.K."), Mexico, Sweden, Germany and France. These retirement plans 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 measurement date for the Company's 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 (the "Board"), has discretion to manage the assets within established asset allocation ranges approved by senior management of the Company. 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 recognizes 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. The Company currently intends 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, 2021 and 2020, 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 subject to time vesting generally over a one to three year period. In addition, as part of the Company's 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.

The Company also issues performance-dependent stock awards as a component of its LTIP. The fair value of the performance-dependent stock awards is based on their grant-date market value adjusted for the likelihood of attaining certain pre-determined performance goals and is calculated by utilizing a Monte Carlo simulation model. Compensation expense is recognized on a straight-line basis over the vesting period, generally three years.

See Note 8 of the 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 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 chief operating decision maker assesses the Company's 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.

Based on various indices or index compilations 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 of, and for the year ended December 31, 2021, 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, 2021, 2020 and 2019, the Company recorded $0.6 million, $0.4 million, and $1.0 million, respectively, of remeasurement losses associated with the applicable currency conversions related to 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

2021 Acquisitions

In November 2021, the Company acquired Baron Industries ("Baron"), a privately held Company that provides vacuum impregnation services of castings, powder metals and electrical components for its Global Specialty Businesses reportable segment for $11.0 million, including an initial cash payment of $7.1 million, subject to post-closing adjustments as well as certain earn-out provisions currently estimated at $3.9 million that are payable at different times from 2022 through 2025. The earn-out provisions could total a maximum of $4.5 million. The Company allocated $8.0 million of the purchase price to intangible assets, $1.1 million of property, plant and equipment and $1.5 million of other assets acquired net of liabilities assumed, which includes $0.3 million of cash acquired. In addition, the Company recorded $0.4 million of goodwill, none of which is expected to be tax deductible. Intangible assets comprised $7.2 million of customer relationships to be amortized over 15 years; and $0.8 million of existing product technology to be amortized over 13 years.

In November 2021, the Company acquired a business that provides hydraulic fluids, coolants, cleaners, and rust preventative oils in Turkey for its EMEA reportable segment for 3.2 million EUR or approximately $3.7 million.

In September 2021, the Company acquired the remaining interest in Grindaix-GmbH ("Grindaix"), a Germany-based, high-tech provider of coolant control and delivery systems for its Global Specialty Businesses reportable segment for 2.4 million EUR or approximately $2.9 million, which is gross of approximately $0.3 million of cash acquired. Previously, in February 2021, the Company acquired a 38% ownership interest in Grindaix for 1.4 million EUR or approximately $1.7 million. The Company recorded its initial investment as an equity method investment within the Condensed Consolidated Financial Statements and accounted for the purchase of the remaining interest as a step acquisition whereby the Company remeasured the previously held equity method investment to its fair value.

In June 2021, the Company acquired certain assets for its chemical milling maskants product line in the Global Specialty Businesses reportable segment for 2.3 million EUR or approximately $2.8 million.

In February 2021, the Company acquired a tin-plating solutions business for the steel end market for $25.0 million. This acquisition is part of each of the Company's geographic reportable segments. The Company allocated $19.6 million of the purchase price to intangible assets, comprised of $18.3 million of customer relationships, to be amortized over 19 years; $0.9 million of existing product technology to be amortized over 14 years; and $0.4 million of a licensed trademark to be amortized over 3 years. In addition, the Company recorded $5.0 million of goodwill, all of which is expected to be tax deductible in various jurisdictions in which we operate. Factors contributing to the purchase price that resulted in goodwill included the acquisition of business processes and personnel that will allow Quaker Houghton to better serve its customers.

As of December 31, 2021, the allocation of the purchase price of the 2021 acquisitions has not been finalized and the one year measurement period has not ended for any of these acquisitions. 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 the 2021 acquired assets and businesses subsequent to the respective acquisition dates are included in the Consolidated Statements of Income for the year ended December 31, 2021. Applicable transaction expenses associated with these acquisitions are included in Combination, integration 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 the acquired assets and businesses are not considered material to the overall operations of the Company for the periods presented.

2022 Acquisitions

In January 2022, the Company acquired a business related to the sealing and impregnation of metal castings for the automotive sector, as well as impregnation resin and impregnation systems for metal parts, for its Global Specialty Business reporting segment for approximately 1.2 million EUR or approximately $1.4 million. This business expands the Company's geographic presence in Germany as well as broadens its product offerings and service capabilities within its existing impregnation business that was initially entered into as part of its past acquisition of Norman Hay. Also in in January 2022, the Company acquired a business that provides pickling inhibitor technologies for the steel industry, drawing lubricants and stamping oil for metalworking, and various other lubrication, rust preventative, and cleaner applications, for its Americas reportable segment for approximately $8.0 million. This business broadens the Company's product offerings within its existing metals and metalworking business in the Americas region.

The results of operations of these two January 2022 acquisitions are not included in the Consolidated Statements of Income because the date of closing for each was subsequent to December 31, 2021. Preliminary purchase price allocation of assets acquired and liabilities assumed have not been presented as that information is not available as of the date of these Consolidated Financial Statements.

Houghton

In August 2019, the Company completed the Combination, 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.

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 for the year ended December 31, 2019 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 Legacy 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, integration 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 table below as these

costs on a pro forma basis 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 (as if the Combination occurred on January 1, 2018)	**For the year ending December 31, 2019**
Net sales	$ 1,562,427
Net income attributable to Quaker Chemical Corporation	94,537

Combination, integration and other acquisition-related expenses have been and are expected to continue to be significant. The Company incurred total costs of $18.6 million, $30.3 million and $38.0 million for the years ended December 31, 2021, 2020 and 2019, respectively, related to the Combination, integration and other acquisition-related activities. These costs included certain legal, financial and other advisory and consultant costs incurred in connection with post-closing integration activities including internal control readiness and remediation, as well as due diligence, regulatory approvals and closing the Combination. These costs also included interest costs to maintain the bank commitment ("ticking fees") for the Combination during the year ended December 31, 2019, accelerated depreciation charges during the years ended December 31, 2021, 2020 and 2019, a gain on the sale of a held-for-sale real property during the year ended December 31, 2021, a loss on the sale of a held-for-sale asset during the year ended December 31, 2020, and recorded income related to indemnification rights during the years ended December 31, 2021 and 2020. As of December 31, 2021 and 2020, the Company had current liabilities related to the Combination and other acquisition-related activities of $5.5 million and $7.5 million, respectively, primarily recorded within other accrued liabilities on its Consolidated Balance Sheets.

Other Previous Acquisitions

In December 2020, the Company completed its acquisition of Coral Chemical Company ("Coral"), a privately held, U.S.-based provider of metal finishing fluid solutions. The acquisition provides technical expertise and product solutions for pre-treatment, metalworking and wastewater treatment applications to the beverage cans and general industrial end markets. The acquired Coral assets and liabilities were assigned to the Americas and Global Specialty Businesses reportable segments. The original purchase price was approximately $54.1 million, subject to routine and customary post-closing adjustments related to working capital and net indebtedness levels.

The following table presents the final estimated fair values of Coral net assets acquired:

	December 22, 2020 (1)	**Measurement Period Adjustments**	**December 22, 2020 (as adjusted)**
Cash and cash equivalents	$ 958	$ -	$ 958
Accounts receivable	8,473	-	8,473
Inventories	4,527	-	4,527
Prepaid expenses and other assets	181	-	181
Property, plant and equipment	10,467	652	11,119
Intangible assets	30,300	(500)	29,800
Goodwill	2,814	804	3,618
Total assets purchased	57,720	956	58,676
Long-term debt including current portions and finance leases	183	556	739
Accounts payable, accrued expenses and other accrued liabilities	3,482	-	3,482
Total liabilities assumed	3,665	556	4,221
Total consideration paid for Coral	54,055	400	54,455
Less: estimated purchase price settlement	-	400	400
Less: cash acquired	958	-	958
Net cash paid for Coral	$ 53,097	$ -	$ 53,097

(1) As previously disclosed in the Company's 2020 Form 10-K.

Measurement period adjustments recorded during the year ended December 31, 2021 include certain adjustments related to refining original estimates for assets and liabilities for certain acquired finance leases, as well as an adjustment to reflect the expected settlement of post-closing working capital and net indebtedness true ups to the initial purchase price. The Company continues to work

with the seller to finalize certain post-closing adjustments and the above table includes the Company's best estimate as of December 31, 2021. As of December 31, 2021, the allocation of the purchase price for Coral has been finalized and the one year measurement period has ended.

In May 2020, the Company acquired Tel Nordic ApS ("TEL"), a company that specializes in lubricants and engineering primarily in high pressure aluminum die casting for its EMEA reportable segment. Consideration paid was in the form of a convertible promissory note in the amount of 20.0 million DKK, or approximately $2.9 million, which was subsequently converted into shares of the Company's common stock. An adjustment to the purchase price of approximately 0.4 million DKK, or less than $0.1 million, was made as a result of finalizing a post-closing settlement in the second quarter of 2020. The Company allocated approximately $2.4 million of the purchase price to intangible assets to be amortized over 17 years. In addition, the Company recorded approximately $0.5 million of goodwill, related to expected value not allocated to other acquired assets, none of which will be tax deductible. As of December 31, 2021, the allocation of the purchase price of TEL was finalized and the one year measurement period ended.

In March 2020, the Company acquired the remaining 49% ownership interest in one of its South African affiliates, Quaker Chemical South Africa Limited ("QSA") for 16.7 million ZAR, or approximately $1.0 million, from its joint venture partner PQ Holdings South Africa. QSA is a part of the Company's EMEA reportable segment. As this acquisition was a change in an existing controlling ownership, the Company recorded $0.7 million of excess purchase price over the carrying value of the noncontrolling interest in Capital in excess of par value.

In October 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 finalized its post-closing adjustments for the Norman Hay acquisition and paid approximately 2.5 million GBP during the first quarter of 2020 to settle such adjustments.

Note 3 – Recently Issued Accounting Standards

Recently Issued Accounting Standards Adopted

The Financial Accounting Standards Board ("FASB") issued Account Standards Update ("ASU") ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* 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. The Company adopted this standard, as required, effective January 1, 2021. There was no cumulative effect of adoption recorded within retained earnings on January 1, 2021.

The FASB issued ASU 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting* in March 2020. The FASB subsequently issued ASU 2021-01, *Reference Rate Reform (Topic 848): Scope* in January 2021 which clarified the guidance but did not materially change the guidance or its applicability to the Company. The amendments provide temporary optional expedients and exceptions for applying U.S. GAAP to contract modifications, hedging relationships and other transactions to ease the potential accounting and financial reporting burden associated with transitioning away from reference rates that are expected to be discontinued, including the London Interbank Offered Rate ("LIBOR"). ASU 2020-04 is effective for the Company as of March 12, 2020 and generally can be applied through December 31, 2022. On December 10, 2021, the Company entered into a Second Amendment to Credit Agreement ("Second Amendment") with Bank of America N.A., an update to provide for the use of a non-USD currency LIBOR successor rate. The Company elected to apply the expedients provided in ASU 2020-04 with respect to the Second Amendment. The Company will continue to monitor for potential impacts related to its USD-based LIBOR rates. See Note 20 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 chief operating decision maker assesses the Company's performance. The Company has four reportable 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.

Segment operating earnings for each of the Company's reportable segments are comprised of the segment's net sales less directly related COGS and SG&A. Operating expenses not directly attributable to the net sales of each respective segment, such as certain corporate and administrative costs, Combination, integration and other acquisition-related expenses, and Restructuring and related charges, are not included in segment operating earnings. Other items not specifically identified with the Company's reportable segments include interest expense, net and other income (expense), net.

The following tables present information about the performance of the Company's reportable segments for the years ended December 31, 2021, 2020 and 2019.

	2021	2020	2019
Net sales			
Americas	$ 572,643	$ 450,161	$ 392,121
EMEA	480,126	383,187	285,570
Asia/Pacific	388,160	315,299	247,839
Global Specialty Businesses	320,229	269,030	207,973
Total net sales	$ 1,761,158	$ 1,417,677	$ 1,133,503

	2021	2020	2019
Segment operating earnings			
Americas	$ 124,863	$ 96,379	$ 78,297
EMEA	85,209	69,163	47,014
Asia/Pacific	96,318	88,356	67,512
Global Specialty Businesses	90,632	79,690	58,881
Total segment operating earnings	397,022	333,588	251,704
Combination, integration and other acquisition-related expenses	(23,885)	(29,790)	(35,477)
Restructuring and related charges	(1,433)	(5,541)	(26,678)
Fair value step up of acquired inventory sold	(801)	(226)	(11,714)
Indefinite-lived intangible asset impairment	-	(38,000)	-
Non-operating and administrative expenses	(157,864)	(143,202)	(104,572)
Depreciation of corporate assets and amortization	(62,573)	(57,469)	(27,129)
Operating income	150,466	59,360	46,134
Other income (expense), net	18,851	(5,618)	(254)
Interest expense, net	(22,326)	(26,603)	(16,976)
Income before taxes and equity in net income of associated companies	$ 146,991	$ 27,139	$ 28,904

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, as of December 31, 2021, 2020 and 2019:

	2021	2020	2019
Segment assets			
Americas	$ 983,521	$ 969,551	$ 926,122
EMEA	714,659	697,821	688,663
Asia/Pacific	750,970	713,004	685,476
Global Specialty Businesses	506,610	511,458	550,055
Total segment assets	$ 2,955,760	$ 2,891,834	$ 2,850,316

	2021	2020	2019
Segment long-lived assets			
Americas	$ 129,321	$ 122,302	$ 139,170
EMEA	69,990	69,344	56,108
Asia/Pacific	123,130	119,233	126,166
Global Specialty Businesses	37,951	59,091	69,184
Total segment long-lived assets	$ 360,392	$ 369,970	$ 390,628

The following tables present information regarding the Company's reportable segments' capital expenditures and depreciation for identifiable assets for the years ended December 31, 2021, 2020 and 2019:

	2021	2020	2019
Capital expenditures			
Americas	$ 9,678	$ 6,451	$ 6,404
EMEA	6,767	3,844	3,263
Asia/Pacific	2,264	5,688	3,857
Global Specialty Businesses	2,748	1,918	2,021
Total segment capital expenditures	$ 21,457	$ 17,901	$ 15,545

	2021	2020	2019
Depreciation			
Americas	$ 12,074	$ 12,322	$ 7,500
EMEA	6,936	6,813	4,560
Asia/Pacific	4,596	4,672	3,458
Global Specialty Businesses	3,043	3,544	2,248
Total segment depreciation	$ 26,649	$ 27,351	$ 17,766

During the years ended December 31, 2021, 2020 and 2019, the Company had approximately $1,198.4 million, $963.2 million and $719.8 million of net sales, respectively, attributable to non-U.S. operations. As of December 31, 2021, 2020 and 2019, the Company had approximately $155.2 million, $176.6 million and $174.4 million of long-lived assets, respectively, attributable to non-U.S. operations.

Inter-segment revenue for the years ended December 31, 2021, 2020 and 2019 was $12.2 million, $9.1 million and $7.3 million for Americas, $29.0 million, $22.0 million and $20.3 million for EMEA, $1.6 million, $0.6 million and $0.2 million for Asia/Pacific and $7.4 million, $4.7 million and $5.4 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

Arrangements Resulting in Net Reporting

As part of the Company's Fluidcare TM business, certain third-party product sales to customers are managed by the Company. The Company transferred third-party products under arrangements resulting in net reporting of $71.7 million, $42.5 million and $48.0 million for the years ended December 31, 2021, 2020 and 2019, respectively.

Customer Concentration

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. During the year ended December 31, 2021, the Company's five largest customers (each composed of multiple subsidiaries or divisions with semiautonomous purchasing authority) accounted for approximately 10% of consolidated net sales, with its largest customer accounting for approximately 3% of consolidated net sales.

Contract Assets and Liabilities

The Company had no material contract assets recorded on its Consolidated Balance Sheets as of December 31, 2021 and 2020.

The Company had approximately $7.0 million and $4.0 million of deferred revenue as of December 31, 2021 and 2020, respectively. During the years ended December 31, 2021 and 2020, respectively, the Company satisfied all of the associated performance obligations and recognized into revenue the advance payments received and recorded as of December 31, 2020 and 2019, 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 more than 10% of the Company's consolidated net sales for any of the years ended December 31, 2021, 2020 and 2019, 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, 2021, 2020 and 2019.

	2021	2020	2019
Metal removal fluids	23.4 %	23.9 %	19.9 %
Rolling lubricants	22.2 %	21.8 %	21.9 %
Hydraulic fluids	13.6 %	13.3 %	13.0 %

	Net sales for the year ending December 31, 2021			
	Americas	EMEA	Asia/Pacific	Consolidated Total
Customer Industries				
Metals	$ 210,340	$ 141,950	$ 207,160	$ 559,450
Metalworking and other	362,303	338,176	181,000	881,479
	572,643	480,126	388,160	1,440,929
Global Specialty Businesses	186,859	80,541	52,829	320,229
	$ 759,502	$ 560,667	$ 440,989	$ 1,761,158
Timing of Revenue Recognized				
Product sales at a point in time	$ 724,357	$ 527,083	$ 429,130	$ 1,680,570
Services transferred over time	35,145	33,584	11,859	80,588
	$ 759,502	$ 560,667	$ 440,989	$ 1,761,158

	Net sales for the year ending December 31, 2020			
	Americas	EMEA	Asia/Pacific	Consolidated Total
Customer Industries				
Metals	$ 163,135	$ 107,880	$ 168,096	$ 439,111
Metalworking and other	287,026	275,307	147,203	709,536
	450,161	383,187	315,299	1,148,647
Global Specialty Businesses	154,796	68,164	46,070	269,030
	$ 604,957	$ 451,351	$ 361,369	$ 1,417,677
Timing of Revenue Recognized				
Product sales at a point in time	$ 580,663	$ 434,549	$ 352,917	$ 1,368,129
Services transferred over time	24,294	16,802	8,452	49,548
	$ 604,957	$ 451,351	$ 361,369	$ 1,417,677

	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

Note 6 – Leases

The Company has operating leases for certain facilities, vehicles and machinery and equipment with remaining lease terms up to 10 years. In addition, the Company has certain land use leases with remaining lease terms up to 94 years.

Operating lease expense is recognized on a straight-line basis over the lease term. Operating lease expense for the years ended December 31, 2021, 2020 and 2019 was $14.1 million, $14.2 million, and $9.4 million, respectively. Short-term lease expense for the years ended December 31, 2021, 2020 and 2019 was $0.9 million, $1.3 million and $1.5 million, respectively. The Company has no material variable lease costs or sublease income for the years ended December 31, 2021, 2020 and 2019.

Cash paid for operating leases during the years ended December 31, 2021, 2020 and 2019 was $13.9 million, $14.1 million and $9.2 million, respectively. The Company recorded new right of use lease assets and associated lease liabilities of $11.1 million during the year ended December 31, 2021.

Supplemental balance sheet information related to the Company's leases is as follows:

	December 31, 2021	December 31, 2020
Right of use lease assets	$ 36,635	$ 38,507
Other accrued liabilities	9,976	10,901
Long-term lease liabilities	26,335	27,070
Total operating lease liabilities	$ 36,311	$ 37,971
Weighted average remaining lease term (years)	5.6	6.0
Weighted average discount rate	4.22%	4.20%

Maturities of operating lease liabilities as of December 31, 2021 were as follows:

	December 31, 2021
For the year ended December 31, 2022	$ 11,346
For the year ended December 31, 2023	9,041
For the year ended December 31, 2024	7,017
For the year ended December 31, 2025	5,292
For the year ended December 31, 2026	4,197
For the year ended December 31, 2027 and beyond	4,502
Total lease payments	41,395
Less: imputed interest	(5,084)
Present value of lease liabilities	$ 36,311

Note 7 – Restructuring and Related Activities

The Company's management approved a global restructuring plan (the "QH Program") as part of its plan to realize certain cost synergies associated with the Combination in the third quarter of 2019. The QH Program includes restructuring and associated severance costs to reduce total headcount by approximately 400 people globally, as well as 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 continue to occur into 2022 under the QH Program. 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 relate to severance costs to reduce headcount, including customary and routine adjustments to initial estimates for employee separation costs, as well as costs to close certain facilities and are recorded in Restructuring and related charges in the Company's Consolidated 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 operating 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 years ended December 31, 2021 and 2020 is as follows:

	QH Program
Accrued restructuring as of December 31, 2019	$ 18,043
Restructuring and related charges	5,541
Cash payments	(15,745)
Currency translation adjustments	409
Accrued restructuring as of December 31, 2020	8,248
Restructuring and related charges	1,433
Cash payments	(5,266)
Currency translation adjustments	(328)
Accrued restructuring as of December 31, 2021	$ 4,087

In connection with the plans for closure of certain manufacturing and non-manufacturing facilities, the Company has made a decision to make available for sale certain facilities. During the years ended December 31, 2021 and 2020, certain of these facilities were sold and the Company recognized a gain of $5.4 million in 2021 and a loss of approximately $0.6 million in 2020 which is included within other income (expense), net on the Consolidated Statement of Income. Additionally, certain buildings and land with an aggregate book value of approximately $0.7 million continues to be held-for-sale as of December 31, 2021 and are recorded in prepaid expenses and other current assets on the Company's Consolidated Balance Sheet. The Company will continue to evaluate for future decisions about making certain other facilities available for sale.

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, 2021, 2020 and 2019:

	2021	2020	2019
Stock options	$ 1,235	$ 1,491	$ 1,448
Non-vested stock awards and restricted stock units	5,438	5,012	3,206
Non-elective and elective 401(k) matching contribution in stock	1,553	3,112	-
Employee stock purchase plan	-	-	84
Director stock ownership plan	901	541	123
Performance stock units	1,911	840	-
Total share-based compensation expense	$ 11,038	$ 10,996	$ 4,861

Share-based compensation expense is recorded in SG&A, except for $0.9 million, $1.5 million and $0.9 million during the years ended December 31, 2021, 2020 and 2019, respectively, recorded within Combination, integration 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, 2021	110,336	$ 143.51		
Options granted	25,250	245.17		
Options exercised	(22,540)	143.49		
Options forfeited	(3,362)	190.65		
Options outstanding as of December 31, 2021	109,684	$ 165.47	4.8	$ 7,550
Options expected to vest after December 31, 2021	67,680	$ 178.10	5.4	$ 3,929
Options exercisable as of December 31, 2021	42,004	$ 145.12	3.9	$ 3,621

The total intrinsic value of options exercised during the years ended December 31, 2021, 2020 and 2019 was approximately $2.7 million, $6.5 million and $2.5 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, 2021 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)
$ 49.01 - $ 80.00	711	-	$ 72.12	711	$ 72.12
$ 80.01 - $ 100.00	1,309	-	87.30	1,309	87.30
$ 120.01 - $ 150.00	43,482	5.2	136.62	12,873	136.59
$ 150.01 - $ 180.00	40,593	3.7	154.23	27,111	153.88
$ 220.01 - $ 250.00	23,589	6.2	245.15	-	-
	109,684	4.8	165.47	42,004	145.12

As of December 31, 2021, unrecognized compensation expense related to options granted in 2021, 2020 and 2019 was $1.8 million, $1.2 million and $0.3 million, respectively, to be recognized over a weighted average period of 1.9 years.

The Company granted stock options under its LTIP plan that are subject only to time vesting generally over a three year period during 2021, 2020, 2019 and 2018. For the purposes of determining the fair value of stock option awards, the Company used a Black-Scholes option pricing model and primarily used the assumptions set forth in the table below:

	2021	2020	2019	2018
Number of stock options granted	25,250	49,115	51,610	35,842
Dividend yield	0.85 %	0.99 %	1.12 %	1.37 %
Expected volatility	37.33 %	31.57 %	26.29 %	24.73 %
Risk-free interest rate	0.60 %	0.36 %	1.52 %	2.54 %
Expected term (years)	4.0	4.0	4.0	4.0

The fair value of these options is 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, 2021, 2020 and 2019, respectively, is as follows:

	2021	2020	2019
2021 Stock option awards	$ 429	$ -	$ -
2020 Stock option awards	516	385	-
2019 Stock option awards	234	698	665
2018 Stock option awards	56	357	364
2017 Stock option awards	-	51	369

Restricted Stock Awards

Activity of non-vested 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, 2020	71,768	$ 151.17
Granted	23,536	242.29
Vested	(23,638)	157.63
Forfeited	(2,973)	172.15
Nonvested awards, December 31, 2021	68,693	$ 179.26

The fair value of the non-vested 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, 2021, unrecognized compensation expense related to these awards was $ 5.1 million, to be recognized over a weighted average remaining period of 1.5 years.

Restricted Stock Units

Activity of non-vested 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, 2020	10,845	$ 147.70
Granted	2,791	245.49
Vested	(2,570)	155.34
Forfeited	(89)	141.77
Nonvested awards, December 31, 2021	10,977	$ 170.82

The fair value of the non-vested 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, 2021, unrecognized compensation expense related to these awards was $0.8 million, to be recognized over a weighted average remaining period of 1.8 years.

Performance Stock Units

The Company grants performance-dependent stock awards ("PSUs") as a component of its LTIP, which will be settled in a certain number of shares subject to market-based and time-based vesting conditions. The number of fully vested shares that may ultimately be issued as settlement for each award may range from 0% up to 200% of the target award, subject to the achievement of the Company's total shareholder return ("TSR") relative to the performance of the Company's peer group, the S&P Midcap 400 Materials group. The service period required for the PSUs is three years and the TSR measurement period for the PSUs is generally from January 1 of the year of grant through December 31 of the year prior to issuances of the shares upon settlement.

Compensation expense for PSUs is measured based on their grant date fair value and is recognized on a straight-line basis over the three year vesting period. The grant-date fair value of the PSUs was estimated using a Monte Carlo simulation on the grant date and using the following assumptions set forth in the table below:

	CEO Grant 2021 (1)	2021	2020
Fully vested shares	3,775	12,103	18,485
Risk-free interest rate	0.65 %	0.29 %	0.28 %
Dividend yield	0.72 %	0.64 %	1.13 %
Expected term (years)	3.0	3.0	3.0

(1) On September 2, 2021, the Board appointed Andrew Tometich to serve as CEO and entered into an Employment Agreement, and granted an equity award consisting of a mix of time-based restricted stock and PSUs.

As of December 31, 2021, there was approximately $4.3 million of total unrecognized compensation cost related to PSUs which the Company expects to recognize over a weighted-average period of 1.4 years.

Defined Contribution Plan

The Company has a 401(k) plan with an employer match covering a majority of its U.S. employees. The Company matches 50% of the first 6% of compensation that is contributed to the plan, with a maximum matching contribution of 3% of compensation. Additionally, the plan provides for non-elective nondiscretionary contributions on behalf of participants who have completed one year of service equal to 3% of the eligible participant's compensation. Beginning in April 2020 and continuing through March 2021, the Company matched both non-elective and elective 401(k) contributions in fully vested shares of the Company's common stock rather than cash. For the years ended December 31, 2021, and 2020, total contributions were $1.5 million and $3.1 million, respectively.

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. 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 U.S. 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 Income (Expense), net

Other income (expense), net, for the years ended December 31, 2021, 2020 and 2019 are as follows:

	2021	2020	2019
Income from third party license fees	$ 1,367	$ 999	$ 1,035
Foreign exchange (losses) gains, net	(3,821)	(6,082)	223
Gain (loss) on disposals of property, plant, equipment and other assets, net	4,695	(871)	58
Non-income tax refunds and other related credits	15,155	3,345	1,118
Pension and postretirement benefit income (costs), non-service components	759	(21,592)	(2,805)
Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery	-	18,144	60
Other non-operating income, net	696	439	57
Total other income (expense), net	$ 18,851	$ (5,618)	$ (254)

Gain (loss) on disposals of property, plant, equipment and other assets, net, includes losses related to certain fixed assets disposals resulting from the property damage caused by flooding of the Company's Conshohocken, Pennsylvania headquarters in 2021, described in Note 26 of Notes to Consolidated Financial Statements, as well as a gain in 2021 and a loss in 2020 on the sale of certain held-for-sale real property assets related to the Combination, described in Note 7 of Notes to Consolidated Financial Statements. Non-income tax refunds and other related credits during the year ended December 31, 2021 includes certain non-income tax credits for the Company's Brazilian subsidiaries described in Note 26 of Notes to Consolidated Financial Statements. Pension and postretirement benefit income (costs), non-service components during the year ended December 31, 2020 include a $1.6 million refund in premium and a $22.7 million non-cash settlement charge related to the Legacy Quaker U.S. Pension Plan, as described in Note 21 of Notes to Consolidated Financial Statements. Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery relate to the termination of restrictions over certain cash that was previously designated solely to be used for settlement of asbestos claims at an inactive subsidiary of the Company and cash proceeds from an insolvent insurance carrier with respect to previously filed recovery claims. See Note 12, Note 19 and Note 26 of Notes to Consolidated Financial Statements. Foreign exchange (losses) gains, net, during the years ended December 31, 2021, 2020 and 2019, include foreign currency transaction losses of approximately $0.6 million, $0.4 million and $1.0 million, respectively, related to hyper-inflationary accounting for the Company's Argentine subsidiaries. See Note 1 of Notes to Consolidated Financial Statements.

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 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, 2021, $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, 2021, the Company has a deferred tax liability of $8.4 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, 2021, 2020 and 2019 are as follows:

	2021	2020	2019
Current:			
Federal	$ 955	$ (1,359)	$ (239)
State	2,115	1,171	352
Foreign	44,375	33,173	26,213
	47,445	32,985	26,326
Deferred:			
Federal	(3,863)	(28,437)	(9,267)
State	(3,117)	(3,087)	(396)
Foreign	(5,526)	(6,757)	(14,579)
Total	$ 34,939	$ (5,296)	$ 2,084

The components of earnings before income taxes for the years ended December 31, 2021, 2020 and 2019 are as follows:

	2021	2020	2019
U.S.	$ 7,263	$ (66,585)	$ (46,697)
Foreign	139,728	93,724	75,601
Total	$ 146,991	$ 27,139	$ 28,904

Total deferred tax assets and liabilities are composed of the following as of December 31, 2021 and 2020:

	2021	2020
Retirement benefits	$ 11,860	$ 15,237
Allowance for doubtful accounts	2,155	2,316
Insurance and litigation reserves	675	842
Performance incentives	2,881	5,914
Equity-based compensation	1,920	1,282
Prepaid expense	460	756
Operating loss carryforward	18,544	16,693
Foreign tax credit and other credits	16,285	24,873
Interest	9,940	16,812
Restructuring reserves	631	1,121
Right of use lease assets	8,322	9,346
Inventory reserves	2,941	2,225
Research and development	8,832	7,974
Other	2,846	3,005
	88,292	108,396
Valuation allowance	(17,400)	(21,511)
Total deferred tax assets, net	$ 70,892	$ 86,885
Depreciation	11,580	15,473
Foreign pension and other	2,332	1,807
Intangibles	197,066	222,794
Lease liabilities	8,421	9,151
Outside basis in equity investment	5,999	7,938
Unremitted Earnings	8,381	5,919
Total deferred tax liabilities	$ 233,779	$ 263,082

The Company has $10.6 million of deferred tax assets related to state net operating losses. A partial valuation allowance of $8.0 million has been established against this amount resulting in a net $2.6 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 $2.6 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. An additional $0.5 million of valuation allowance was established for other net state deferred tax assets.

The Company has $8.0 million of deferred tax assets related to foreign net operating loss carryforwards. A partial valuation allowance of $2.5 million has been established against the $8.0 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. An additional partial valuation allowance of $0.6 million has been established against certain other foreign deferred tax assets.

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 foreign tax credits based on certain assumptions such as projected U.S. taxable income, overall domestic loss recapture, and annual limitations due to the ownership change under the Internal Revenue Code. The Company had a foreign tax credit carry forward of $15.9 million and $24.9 million as of December 31, 2021 and 2020, respectively, with a $5.8 million and $10.2 million valuation allowance as of December 31, 2021 and 2020, respectively, reflecting the amount of credits that are not expected to be utilized before expiration.

The Company also acquired disallowed interest deferred tax assets of $14.0 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, 2021, the Company had a net realizable disallowed interest carryforward of $9.4 million on its balance sheet.

As of December 31, 2021, the Company had deferred tax liabilities of $178.0 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 $6.0 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, 2021, 2020 and 2019:

	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, 2021	$ 21,511	$ -	$ 29	$ (4,470)	$ 330	$ 17,400
Year ended December 31, 2020	$ 13,834	$ 7,148	$ 2,738	$ (2,153)	$ (56)	$ 21,511
Year ended December 31, 2019	$ 7,520	$ 13,752	$ 832	$ (8,227)	$ (43)	$ 13,834

The Company's net deferred tax assets and liabilities are classified in the Consolidated Balance Sheets as of December 31, 2021 and 2020 as follows:

	2021	2020
Non-current deferred tax assets	$ 16,138	$ 16,566
Non-current deferred tax liabilities	179,025	192,763
Net deferred tax liability	$ (162,887)	$ (176,197)

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, 2021, 2020 and 2019. Certain immaterial reclassifications within the presentation of the reconciliation of income taxes have been made to the years ended December 31, 2020 and 2019:

	2021	2020	2019
Income tax provision at the Federal statutory tax rate	$ 30,868	$ 5,699	$ 6,070
Unremitted earnings	1,841	(2,308)	(4,383)
Tax law changes / reform	1,955	(1,059)	(416)
U.S. tax on foreign operations	10,479	5,140	574
Pension settlement	-	(2,247)	-
Foreign derived intangible income	(8,698)	(7,339)	(1,699)
Non-deductible acquisition expenses	129	131	1,743
Withholding taxes	6,584	7,809	8,621
Foreign tax credits	(14,725)	(4,699)	(3,787)
Share-based compensation	600	335	(540)
Foreign tax rate differential	3,090	1,139	1,444
Research and development credit	(1,685)	(1,018)	(830)
Uncertain tax positions	519	1,990	899
State income tax provisions, net	(1,446)	(2,245)	(117)
Non-deductible meals and entertainment	426	290	318
Intercompany transfer of intangible assets	4,347	(4,384)	(5,318)
Miscellaneous items, net	655	(2,530)	(495)
Taxes on income before equity in net income of associated companies	$ 34,939	$ (5,296)	$ 2,084

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, 2021, the Company has a deferred tax liability $8.4 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, 2021 was approximately $377.4 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.

As of December 31, 2021, the Company's cumulative liability for gross unrecognized tax benefits was $22.5 million. The Company had accrued approximately $3.1 million for cumulative penalties and $3.1 million for cumulative interest as of December 31, 2021. As of December 31, 2020, the Company's cumulative liability for gross unrecognized tax benefits was $22.2 million. The Company had accrued approximately $3.9 million for cumulative penalties and $3.0 million for cumulative interest as of December 31, 2020.

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 benefit of $0.5 million for penalties and an expense of $0.3 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2021, an expense of less than $0.1 million for penalties and $0.6 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2020, and 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.

The Company estimates that during the year ending December 31, 2022, it will reduce its cumulative liability for gross unrecognized tax benefits by approximately $2.3 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, 2022.

A reconciliation of the beginning and ending amounts of unrecognized tax benefits for the years ended December 31, 2021, 2020 and 2019, respectively, is as follows:

	2021	2020	2019
Unrecognized tax benefits as of January 1	$ 22,152	$ 19,097	$ 7,050
Increase (decrease) in unrecognized tax benefits taken in prior periods	1,002	2,025	(28)
Increase in unrecognized tax benefits taken in current period	2,915	3,095	1,935
Decrease in unrecognized tax benefits due to lapse of statute of limitations	(2,631)	(3,659)	(1,029)
Increase in unrecognized tax benefits due to acquisition	-	597	11,301
(Decrease) increase due to foreign exchange rates	(974)	997	(132)
Unrecognized tax benefits as of December 31	$ 22,464	$ 22,152	$ 19,097

The amount of net unrecognized tax benefits above that, if recognized, would impact the Company's tax expense and effective tax rate is $15.2 million, $14.7 million and $13.3 million for the years ended December 31, 2021, 2020 and 2019, 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 Italy from 2007, Brazil from 2011, the Netherlands, Mexico and China from 2016, Mexico, Canada, Germany, Spain, U.S. and the United Kingdom from 2017, India from fiscal year beginning April 1, 2019 and ending March 31, 2020, and various U.S. state tax jurisdictions from 2011.

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 2015. 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. In 2020, the respective tax authorities in Italy, Spain, and Netherland reached agreement with respect to the MAP proceedings, which the Company has accepted. As of December 31, 2021, the Company has received $1.6 million in refunds from the Netherlands and Spain and has an accrual for $2.4 million due to Italy. In February 2022, the Company received a settlement notice from the Italian taxing authorities confirming the amount due of $2.6 million, having granted the Company's request to utilize its remaining net operating losses to partially offset the liability. This amendment to the tax assessment is expected to result in the Company recognizing tax expense of $0.6 million in Q1 2022.

Houghton Italia, S.r.l is also involved in a corporate income tax audit with the Italian tax authorities covering tax years 2014 through 2018. As of December 31, 2021, the Company has a $5.0 million reserve for uncertain tax positions relating to matters related to this audit. Because the reserve relates to the tax periods prior to August 1, 2019, the tax liability was established through purchase accounting related to the Combination. The Company has also submitted an indemnification claim against funds held in escrow by Houghton's former owners and as a result, a corresponding $5.9 million indemnification receivable has also been established through purchase accounting. During the fourth quarter of 2021, the Company settled a portion of the Houghton Italia, S.r.l. corporate income tax audit with the Italian tax authorities for the tax years 2014 and 2015. The Company remains under audit for tax years 2016 through 2018 and believes it has adequate reverses for the remaining uncertain tax positions.

Houghton Deutschland GmbH is also under audit by the German tax authorities for tax years 2015 through 2017. Based on preliminary audit findings, primarily related to transfer pricing, the Company has recorded a reserve for $0.4 million as of December 31, 2021. Of this amount, $0.3 million relates to tax periods prior to the Combination and therefore the Company has submitted an indemnification claim with Houghton's former owners for any tax liabilities arising pre-Combination. As a result, a corresponding indemnification receivable has also been established.

Note 11 – Earnings Per Share

The following table summarizes earnings per share calculations for the years ended December 31, 2021, 2020 and 2019:

	2021	2020	2019
Basic earnings per common share			
Net income attributable to Quaker Chemical Corporation	$ 121,369	$ 39,658	$ 31,622
Less: income allocated to participating securities	(480)	(148)	(90)
Net income available to common shareholders	$ 120,889	$ 39,510	$ 31,532
Basic weighted average common shares outstanding	17,805,034	17,719,792	15,126,928
Basic earnings per common share	$ 6.79	$ 2.23	$ 2.08
Diluted earnings per common share			
Net income attributable to Quaker Chemical Corporation	$ 121,369	$ 39,658	$ 31,622
Less: income allocated to participating securities	(479)	(148)	(90)
Net income available to common shareholders	$ 120,890	$ 39,510	$ 31,532
Basic weighted average common shares outstanding	17,805,034	17,719,792	15,126,928
Effect of dilutive securities	50,090	31,087	36,243
Diluted weighted average common shares outstanding	17,855,124	17,750,879	15,163,171
Diluted earnings per common share	$ 6.77	$ 2.22	$ 2.08

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 during the year and the approximately 4.3 million shares issued as a component of the consideration transferred in the Combination, comprising 24.5% of the common stock of the Company immediately after the closing. Certain stock options, restricted stock units and PSUs are not included in the diluted earnings per share calculation when the effect would have been anti-dilutive. The calculated amount of anti-diluted shares not included were 4,070 in 2021, 945 in 2020 and 108 in 2019.

Note 12 – Restricted Cash

Prior to December 2020, the Company had 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 were restricted and could 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 were deposited into interest bearing accounts which earned less then $0.1 million and $0.2 million in the years ended December 31, 2020, and 2019, respectively, offset by $1.0 million and $0.8 million of net payments during 2020 and 2019, 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 that continued until the restrictions lapsed.

During December 2020, the restrictions ended on these previously received insurance settlements and the Company transferred the cash into an operating account. In connection with the termination in restrictions, the Company recognized an $18.1 million gain on its Consolidated Statement of Income in Other income (expense), net, for the amount of previously restricted cash, net of the estimated liability to pay claims and associated with the inactive subsidiary's asbestos litigation as of December 31, 2020. Therefore, due to these restrictions ending, there is no restricted cash for the year ended December 31, 2021. 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, 2021, 2020, 2019 and 2018:

	2021	2020	2019	2018
Cash and cash equivalents	$ 165,176	$ 181,833	$ 123,524	$ 104,147
Restricted cash included in other current assets	-	62	353	-
Restricted cash included in other assets	-	-	19,678	20,278
Cash, cash equivalents and restricted cash	$ 165,176	$ 181,895	$ 143,555	$ 124,425

Note 13 – Accounts Receivable and Allowance for Doubtful Accounts

As of December 31, 2021 and 2020, the Company had gross trade accounts receivable totaling $443.0 million and $386.1 million, respectively.

The following are changes in the allowance for doubtful accounts during the years ended December 31, 2021, 2020 and 2019:

	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, 2021	$ 13,145	$ 653	$ (946)	$ (518)	$ 12,334
Year ended December 31, 2020	$ 11,716	$ 3,582	$ (2,187)	$ 34	$ 13,145
Year ended December 31, 2019	$ 5,187	$ 1,925	$ (322)	$ 4,926	$ 11,716

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.

Note 14 – Inventories

Inventories, net, as of December 31, 2021 and 2020 were as follows:

	2021	2020
Raw materials and supplies	$ 129,382	$ 86,148
Work in process, finished goods and reserves	135,149	101,616
Total inventories, net	$ 264,531	$ 187,764

Note 15 – Property, Plant and Equipment

Property, plant and equipment as of December 31, 2021 and 2020 were as follows:

	2021	2020
Land	$ 30,793	$ 33,009
Building and improvements	134,313	135,595
Machinery and equipment	252,779	246,242
Construction in progress	16,459	8,407
Property, plant and equipment, at cost	434,344	423,253
Less: accumulated depreciation	(236,824)	(219,370)
Total property, plant and equipment, net	$ 197,520	$ 203,883

As of December 31, 2021, PP&E includes $0.8 million of finance lease assets and future minimum lease payments. In connection with the plans for closure of certain facilities, certain buildings and land with an aggregate book value of approximately $0.7 million continue to be held-for-sale as of December 31, 2021 and are recorded in prepaid expenses and other current assets on the Company’s Consolidated Balance Sheet.

Note 16 – Goodwill and Other Intangible Assets

Changes in the carrying amount of goodwill for the years ended December 31, 2021 and 2020 were as follows:

	Americas	EMEA	Asia/Pacific	Global Specialty Businesses	Total
Balance as of December 31, 2019	$ 216,385	$ 133,018	$ 141,727	$ 116,075	$ 607,205
Goodwill additions	1,485	531	-	1,329	3,345
Currency translation and other adjustments	(4,628)	6,613	16,363	2,314	20,662
Balance as of December 31, 2020	213,242	140,162	158,090	119,718	631,212
Goodwill additions	1,490	3,380	1,308	2,624	8,802
Currency translation and other adjustments	(709)	(8,022)	3,060	(3,149)	(8,820)
Balance as of December 31, 2021	$ 214,023	$ 135,520	$ 162,458	$ 119,193	$ 631,194

Other adjustments in the table above includes updates to the Company's allocation of the Houghton purchase price and associated goodwill to each of the Company's reportable segments during the year ended December 31, 2020, including a $2.6 million decrease in the Americas, a $1.4 million decrease in EMEA, a $8.0 million increase in Asia/Pacific and a $0.5 million increase in Global Specialty Businesses.

Gross carrying amounts and accumulated amortization for definite-lived intangible assets as of December 31, 2021 and 2020 were as follows:

	Gross Carrying Amount		Accumulated Amortization	
	2021	2020	2021	2020
Customer lists and rights to sell	$ 853,122	$ 839,551	$ 147,858	$ 99,806
Trademarks, formulations and product technology	163,974	166,448	38,747	30,483
Other	6,309	6,372	5,900	5,824
Total definite-lived intangible assets	$ 1,023,405	$ 1,012,371	$ 192,505	$ 136,113

The Company recorded $59.9 million, $55.9 million and $26.7 million of amortization expense during the years ended December 31, 2021, 2020 and 2019, 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, 2022	$ 59,900
For the year ended December 31, 2023	59,727
For the year ended December 31, 2024	59,138
For the year ended December 31, 2025	58,383
For the year ended December 31, 2026	58,108

The Company has four indefinite-lived intangible assets totaling $196.9 million as of December 31, 2021, including $195.8 million of indefinite-lived intangible assets for trademarks and tradename associated with the Combination. Comparatively, the Company had four indefinite-lived intangible assets for trademarks and tradename totaling $205.1 million as of December 31, 2020.

The Company completes its annual goodwill and indefinite-lived intangible asset 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. The Company completed its annual impairment assessment during the fourth quarter of 2021 and concluded no impairment charge was warranted. The Company 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.

As of March 31, 2020, the Company evaluated the initial impact of COVID-19 on the Company's operations, and the volatility and uncertainty in the economic outlook as a result of COVID-19 to determine if they indicated it was more likely than not that the carrying value of any of the Company's reporting units or indefinite-lived or long-lived assets was not recoverable. The Company concluded that the impact of COVID-19 did not represent a triggering event as of March 31, 2020 with regards to the Company's

reporting units or indefinite-lived and long-lived assets, except for the Company's Houghton and Fluidcare TM trademarks and tradename indefinite-lived intangible assets.

The determination of estimated fair value of the Houghton and Fluidcare TM trademarks and tradename indefinite-lived assets was based on a relief from royalty valuation method which requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to the weighted average cost of capital ("WACC") and royalty rates, as well as revenue growth rates and terminal growth rates. In the first quarter of 2020, as a result of the impact of COVID-19 driving a decrease in projected legacy Houghton net sales in the current year and the impact of the current year decline on projected future legacy Houghton net sales as well as an increase in the WACC assumption utilized in the quantitative impairment assessment, the Company concluded that the estimated fair values of the Houghton and Fluidcare TM trademarks and tradename intangible assets were less than their carrying values. As a result, an impairment charge of $38.0 million, primarily related to the Houghton trademarks and tradename, to write down the carrying values of these intangible assets to their estimated fair values was recorded in the first quarter of 2020.

Note 17 – Investments in Associated Companies

As of December 31, 2021, the Company held a 50% investment in and had significant influence over Nippon Quaker Chemical, Ltd. ("Nippon Japan"), Kelko Quaker Chemical, S.A. ("Kelko Panama") and Houghton Korea acquired in 2019 in connection with the Combination, and held a 32% investment in and had significant influence over Primex, Ltd. ("Primex").

The carrying amount of the Company's equity investments as of December 31, 2021 was $95.3 million, which includes investments of $66.4 million in Houghton Korea; $21.5 million in Primex; $7.1 million in Nippon Japan; and $0.3 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, 2021 and 2020, 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, 2021, 2020 and 2019:

	Year Ended December 31,		
	2021	**2020**	**2019**
Houghton Korea	$ 3,808	$ 5,241	$ 2,337
Nippon Japan	461	853	850
Kelko Panama	154	107	55
Grindaix (1)	(37)	-	-
Primex	4,993	1,151	1,822
Total equity in net income of associated companies	$ 9,379	$ 7,352	$ 5,064

(1) In February 2021, the Company acquired a 38% ownership interest in Grindaix. From that date through September 2021 when the Company purchased the remaining interest of Grindaix, the Company accounted for its 38% interest under the equity method of accounting and recorded equity in net income of associated companies. See Note 2 of Notes to Consolidated Financial Statements.

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, 2021 and 2020 were as follows:

	2021	2020
Pension assets	$ 7,916	$ 6,748
Uncertain tax positions	6,931	7,209
Indemnification assets	6,630	7,615
Debt issuance costs	4,267	5,919
Supplemental retirement income program	2,269	1,961
Other	2,946	2,344
Total other non-current assets	$ 30,959	$ 31,796

As of December 31, 2021 and 2020, indemnification assets relates to 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. As of December 31, 2021 and 2020, one of the Company's foreign 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. See Notes 10, 12, 21 and 22 of Notes to Consolidated Financial Statements.

Note 19 – Other Accrued Liabilities

Other accrued liabilities as of December 31, 2021 and 2020 were as follows:

	2021	2020
Non-income taxes	$ 23,725	$ 26,080
Current income taxes payable	16,642	13,124
Professional fees, legal, and acquisition-related accruals	12,264	11,437
Selling expenses and freight accruals	11,695	10,475
Short-term lease liabilities	9,976	10,901
Customer advances and sales return reserves	7,965	6,380
Interest rate swap	1,782	-
Other	11,568	13,710
Total other accrued liabilities	$ 95,617	$ 92,107

Note 20 – Debt

Debt as of December 31, 2021 and 2020 includes the following:

	As of December 31, 2021		As of December 31, 2020	
	Interest Rate	Outstanding Balance	Interest Rate	Outstanding Balance
Credit Facilities:				
Revolver	1.62%	$ 211,955	1.65%	$ 160,000
U.S. Term Loan	1.65%	540,000	1.65%	570,000
EURO Term Loan	1.50%	137,616	1.50%	157,062
Industrial development bonds	5.26%	10,000	5.26%	10,000
Bank lines of credit and other debt obligations	Various	1,777	Various	2,072
Total debt		$ 901,348		$ 899,134
Less: debt issuance costs		(8,001)		(11,099)
Less: short-term and current portion of long-term debts		(56,935)		(38,967)
Total long-term debt		$ 836,412		$ 849,068

Credit facilities

The Company's primary credit facility (as amended, the "Credit Facility") is comprised of a $400.0 million multicurrency revolver (the "Revolver"), a $600.0 million 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 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 Credit Facility bear interest at a base rate or LIBOR plus an applicable margin based upon the Company's consolidated net leverage ratio. On December 10, 2021, the Company entered into the Second Amendment with Bank of America N.A., to include among other things, an update to provide for use of a non-USD currency LIBOR successor rate. The variable interest rate incurred on the outstanding borrowings under the Credit Facility as of and during the year ended December 31, 2021 was approximately 1.6%. In addition to paying interest on outstanding principal under the Credit Facility, the Company is required to pay a commitment fee ranging from 0.2% to 0.3% depending on the Company's consolidated net leverage ratio to the lenders under the Revolver in respect of the unutilized commitments thereunder. The Company has unused capacity under the Revolver of approximately $184 million, net of bank letters of credit of approximately $4 million, as of December 31, 2021.

The Credit Facility is subject to certain financial and other covenants. The Company's initial consolidated net debt to consolidated adjusted EBITDA ratio could not exceed 4.25 to 1, with step downs in the permitted ratio over the term of the Credit Facility. As of December 31, 2021, the consolidated net debt to adjusted EBITDA may not exceed 3.75 to 1. The Company's consolidated adjusted EBITDA to interest expense ratio cannot be less than 3.0 to 1 over the term of the agreement. The Credit Facility also prohibits the payment of cash dividends if the Company is in default or if the amount of the dividend paid annually exceeds 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. As of December 31, 2021 and December 31, 2020, the Company was in compliance with all of the Credit Facility covenants. The Term Loans have quarterly principal amortization during their five year terms, 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. During the year ended December 31, 2021, the Company made four quarterly amortization payments related to the Term Loans totaling $38.0 million. The 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 are guaranteed only by certain foreign subsidiaries on an unsecured basis.

The 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 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 Credit Facility, based on the Company's consolidated net leverage ratio. At the time the Company entered into the swaps, and as of December 31, 2021, the aggregate interest rate on the swaps, including the fixed base rate plus an applicable margin, 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 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 are being amortized into interest expense over the five year term of the Credit Facility. As of December 31, 2021 and 2020, the Company had $8.0 million and $11.1 million, respectively, of debt issuance costs recorded as a reduction of long-term debt. As of December 31, 2021 and 2020, the Company had $4.3 million and $5.9 million, respectively, of debt issuance costs recorded within other non-current assets.

Industrial development bonds

As of December 31, 2021 and 2020, the Company had fixed rate, industrial development authority bonds totaling $10.0 million in principal amount due in 2028. These bonds have similar covenants to the Credit Facility noted above.

Bank lines of credit and other debt obligations

The Company has certain unsecured bank lines of credit and discounting facilities in certain 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, 2021, was approximately $26 million.

In addition to the bank letters of credit described in the "Credit facilities" subsection above, the Company's only other off-balance sheet arrangements include certain financial and other guarantees. The Company's total bank letters of credit and guarantees outstanding as of December 31, 2021 were approximately $6 million.

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

	Year Ended December 31,		
	2021	2020	2019
Interest expense	$ 19,089	$ 23,552	$ 16,788
Amortization of debt issuance costs	4,749	4,749	1,979
Total	$ 23,838	$ 28,301	$ 18,767

Based on the variable interest rates associated with the Credit Facility, as of December 31, 2021 and 2020, the amounts at which the Company's total debt were recorded are not materially different from their fair market value.

At December 31, 2021, 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:

2022	$ 56,978
2023	75,765
2024	758,241
2025	298
2026	145

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, 2021 and 2020:

	Pension Benefits						Other Post-Retirement Benefits	
	2021			2020			2021	2020
	Foreign	U.S.	Total	Foreign	U.S.	Total	U.S.	U.S.
Change in benefit obligation								
Gross benefit obligation at beginning of year	$ 247,675	$ 109,969	$ 357,644	$ 217,893	$ 153,723	$ 371,616	$ 3,234	$ 4,266
Service cost	698	547	1,245	4,340	491	4,831	1	5
Interest cost	2,594	1,737	4,331	3,416	2,923	6,339	27	77
Employee contributions	71	-	71	73	-	73	-	-
Effect of plan amendments	-	-	-	-	50	50	(78)	-
Curtailment gain	-	-	-	(2,324)	-	(2,324)	-	-
Plan settlements	(541)	-	(541)	(2,316)	(53,494)	(55,810)	-	-
Benefits paid	(6,869)	(5,064)	(11,933)	(5,087)	(6,138)	(11,225)	(182)	(250)
Plan expenses and premiums paid	(74)	-	(74)	(135)	-	(135)	-	-
Transfer in of business acquisition	231	-	231	-	-	-	-	-
Actuarial (gain) loss	(4,160)	(3,769)	(7,929)	16,834	12,414	29,248	(992)	(864)
Translation differences and other	(10,873)	-	(10,873)	14,981	-	14,981	-	-
Gross benefit obligation at end of year	$ 228,752	$ 103,420	$ 332,172	$ 247,675	$ 109,969	$ 357,644	$ 2,010	$ 3,234

	Pension Benefits						Other Post-Retirement Benefits	
	2021			2020			2021	2020
	Foreign	U.S.	Total	Foreign	U.S.	Total	U.S.	U.S.
Change in plan assets								
Fair value of plan assets at beginning of year	$ 228,789	$ 73,481	$ 302,270	$ 195,099	$ 120,550	$ 315,649	$ -	$ -
Actual return on plan assets	915	7,201	8,116	20,367	10,759	31,126	-	-
Employer contributions	4,289	2,063	6,352	6,912	2,302	9,214	182	250
Employee contributions	71	-	71	73	-	73	-	-
Plan settlements	(541)	-	(541)	(2,316)	(53,494)	(55,810)	-	-
Benefits paid	(6,869)	(5,065)	(11,934)	(5,087)	(6,138)	(11,225)	(182)	(250)
Plan expenses and premiums paid	(74)	-	(74)	(135)	(498)	(633)	-	-
Translation differences	(9,694)	-	(9,694)	13,876	-	13,876	-	-
Fair value of plan assets at end of year	$ 216,886	$ 77,680	$ 294,566	$ 228,789	$ 73,481	$ 302,270	$ -	$ -
Net benefit obligation recognized	$ (11,866)	$ (25,740)	$ (37,606)	$ (18,886)	$ (36,488)	$ (55,374)	$ (2,010)	$ (3,234)
Amounts recognized in the balance sheet consist of:								
Non-current assets	$ 7,916	$ -	$ 7,916	$ 6,748	$ -	$ 6,748	$ -	$ -
Current liabilities	(191)	(1,137)	(1,328)	(568)	(612)	(1,180)	(220)	(286)
Non-current liabilities	(19,591)	(24,603)	(44,194)	(25,066)	(35,876)	(60,942)	(1,790)	(2,948)
Net benefit obligation recognized	$ (11,866)	$ (25,740)	$ (37,606)	$ (18,886)	$ (36,488)	$ (55,374)	$ (2,010)	$ (3,234)
Amounts not yet reflected in net periodic benefit costs and included in accumulated other comprehensive loss:								
Prior service (cost) credit	(22)	43	21	(26)	50	24	46	-
Accumulated (loss) gain	(19,163)	(9,763)	(28,926)	(21,976)	(5,532)	(27,508)	1,034	124
AOCI	(19,185)	(9,720)	(28,905)	(22,002)	(5,482)	(27,484)	1,080	124
Cumulative employer contributions in excess of or (below) net periodic benefit cost	7,319	(16,020)	(8,701)	3,116	(31,006)	(27,890)	(3,090)	(3,358)
Net benefit obligation recognized	$ (11,866)	$ (25,740)	$ (37,606)	$ (18,886)	$ (36,488)	$ (55,374)	$ (2,010)	$ (3,234)

The accumulated benefit obligation for all defined benefit pension plans was $321.5 million ($103.4 million U.S. and $218.1 million Foreign) and $344.4 million ($109.5 million U.S. and approximately $234.9 million Foreign) as of December 31, 2021 and 2020, respectively.

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

	2021			2020		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Projected benefit obligation	$ 138,963	$ 103,420	$ 242,383	$ 32,373	$ 109,969	$ 142,342
Accumulated benefit obligation	128,268	103,420	231,688	30,892	109,540	140,432
Fair value of plan assets	119,181	77,680	196,861	18,074	73,481	91,555

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

	2021			2020		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Projected benefit obligation	$ 138,963	$ 103,420	$ 242,383	$ 32,373	$ 109,969	$ 142,342
Fair value of plan assets	119,181	77,680	196,861	18,074	73,481	91,555

Components of net periodic benefit costs – pension plans:

	2021			2020		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Service cost	$ 698	$ 547	$ 1,245	$ 4,340	$ 491	$ 4,831
Interest cost	2,594	1,737	4,331	3,416	2,923	6,339
Expected return on plan assets	(4,686)	(3,611)	(8,297)	(4,262)	(4,810)	(9,072)
Settlement loss (gain)	35	-	35	(88)	22,667	22,579
Curtailment charge	-	-	-	(1,155)	-	(1,155)
Actuarial loss amortization	996	2,252	3,248	886	2,110	2,996
Prior service cost (credit) amortization	3	7	10	(167)	-	(167)
Net periodic benefit (income) cost	$ (360)	$ 932	$ 572	$ 2,970	$ 23,381	$ 26,351

	2019		
	Foreign	U.S.	Total
Service cost	$ 3,507	$ 434	$ 3,941
Interest cost	3,046	3,313	6,359
Expected return on plan assets	(3,668)	(3,227)	(6,895)
Settlement loss	258	-	258
Actuarial loss amortization	757	2,348	3,105
Prior service credit amortization	(165)	-	(165)
Net periodic benefit cost	$ 3,735	$ 2,868	$ 6,603

Other changes recognized in other comprehensive income – pension plans:

	2021			2020		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Net (gain) loss arising during the period	$ (388)	$ (448)	$ (836)	$ (1,594)	$ 1,536	$ (58)
Effect of plan amendment						
Recognition of amortization in net periodic benefit cost						
Settlement loss	(83)	(2,252)	(2,335)	(39)	(22,667)	(22,706)
Prior service (cost) credit	-	(7)	(7)	1,325	50	1,375
Actuarial (loss) gain	(954)	(6,925)	(7,879)	(758)	3,967	3,209
Curtailment Recognition	(3)	-	(3)	(3)	-	(3)
Effect of exchange rates on amounts included in AOCI	(1,390)	-	(1,390)	1,535	-	1,535
Total recognized in other comprehensive (income) loss	(2,818)	(9,632)	(12,450)	466	(17,114)	(16,648)
Total recognized in net periodic benefit cost and other comprehensive (income) loss	$ (3,178)	$ (8,700)	$ (11,878)	$ 3,436	$ 6,267	$ 9,703

	2019		
	Foreign	**U.S.**	**Total**
Net loss arising during period	$ 3,826	$ 3,926	$ 7,752
Recognition of amortization in net periodic benefit cost			
Prior service credit	196	-	196
Actuarial loss	(1,015)	(2,347)	(3,362)
Effect of exchange rates on amounts included in AOCI	(61)	-	(61)
Total recognized in other comprehensive loss	2,946	1,579	4,525
Total recognized in net periodic benefit cost and other comprehensive loss	$ 6,681	$ 4,447	$ 11,128

Components of net periodic benefit costs – other postretirement plan:

	2021	**2020**	**2019**
Service cost	$ 1	$ 5	$ 6
Interest cost	27	77	143
Actuarial loss amortization	(82)	(5)	-
Prior service credit amortization	(31)	-	-
Net periodic benefit costs	$ (85)	$ 77	$ 149

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

	2021	**2020**	**2019**
Net (gain) loss arising during period	$ (992)	$ (864)	$ 395
Recognition of amortizations in net periodic benefit cost	(78)	-	-
Prior service credit	31	-	-
Actuarial gain amortization	82	5	-
Total recognized in other comprehensive (income) loss	(957)	(859)	395
Total recognized in net periodic benefit cost and other comprehensive (income) loss	$ (1,042)	$ (782)	$ 544

Weighted-average assumptions used to determine benefit obligations as of December 31, 2021 and 2020:

	Pension Benefits		**Other Postretirement Benefits**	
	2021	**2020**	**2021**	**2020**
U.S. Plans:				
Discount rate	2.58 %	2.19 %	2.45 %	2.05 %
Rate of compensation increase	N/A	6.00 %	N/A	N/A
Foreign Plans:				
Discount rate	1.71 %	1.79 %	N/A	N/A
Rate of compensation increase	2.21 %	2.74 %	N/A	N/A

Weighted-average assumptions used to determine net periodic benefit costs for the years ended December 31, 2021 and 2020:

	Pension Benefits		Other Postretirement Benefits	
	2021	2020	2021	2020
U.S. Plans:				
Discount rate	2.67 %	3.11 %	1.90 %	2.99 %
Expected long-term return on plan assets	5.75 %	6.50 %	N/A	N/A
Rate of compensation increase	6.00 %	6.00 %	N/A	N/A
Foreign Plans:				
Discount rate	1.38 %	2.30 %	N/A	N/A
Expected long-term return on plan assets	2.06 %	2.20 %	N/A	N/A
Rate of compensation increase	2.52 %	2.79 %	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, 2021 and 2020:

	2021	2020
Health care cost trend rate for next year	5.65 %	5.70 %
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	4.00 %	4.50 %
Year that the rate reaches the ultimate trend rate	2046	2037

Plan Assets and Fair Value

The Company's pension plan target asset allocation and the weighted-average asset allocations as of December 31, 2021 and 2020 by asset category were as follows:

Asset Category	Target	2021	2020
U.S. Plans			
Equity securities	44 %	46 %	58 %
Debt securities	50 %	48 %	36 %
Other	6 %	6 %	6 %
Total	100 %	100 %	100 %
Foreign Plans			
Equity securities	39 %	36 %	33 %
Debt securities	50 %	43 %	45 %
Other	11 %	21 %	22 %
Total	100 %	100 %	100 %

As of December 31, 2021 and 2020, “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, 2021, the foreign pension plan commingled funds included approximately 35 percent of investments in equity securities, 51 percent of investments in fixed income securities, and 14 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, 2021, the U.S. pension plan pooled separate accounts included approximately 49 percent of investments in equity securities and 51 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, 2021, the diversified investment funds included approximately 62 percent of investments in equity securities, 20 percent of investments in fixed income securities, and 18 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, 2021 and 2020, the U.S. and foreign plans' investments measured at fair value on a recurring basis were as follows:

		Fair Value Measurements at December 31, 2021 Using Fair Value Hierarchy		
U.S. Pension Assets	**Total Fair Value**	**Level 1**	**Level 2**	**Level 3**
Pooled separate accounts	$ 72,721	$ -	$ 72,721	$ -
Real estate	4,959	-	-	4,959
Subtotal U.S. pension plan assets in fair value hierarchy	$ 77,680	$ -	$ 72,721	$ 4,959
Total U.S. pension plan assets	$ 77,680			
Foreign Pension Assets				
Cash and cash equivalents	$ 1,989	$ 1,989	$ -	$ -
Insurance contract	99,527	-	-	99,527
Diversified equity securities - registered investment companies	10,999	-	10,999	-
Fixed income – foreign registered investment companies	3,593	-	3,593	-
Fixed income government securities	35,339	-	35,339	-
Real estate	6,588	-	-	6,588
Other - alternative investments	6,979	-	-	6,979
Sub-total of foreign pension assets in fair value hierarchy	$ 165,014	$ 1,989	$ 49,931	$ 113,094
Commingled funds measured at NAV	2,300			
Diversified investment fund - registered investment companies measured at NAV	49,572			
Total foreign pension assets	$ 216,886			
Total pension assets in fair value hierarchy	$ 242,694	$ 1,989	$ 122,652	$ 118,053
Total pension assets measured at NAV	51,872			
Total pension assets	$ 294,566			

	Total	Fair Value Measurements at December 31, 2020 Using Fair Value Hierarchy		
U.S. Pension Assets	**Fair Value**	**Level 1**	**Level 2**	**Level 3**
Pooled separate accounts	$ 69,385	$ -	$ 69,385	$ -
Real estate	4,096	-	-	4,096
Subtotal U.S. pension plan assets in fair value hierarchy	$ 73,481	$ -	$ 69,385	$ 4,096
Total U.S. pension plan assets	$ 73,481			
Foreign Pension Assets				
Cash and cash equivalents	$ 634	$ 634	$ -	$ -
Insurance contract	112,920	-	-	112,920
Diversified equity securities - registered investment companies	8,851	-	8,851	-
Fixed income – foreign registered investment companies	3,711	-	3,711	-
Fixed income government securities	37,579	-	37,579	-
Real estate	5,679	-	-	5,679
Other - alternative investments	10,638	-	-	10,638
Sub-total of foreign pension assets in fair value hierarchy	$ 180,012	$ 634	$ 50,141	$ 129,237
Commingled funds measured at NAV	2,368			
Diversified investment fund - registered investment companies measured at NAV	46,409			
Total foreign pension assets	$ 228,789			
Total pension assets in fair value hierarchy	$ 253,493	$ 634	$ 119,526	$ 133,333
Total pension assets measured at NAV	48,777			
Total pension assets	$ 302,270			

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, 2021 and 2020 were as follows:

	Insurance Contract	Real Estate	Alternative Investments	Total
Balance as of December 31, 2019	$ 92,657	$ 9,581	$ 9,436	$ 111,674
Purchases	3,902	18	989	4,909
Settlements	(2,027)	-	-	(2,027)
Unrealized gains (losses)	8,917	(16)	(171)	8,730
Currency translation adjustment	9,471	192	384	10,047
Balance as of December 31, 2020	112,920	9,775	10,638	133,333
Purchases	1,722	(78)	(334)	1,310
Settlements	(1,812)	-	-	(1,812)
Unrealized (losses) gains	(5,031)	1,926	(3,282)	(6,387)
Currency translation adjustment	(8,272)	(76)	(43)	(8,391)
Balance as of December 31, 2021	$ 99,527	$ 11,547	$ 6,979	$ 118,053

In the fourth quarter of 2018, the Company began the process of terminating its Legacy Quaker noncontributory U.S. pension plan ("Legacy Quaker U.S. Pension Plan"). During the third quarter of 2019, the Company received a favorable termination determination letter from the I.R.S. and completed the Legacy Quaker U.S. Pension Plan termination during the first quarter of 2020. 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 was required to fully fund the Legacy Quaker U.S. Pension Plan on a termination basis and the amount necessary to do so was approximately $1.8 million, subject to final true up adjustments. In the third quarter of 2020, the Company finalized the amount of the liability and related annuity payments and received a refund in premium of approximately $1.6 million. In addition, the Company recorded a non-cash pension settlement charge at plan termination of approximately $22.7 million. This settlement charge included the immediate recognition into expense of the related unrecognized losses within AOCI on the balance sheet as of the plan termination date.

In connection with the Combination, the Company indirectly acquired all of Houghton's defined benefit pension plans, which are included in the tables set forth above. The pension plans cover certain U.S. salaried and hourly employees as well as certain employees in the U.K., France and Germany. 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. The foreign plans provide benefits based on a formula of years and service and a percentage of compensation which varies among the various countries.

The Company 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, 2020, the last valuation date available for the multiemployer plan, total plan liabilities were approximately $587 million. As of December 31, 2020, the multiemployer pension plan had total plan assets of approximately $387 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 $0.2 million during the year ended December 31, 2021. 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, 2021.

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 $10.6 million to its pension plans (approximately $6.6 million U.S. and $4.0 million Foreign) and approximately $0.2 million to its other postretirement benefit plan in 2022.

Estimated Future Benefit Payments

Excluding any impact related to the PPA 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**
2022	$ 6,678	$ 6,627	$ 13,305	$ 220
2023	6,661	6,043	12,704	209
2024	6,475	6,205	12,680	187
2025	6,984	6,199	13,183	174
2026	7,702	6,213	13,915	157
2027 to 2031	42,577	30,169	72,746	625

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 $3.0 million, $2.5 million and $1.8 million for the years ended December 31, 2021, 2020 and 2019, 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 2019 and 2018, the Company made both non-elective and elective 401(k) matching contributions in cash, rather than stock. Beginning in April 2020 and continuing through March 2021, the Company matched both non-elective and elective 401(k) contributions in fully vested shared of the Company's common stock rather than cash. See Note 8 of Notes to Consolidated Financial Statements. Total Company contributions were $4.8 million, $5.7 million and $4.0 million for the years ended December 31, 2021, 2020 and 2019, respectively.

Note 22 – Other Non-Current Liabilities

Other non-current liabilities as of December 31, 2021 and 2020 were as follows:

	2021	2020
Uncertain tax positions (includes interest and penalties)	$ 28,665	$ 28,961
Non-current income taxes payable	8,500	8,500
Deferred and other long-term compensation	6,388	6,257
Environmental reserves	4,424	4,610
Inactive subsidiary litigation and settlement reserve	410	542
Fair value of interest rate swaps	-	4,672
Other	1,228	1,627
Total other non-current liabilities	$ 49,615	$ 55,169

The Fair value of interest rate swaps as of December 31, 2021 has been reclassified to other accrued liabilities in connection with the expiration of the swap contract in November 2022. See Notes 19 and 25 of Notes to Consolidated Financial Statements.

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 17,897,033 and 17,850,616 shares issued and outstanding as of December 31, 2021 and 2020, respectively. The change in shares issued and outstanding during 2021 was primarily related to 29,415 shares issued for share-based compensation plans and 17,002 shares issued for the exercise of stock options and other 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. The Board 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, 2021, no preferred stock had been issued.

The Company has a share repurchase program that was approved by its Board in 2015 for the repurchase of up to $100.0 million of Quaker Chemical Corporation common stock. The Company has not repurchased any shares under the program for the years ended December 31, 2021, 2020 and 2019. As of December 31, 2021, 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, 2021, 2020 and 2019:

	Currency Translation Adjustments	Defined Benefit Pension Plans	Unrealized Gain (Loss) in Available-for-Sale Securities	Derivative Instruments	Total
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)
Other comprehensive income (loss) before reclassifications	41,693	(6,617)	2,848	(4,257)	33,667
Amounts reclassified from AOCI	-	24,141	(202)	-	23,939
Related tax amounts	-	(6,458)	(555)	979	(6,034)
Balance as of December 31, 2020	(2,875)	(23,467)	3,342	(3,598)	(26,598)
Other comprehensive (loss) income before reclassifications	(46,968)	11,948	(531)	2,890	(32,661)
Amounts reclassified from AOCI	-	1,459	(3,197)	-	(1,738)
Related tax amounts	-	(3,112)	783	(664)	(2,993)
Balance as of December 31, 2021	$ (49,843)	$ (13,172)	$ 397	$ (1,372)	$ (63,990)

All reclassifications related to unrealized gain (loss) in available-for-sale securities relate to the Company's equity interest in a captive insurance company and are recorded in equity in net income of associated companies. The amounts reported in other comprehensive income 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, 2021 Using Fair Value Hierarchy		
Assets	Total Fair Value	Level 1	Level 2	Level 3
Company-owned life insurance	$ 2,533	$ -	$ 2,533	$ -
Total	$ 2,533	$ -	$ 2,533	$ -

		Fair Value Measurements at December 31, 2020 Using Fair Value Hierarchy		
Assets	Total Fair Value	Level 1	Level 2	Level 3
Company-owned life insurance	$ 1,961	$ -	$ 1,961	$ -
Total	$ 1,961	$ -	$ 1,961	$ -

The fair values of Company-owned life insurance assets 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, 2021 or 2020, respectively, so related disclosures have not been included.

Note 25 – Hedging Activities

In order to satisfy certain requirements of the Credit Facility as well as to manage the Company's exposure to variable interest rate risk associated with the Credit Facility, in November 2019, the Company entered into $ 170.0 million notional amounts of three year interest rate swaps. See Note 20 of Notes to Consolidated Financial Statements. 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 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, 2021	Fair Value December 31, 2020
Derivatives designated as cash flow hedges:			
Interest rate swaps	Other accrued liabilities	$ 1,782	$ -
	Other non-current liabilities	-	4,672
		$ 1,782	$ 4,672

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

		December 31, 2021	December 31, 2020
Derivatives designated as cash flow hedges:			
Interest rate swaps	AOCI	$ 1,372	$ 3,598
		$ 1,372	$ 3,598

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

		For the Years Ended December 31, 2021	2020	2019
Amount and location of (expense) income reclassified from AOCI into (expense) income (Effective Portion)	Interest expense, net	$ (2,649)	$ (1,754)	$ 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 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. In 2020, the Santa Ana Regional Water Quality Control Board asked that ACP conduct some additional indoor and outdoor soil vapor testing on and near the ACP site to confirm that ACP continues to meet the applicable local standards and ACP performed such testing program work in 2021 and will continue into 2022. As of December 31, 2021, 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, 2021, 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. 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 $0.4 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 originally 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.

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, 2021, 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 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.

The Company is party to environmental matters related to certain domestic and foreign properties. These environmental matters primarily require the Company to perform long-term monitoring as well as operating and maintenance at each of the applicable sites. During the year ended December 31, 2021, there have been no significant changes to the facts or circumstances of these matters, aside from ongoing monitoring and maintenance activities and routine payments associated with each of these 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 27 years, has estimated the present value range of costs for all of these environmental matters, on a discounted basis, to be between approximately $5.0 million and $6.0 million as of December 31, 2021, for which $5.6 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2021. Comparatively, as of December 31, 2020, the Company had $6.0 million accrued for with respect to these matters.

The Company'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 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 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. The Company 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 $0.4 million and $0.1 million were accrued as of December 31, 2021 and 2020, respectively, to provide for such anticipated future environmental assessments and remediation costs.

During the fourth quarter of 2020, one of the Company's subsidiaries received a notice of inspection from a taxing authority in a country where certain of its subsidiaries operate which related to a non-income (indirect) tax that may be applicable to certain products the subsidiary sells. During the third quarter of 2021, the Company's subsidiary received notice from the taxing authority that the inspection was closed, with no tax assessment issued. Based on this development, during the third quarter of 2021, the Company reversed its previously recorded $1.8 million liability related to this matter. The Company also reversed the associated $1.1 million indemnification receivable, as the asserted tax liability in part related to a Houghton entity acquired in the Combination and for the periods prior to the Combination, for which the Company would have rights to indemnification from Houghton's former owners. Based on all available information as of the date of this report, the Company does not anticipate further tax liabilities related to this matter to be asserted by the taxing authority.

During 2021, one of the Company's Brazilian subsidiaries received a notice that it had prevailed on an existing legal claim in regard to certain non-income (indirect) taxes that had been previously charged and paid. The matter specifically relates to companies' rights to exclude the state tax on goods circulation (a valued-added-tax or VAT equivalent, known in Brazil as "ICMS") from the calculation of certain additional indirect taxes (specifically the program of social integration ("PIS") and contribution for the financing of social security ("COFINS")) levied by the Brazilian States on the sale of goods. In May 2021, the Brazilian Supreme Court concluded that ICMS should not be included in the tax base of PIS and COFINS, and confirmed the methodology for calculating the PIS and COFINS tax credit claims to which taxpayers are entitled. The Company's Brazilian entities had previously filed legal or administrative disputes on this matter and are entitled to receive tax credits and interest dating back to five years preceding the date of their legal claims. As a result of these court rulings, during the second quarter of 2021, the Company recognized non-income tax credits of 67.0 million BRL or approximately $13.3 million, which included approximately $8.4 million for the PIS and COFINS tax credits as well as interest on these tax credits of $4.9 million, and is recorded within prepaid and other current assets on the Company's Consolidated Balance Sheet. The tax credits to which the Company's Brazilian subsidiaries are entitled are claimable once registered with the Brazilian tax authorities. The Company submitted its formal claim for tax credits in October 2021. These tax credits can be used to offset future Brazilian federal taxes and the Company currently anticipates using the full amount of credits during the five year period of time permitted. During the third quarter of 2021, the Brazilian Supreme Court ruled that interest income to which companies are entitled for matters such as this claim should not be taxable, which resulted in a reduction to the estimated income tax expense associated with the tax credits recorded.

In connection with obtaining regulatory approvals for the Combination, certain steel and aluminum related product lines of Houghton were divested in August 2019. In July 2021, the entity that acquired these divested product lines submitted an indemnification claim for certain alleged breaches of representation made by Houghton in the agreement pursuant to which such assets had been divested. The Company and the acquirer have agreed to extend the period for a possible negotiated resolution of this claim through March 31, 2022 so that both parties can evaluate the other's positions with respect to the subject matters of the claim. The Company is evaluating the merits of the alleged losses in the indemnification claim received. As of the date of this Report, the Company does not believe it is reasonably possible to determine or quantify any possible exposure.

During the third quarter of 2021, two of the Company's locations suffered property damages as a result of flooding and fire, respectively. The Company maintains property insurance for all of its facilities globally. In Conshohocken, Pennsylvania, the Company's global headquarters as well as its laboratory experienced property damages as a result of flooding from Hurricane Ida. Also, one of the Company's North American production facilities in its Global Specialty Businesses segment experienced an electrical fire that resulted in damage and the temporary shutdown of production, and also required remediation, cleaning and subsequent restoration. The Company, its insurance adjuster and insurance carrier are actively managing the remediation and restoration activities associated with these events and at this time the Company has concluded, based on all available information and discussions with its

insurance adjuster and insurance carrier, that the losses incurred during the third quarter of 2021 will be covered under the Company's property insurance coverage, net of an aggregate deductible of $2.0 million. The Company has received payments from its insurers of $2.1 million and has recorded an insurance receivable associated with these events (and a gain on insurance recoveries for losses incurred) of $0.7 million as of December 31, 2021. The Company and its insurance carrier are in early stages of reviewing the impact of the electrical fire on the production facility's operations as it relates to a potential business interruption insurance claim; however, as of the date of this Report, the Company cannot reasonably estimate any probable amount of business interruption insurance claim recoverable, therefore the Company has not recorded a gain contingency for a possible business interruption insurance claim as of December 31, 2021.

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.

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, as of December 31, 2021, the end of the period covered by this Report, our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Exchange Act) were effective.

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 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, 2021. 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"). Based on its assessment, management has concluded that as of December 31, 2021, the Company's internal control over financial reporting is effective based on those criteria.

Management has excluded the internal controls of Grindaix GmbH and Baron Industries from our assessment of internal control over financial reporting as of December 31, 2021, because these entities were acquired by the Company in purchase business combinations in September and November 2021, respectively. Grindaix GmbH and Baron Industries are wholly owned subsidiaries whose total assets and total revenues excluded from our assessment of internal control over financial reporting each represent less than 1% of the related consolidated financial statement amounts as of and for the year ended December 31, 2021.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2021 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in its report which is included in "Item 8. Financial Statements and Supplementary Data."

Remediation of the Previously Identified Material Weaknesses

As disclosed in "Item 9A. Controls and Procedures." in the Company's 2020 Form 10-K, we previously identified certain deficiencies in our application of the principles associated with the COSO framework that management concluded constituted material weaknesses. We did not design and maintain effective controls in response to the risks of material misstatement. Specifically, changes to existing controls or the implementation of new controls were not sufficient to respond to changes to the risks of material misstatement in financial reporting as a result of becoming a larger, more complex global organization due to the Combination. This material weakness also contributed to an additional material weakness as we did not design and maintain effective controls over the review of pricing, quantity and customer data to verify that revenue recognized was complete and accurate.

The Company and its Board of Directors are committed to maintaining a strong internal control environment. Since identifying the material weaknesses, the Company has dedicated a significant amount of time and resources to remediate all of the previously identified material weaknesses as quickly and effectively as possible. During 2020 and 2021, the Company dedicated multiple internal resources and supplemented those internal resources with various third-party specialists to assist with the formalization of a robust and detailed remediation plan. In undertaking remediation activities, the Company has hired additional personnel dedicated to financial and information technology compliance to further supplement its internal resources. In addition, the Company has established a global network of personnel to assist local management in understanding control performance and documentation requirements. In order to sustain this network, the Company conducts periodic trainings and hosts discussions to address questions on a current basis.

Risk Assessment – Specific to the material weakness in our risk assessment process that was previously disclosed in ***"Item 9A. Controls and Procedures."*** in the Company's 2020 Form 10-K, we previously determined that our risk assessment process was not designed adequately to respond to changes to the risks of material misstatement to financial reporting. In order to remediate this material weakness, we have designed and implemented an improved risk assessment process, 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 due to the Combination. During 2020 and in 2021, a full review was performed of our processes and controls across significant and other locations in order to identify and address potential design gaps. In addition to individual transactional-level control enhancements, this review resulted in (i) an enhanced financial statement risk assessment, (ii) the standardization of existing legal entity and newly implemented segment quarterly analytics and quarterly closing packages completed by key financial reporting personnel, (iii) a global account reconciliation review program and (iv) enhancements to our quarterly identification and reassessment of new and existing business and information technology risks that could affect our financial reporting. Monitoring is also performed through our enhanced quarterly controls certification process, whereby changes in business or information technology processes or control owners are identified and addressed timely. As previously disclosed in the 2020 Form 10-K, this material weakness remediation was also dependent on the remediation of the Revenue – Price and Quantity material weakness. During the fourth quarter of 2021, we completed testing of the operating effectiveness of the controls (including Revenue- Price and Quantity) and have concluded that the material weakness has been remediated as of December 31, 2021.

Revenue – Price and Quantity – Specific to the material weakness in our revenue process that was previously disclosed in ***"Item 9A. Controls and Procedures."*** in the Company's 2020 Form 10-K, we did not design and maintain effective controls over the review of pricing, quantity and customer data to verify that revenue recognized was complete and accurate. In order to remediate this material weakness, the Company redesigned certain aspects of its revenue process and related controls. The design included enhancements to entity-level and transactional-level manual controls as well as IT general and application controls, which were substantially implemented during the third quarter of 2021. During the fourth quarter of 2021, we completed testing of the operating effectiveness of the controls and have concluded that the material weakness has been remediated as of December 31, 2021.

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, 2021, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Based on that evaluation, there were no changes that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting during the fourth quarter of the year ended December 31, 2021.

Item 9B. ***Other Information.***

Not applicable.

Item 9C. ***Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.***

Not applicable.

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 2022 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, 2021 (the “2022 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 2022 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 (iv) the information in the 2022 Proxy Statement beginning with and including the sub-caption “Shareholder Nominations and Recommendations” to, but not including, the sub-caption “Board Oversight of Risk.” Information about our Executive Officers is included in Item 4(a) of this Report.

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

Incorporated by reference is (i) the information in the 2022 Proxy Statement beginning with and including the caption “Compensation Committee Interlocks and Insider Participation” 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 2022 Proxy Statement beginning with and including the caption “Stock Ownership of Certain Beneficial Owners and Management” to, but not including, the caption “Certain Relationships and Related Transactions.”

Equity Compensation Plans

The following table sets forth certain information relating to the Company’s equity compensation plans as of December 31, 2021. 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	109,684	$ 165.47	606,155	(1)
Equity compensation plans not approved by security holders	-	-	-	
Total	109,684	$ 165.47	606,155	(1)

(1) As of December 31, 2021, 304,900 of these shares were available for issuance as restricted stock awards under the Company’s 2001 Global Annual Incentive Plan, 240,004 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 61,251 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 2022 Proxy Statement beginning with and including the caption “Certain Relationships and Related Party Transactions” to, but not including, the caption “Proposal 2 — Ratification of Appointment of Independent Registered Public Accounting Firm,” (ii) the information in the 2022 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 2022 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 2022 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, 2022.

PART IV

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

(a) Exhibits and Financial Statement Schedules

1. Financial Statements and Supplementary Data

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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 — Restated By-laws (effective May 6, 2015, as amended through March 27, 2020). Incorporated by reference to Exhibit 3.2 as filed by Registrant within its quarterly report on Form 10-Q on May 11, 2020.

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. Incorporated by reference to Exhibit 4.2 as filed by the Registrant with Form 10-K for the year ended 2019.

10.1 — 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.

10.2 — 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.

10.3 — 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. †

10.4 — 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. †

10.5 — 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. †

10.6 — 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. †

10.7 — 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. †

10.8 — 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. †

10.9 — Employment Agreement by and between Registrant and Joseph Berquist dated August 18 2021, effective on September 9, 2021. Incorporated by reference to Exhibit 10.3 as filed by the registrant with Form 10-Q for the quarter ended September 30, 2021. †

10.10 — 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 . †

10.11 — 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. †

10.12 — Employment Agreement by and between Registrant and Andrew Tometich dated September 2, 2021, effective on October 11, 2021. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended September 30, 2021.. †

10.13 — Change in Control Agreement by and between Registrant and Andrew Tometich dated September 2, 2021, effective on October 11, 2021. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q for the quarter ended on September 30, 2021. †

10.14 — 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.†

10.15 — 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.†

10.16 — 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 .†

10.17 — 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 .†

10.18 — 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 .†

10.19 — Memorandum of Employment by and between the Registrant and Shane Hostetter dated and effective April 19, 2021. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q for the quarter ended on March 31, 2021. †

10.20 — Form of Change of Control Agreement by and between the Registrant and Shane Hostetter dated and effective April 19, 2021. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q for the quarter that ended on March 31, 2021. †

10.21 — Memorandum of Employment by and between the Registrant and David Will dated March 22, 2021 and effective April 19, 2021. Incorporated by reference to Exhibit 10.3 as filed by the Registrant with Form 10-Q for the quarter ended on March 31, 2021. †

10.22 — Terms and Conditions of Employment by and between Quaker Chemical Ltd and Adrian Steeples, dated December 7, 2010. Incorporated by reference to Exhibit 10.19 as filed by the Registrant with Form 10-K for the year ended 2019.†

10.23 — Amendment to Terms and Conditions of Employment by and between Quaker Chemical Ltd and Adrian Steeples, dated June 15, 2011. Incorporated by reference to Exhibit 10.20 as filed by the Registrant with Form 10-K for the year ended 2019. †

10.24 — 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. †

10.25 — 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. †

10.26 — Retirement Savings Plan, as amended and restated effective January 22, 2021, approved November 1, 2021. *†

10.27 — Quaker Houghton Annual Incentive Plan (as amended and restated effective November 17, 2021). *†

10.28 — 2011 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 31, 2011 . †

10.29 — 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 . †

10.30 — 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 28, 2016. †

10.31 — 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. †

10.32 — 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. †

10.33 — Form of Stock Option Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.30 as filed by the Registrant with Form 10-K for the year ended 2019. †

10.34 — Chief Executive Officer Transition Agreement dated April 22, 2021, effective December 31, 2021. Incorporated by reference to Exhibit 10.4 as filed by the Registrant with Form 10-Q for the quarter ended on March 31, 2021 . †

10.35 — Form of Restricted Stock Award Agreement for non-employee directors under Registrant's 2016 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 on June 30, 2021 . †

10.36 — 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 10.2 as filed by the Registrant with Form 10-Q for the quarter ended on June 30, 2021. †

10.37 — Form of Incentive Stock Option 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 the Registrant with Form 10-Q for the quarter ended on June 30, 2021 . †

10.38 — Form of Non-Qualified Stock Option Award 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 the Registrant with Form 10-Q for the quarter ended on June 30, 2021. †

10.39 — Form of Restricted Stock Unit Award Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.5 as filed by the Registrant with Form 10-Q for the quarter ended on June 30, 2021. †

10.40 — Form of Performance Stock Unit Award Agreement for executive officers and other employees under Registrant's 2016 Long-Term Performance Incentive Plan. Incorporated by reference to Exhibit 10.6 as filed by the Registrant with Form 10-Q for the quarter ended on June 30, 2021. †

10.41 — 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.

10.42 — 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.

10.43 — 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.

10.44 — 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. ***

10.45 — 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.

10.46 — Amendment No. 2, dated as of December 10, 2021, to the Credit Agreement, dated as of August 1, 2019.*

10.47 — 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.

10.48 — 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.***

10.49 — 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.***

10.50 — Amendment No 1, effective March 1, 2020, to the Quaker Houghton Retirement Savings Plan. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with its quarterly report on Form 10-Q on May 11, 2020. †

10.51 — Amendment No 2, effective February 10, 2020, to the Quaker Houghton Retirement Savings Plan. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with its quarterly report on Form 10-Q on August 5, 2020. †

10.52 — Amendment No 3, effective April 17, 2020, to the Quaker Houghton Retirement Savings Plan. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with its quarterly report on Form 10-Q on August 5, 2020. †

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 Andrew E. Tometich pursuant to 18 U.S.C. Section 1350.**

32.2 — Certification of Shane W. Hostetter 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/ ANDREW E. TOMETICH

Andrew E. Tometich
Director, Chief Executive Officer and President

Date: March 1, 2022

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/ ANDREW E. TOMETICH **Andrew E. Tometich** **Chief Executive Officer and President**	Principal Executive Officer and Director	March 1, 2022
/s/ SHANE W. HOSTETTER **Shane W. Hostetter** **Senior Vice President, Chief Financial Officer and Chief Accounting Officer**	Principal Financial Officer	March 1, 2022
/s/ DAVID A. WILL **David A. Will** **Vice President, Global Controller**	Principal Accounting Officer	March 1, 2022
/s/ MICHAEL F. BARRY **Michael F. Barry** **Chairman of the Board**	Director	March 1, 2022
/s/ DONALD R. CALDWELL **Donald R. Caldwell**	Director	March 1, 2022
/s/ CHARLOTTE C. DECKER **Charlotte C. Decker**	Director	March 1, 2022
/s/ MARK A. DOUGLAS **Mark A. Douglas**	Director	March 1, 2022
/s/ JEFFRY D. FRISBY **Jeffry D. Frisby**	Director	March 1, 2022
/s/ WILLIAM H. OSBORNE **William H. Osborne**	Director	March 1, 2022
/s/ ROBERT H. ROCK **Robert H. Rock**	Director	March 1, 2022
/s/ FAY WEST **Fay West**	Director	March 1, 2022
/s/ SANJAY HINDUJA **Sanjay Hinduja**	Director	March 1, 2022
/s/ RAMASWAMI SESHASAYEE **Ramaswami Seshasayee**	Director	March 1, 2022
/s/ MICHAEL SHANNON **Michael Shannon**	Director	March 1, 2022

EXHIBIT 21

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT

	Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
*	Quaker Chemical, S.A.	Argentina	100%
*	Houghton Argentina S.A.	Argentina	100%
+*	Quaker Australia Holdings Pty. Limited	Australia	100%
*	Quaker Chemical (Australasia) Pty. Ltd.	Australia	100%
+*	Quaker Houghton Australia Pty. Ltd. (formerly Houghton Australia Party Ltd)	Australia	100%
*	Surface Technology Australia	Australia	100%
**	Primex, Ltd.	Barbados	32%
+*	Quaker Chemical Participacoes, Ltda.	Brazil	100%
*	Quaker Chemical Industria e Comercio Ltda.	Brazil	100%
*	Quaker Chemical Operacoes, Ltda.	Brazil	100%
*	Ultraseal Asia Limited	British Virgin Islands	100%
*	Quaker Chemical Canada Limited	Canada	100%
+*	Quaker Chemical Canada Holdings, Inc.	Canada	100%
*	Quaker Houghton Canada Inc. (formerly Lubricor, Inc.)	Canada	100%
*	Houghton Canada Inc.	Canada	100%
+*	Global Houghton Ltd.	Cayman Islands	100%
*	Quaker Chemical (China) Co. Ltd.	China	100%
*	Quaker Shanghai Trading Company Limited	China	100%
+*	Quaker Houghton Chemical Investment Management (Shanghai) Co., Ltd. (Formerly Quaker Chemical Investment Management (Shanghai) Co Ltd)	China	100%
*	Quaker Houghton Material Science & Technology (Suzhou) Co Ltd	China	100%
*	Wuhan Quaker Technology Co., Ltd	China	60%
*	Houghton (Shanghai) Specialty Industrial Fluids 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%
+*	Quaker Denmark ApS	Denmark	100%
*	Houghton Denmark AS	Denmark	100%
*	Tel Nordic ApS	Denmark	100%
*	SIFCO Concepts Sarl	France	100%
*	Quaker Houghton Support France EURL (Formerly Quaker Chemical Services EURL)	France	100%
*	ECL Engineered Custom Lubricants GmbH	Germany	100%
*	Houghton Deutschland GmbH	Germany	100%
*	Grindaix GmbH	Germany	100%
*	Quaker Houghton Support Deutschland	Germany	100%
*	Ultraseal Germany GmbH	Germany	100%

EXHIBIT 21

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT, ***continued***

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Internationale Metall Impragnier GmbH	Germany	100%
* Maldaner GmbH	Germany	100%
* Sterr & Eder Industrieservice GmbH	Germany	100%
* Quaker Chemical Limited	Hong Kong	100%
* Houghton Magyarország Kft	Hungary	100%
* Quaker Chemical India Private Limited	India	100%
* Houghton Hardcastle India Ltd	India	9%
* DA Stuart India Private Limited	India	100%
* Ultraseal India Private Ltd	India	30%
* Quaker Italia S.r.l.	Italy	100%
* Quaker Houghton Support Italia S.r.l. (formerly: Quaker Chemical S.r.l.)	Italy	100%
* Houghton Italia S.p.A.	Italy	100%
* Houghton Japan Co., Ltd.	Japan	100%
** Nippon Quaker Chemical, Ltd.	Japan	50%
* Ultraseal Japan	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%
+* Quaker Houghton Investments Limited	Malta	100%
* Tecniquimia Mexicana S.A. de C.V.	Mexico	100%
* Unitek Servicios De Asesoria Especializad S.A de C.V.	Mexico	100%
* Lubricor Mexicana S.A. de C.V.	Mexico	100%
+* Quaker Chemical Europe B.V.	Netherlands	100%
* Quaker Houghton B.V. (formerly Quaker Chemical BV)	Netherlands	100%
+* Quaker Houghton Russia B.V. (formerly Quaker Chemical Russia B.V.; KWR Holdings B.V.)	Netherlands	100%
+* Quaker China Holdings B.V.	Netherlands	100%
+* Houghton Europe BV	Netherlands	100%
+* QH Europe BV	Netherlands	100%
* Quaker Houghton Sales BV (formerly Quaker Sales Europe BV)	Netherlands	100%
* Kelko Quaker Chemical, S.A.	Panama	50%
* Houghton Polska Sp. Zo.o.	Poland	100%
+* Quaker Chemical Holdings South Africa (Pty) Limited	Republic of South Africa	100%
* Quaker Chemical South Africa (Pty.) Limited	Republic of South Africa	100%
* Houghton Romania S.R.L.	Romania	100%
+* GHI Asia Pacific Pte. Ltd.	Singapore	100%
* Quaker Houghton Singapore (formerly Houghton Singapore)	Singapore	100%
** Korea Houghton Corporation	South Korea	50%
* Quaker Chemical, S.A.	Spain	100%
* Verkol S.A.U.	Spain	100%

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT, *continued*

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
+* Quaker Spain Holding, SLU	Spain	100%
* Houghton Iberica S.A.	Spain	100%
* Binol AB	Sweden	100%
* Houghton Sverige AB	Sweden	100%
* SIFCO Concepts Sweden	Sweden	100%
* Houghton Taiwan Co. Limited	Taiwan	100%
* Quaker (Thailand) Ltd.	Thailand	100%
* Quaker Houghton Thailand (formerly Thai Houghton 1993 Co., Ltd)	Thailand	100%
* Houghton Kimya Sanayi AS	Turkey	100%
* Houghton Ukraine ToV	Ukraine	100%
* Quaker Chemical Limited	United Kingdom	100%
+* GHGL London Ltd.	United Kingdom	100%
+* GHG Lubricants Holdings Limited	United Kingdom	100%
+* Houghton Holdings Limited	United Kingdom	100%
* Houghton Limited (formerly 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%
* 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%
+* SB Decking, Inc. (formerly Selby, Battersby & Co.)	United States	100%
* AC Products, Inc.	United States	100%
* Epmar Corporation	United States	100%
* Summit Lubricants, Inc.	United States	100%
* ECLI Products, LLC	United States	100%
+* GH Holdings Inc.	United States	100%
+* Houghton Technical Corp.	United States	100%
* SIFCO Applied Surface Concepts, LLC	United States	100%
* Quaker Houghton PA, Inc. (formerly Houghton International, Inc.)	United States	100%
* Ultraseal USA Inc.	United States	100%

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT, *continued*

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
+* Wallover Enterprises, Inc.	United States	100%
* Wallover Oil Company Incorporated	United States	100%
* Wallover Oil Hamilton Inc.	United States	100%
+* Quaker International Holdings, LLC	United States	100%
+* MIH Acquisition Company, LLC	United States	100%
* Coral Chemical Company, LLC	United States	100%
* Baron Acquisition LLC (d/b/a Baron Industries LLC)	United States	100%
* Baron of Tennessee LLC	United States	100%
* Quaker Chemical Corporation (PA)	United States	100%
* Quaker Chemical Corporation (DE)	United States	100%
+* EFHCO, LLC	United States	100%
* Kelko Quaker Chemical, S.A.	Venezuela	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-3 (Registration Nos. 333-155607, 333-233530, 333-233956 and 333-238508) and on Forms S-8 (Registration Nos. 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 1, 2022 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 1, 2022

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, Andrew E. Tometich, 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 1, 2022

/s/ ANDREW E. TOMETICH

Andrew E. Tometich

Chief Executive Officer

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, Shane W. Hostetter, 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 1, 2022

/s/ Shane W. Hostetter

Shane W. Hostetter

Chief Financial Officer

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, 2021 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 1, 2022

/s/ ANDREW E. TOMETICH

Andrew E. Tometich

Chief Executive Officer of Quaker Chemical Corporation

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, 2021 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 1, 2022

/s/ SHANE W. HOSTETTER

Shane W. Hostetter

Chief Financial Officer of Quaker Chemical Corporation

EXHIBIT 10.26

QUAKER HOUGHTON
RETIREMENT SAVINGS PLAN

(As Amended and Restated Effective January 1, 2021)

ARTICLE I DEFINITIONS 1
1.1 “AC Participant” 1
1.2 “AC Products Discretionary Contributions” 1
1.3 “Administrator” 1
1.4 “Affiliated Employer” 1
1.5 “Aggregate Account” 1
1.6 “Bargaining Component Plan” 2
1.7 “Base Compensation” 2
1.8 “Beneficiary” 2
1.9 “Catch-Up Contributions” 2
1.10 “Catch-Up Eligible Employee” 2
1.11 “Code” 2
1.12 “Company” 2
1.13 “Company Securities” 2
1.14 “Compensation” 2
1.15 “Contract” 3
1.16 “Coral Participant” 3
1.17 “Deferred Compensation” 3
1.18 “ECLI Participant” 3
1.19 “Effective Date” 3
1.20 “Elective Contributions” 3
1.21 “Eligible Employee” 4
1.22 “Employee” 4
1.23 “Employer” 4
1.24 “Entry Date” 5
1.25 “Epmar Participant” 5
1.26 “ERISA” 5
1.27 “Excess Aggregate Contributions” 5
1.28 “Excess Contributions” 5
1.29 “Excess Deferred Compensation” 5
1.30 “Fiduciary” 5
1.31 “Forfeiture” 5
1.32 “415 Compensation” 5
1.33 “414(s) Compensation” 5
1.34 “Highly Compensated Employee” 6
1.35 “Houghton Participant” 6
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QUAKER HOUGHTON RETIREMENT SAVINGS PLAN

(As Amended and Restated Effective January 1, 2021)

WHEREAS, Quaker Chemical Corporation (d/b/a Quaker Houghton)(the "Company") maintains the Quaker Houghton Retirement Savings Plan (the "Plan") for the benefit of eligible employees of the Company and participating affiliates;

WHEREAS, the Plan was most recently amended and restated effective January 1, 2020, and amended on three occasions thereafter;

WHEREAS, effective as of January 1, 2020, the Houghton International Inc. Tax Advantaged Capital Accumulation Plan (the "Houghton Plan") and the Wallover Enterprises Inc. Profit Sharing Plan and Trust (the "Wallover Plan") merged with and into the Plan;

WHEREAS, effective as of January 1, 2022, the Coral Chemical Company 401(k) Plan (the "Coral Plan") and the SIFCO Applied Surface Concepts, LLC 401(k) Plan (the "SIFCO Plan") shall be merged with and into the Plan; and

WHEREAS, the Company desires to amend and restate the Plan in order to incorporate all amendments adopted after the Plan's last amendment and restatement and reflect the merger of the SIFCO Plan and Coral Plan into the Plan;

NOW, THEREFORE, the Plan is hereby amended and restated as set forth below, effective January 1, 2021, except as otherwise provided herein. Prior to January 1, 2021, the terms of the Plan as in effect prior to January 1, 2021 shall apply as applicable.

ARTICLE I
DEFINITIONS

The following words and phrases, as used in the Plan, shall have the following meanings unless the context clearly indicates otherwise:

1.1 "AC Participant" means a Participant who is employed by AC Products, Inc., other than the individual who was the President of AC Products, Inc. on January 1, 2006.

1.2 "AC Products Discretionary Contributions" means the discretionary contributions, if any, made by AC Products, Inc. pursuant to Section 4.4(c) and allocated pursuant to Section 4.7(b)(iv).

1.3 "Administrator" means the committee designated by the Company to administer the Plan on behalf of the Employer.

1.4 "Affiliated Employer" means any corporation which is a member of a controlled group of corporations (as defined in Code section 414(b)) which includes the Company; any trade or business (whether or not incorporated) which is under common control (as defined in Code section 414(c)) with the Company; any organization (whether or not incorporated) which is a member of an affiliated service group (as defined in Code section 414(m)) which includes the Company; and any other entity required to be aggregated with the Company pursuant to Regulations under Code section 414(o).

1.5 "Aggregate Account" means, with respect to each Participant, the value of all accounts maintained on behalf of the Participant, whether attributable to Employer or Employee contributions.

1.6 “Bargaining Component Plan” means the component of the Plan that covers Employees who are members of a collective bargaining unit.

1.7 “Base Compensation” means, with respect to any Employee, the Compensation of the Employee, excluding overtime payments, shift differential, commissions, all nonsalary and nonwage direct or indirect compensation, Employer contributions to Social Security, contributions to this or any other retirement plan or program, the value of any other fringe benefit provided by or at the expense of the Employer, and any income realized upon the receipt, exercise, or vesting of a grant of a stock option, performance incentive unit, restricted stock, or other equity award pursuant to the Company’s long-term performance incentive plan.

1.8 “Beneficiary” means the person to whom the share of a deceased Participant's total account is payable, subject to the restrictions of Sections 6.3 and 6.6.

1.9 “Catch-Up Contributions” means additional contributions that a Catch-Up Eligible Employee may elect to make, including Roth Catch-Up Contributions, in accordance with Section 4.3 and Code section 414(v).

1.10 “Catch-Up Eligible Employee” means, with respect to a Plan Year, an Eligible Employee who is eligible to make Elective Contributions under Section 4.2 and who has attained or will attain age 50 before the end of such Plan Year.

1.11 “Code” means the Internal Revenue Code of 1986, as amended or replaced from time to time, and any Regulations in effect thereunder.

1.12 “Company” means Quaker Chemical Corporation, a Pennsylvania corporation, and any successor thereto.

1.13 “Company Securities” means the common stock of the Company.

1.14 “Compensation” means, with respect to any Employee, (a) the total remuneration earned or accrued on behalf of the Employee during the time period to which reference is made, exclusive of: (i) remuneration paid to any Participant after the date on which such Participant ceased to be employed in a classification eligible for participation in this Plan, other than remuneration with respect to services performed while the Participant was an Eligible Employee that is paid prior to the later of the end of the Plan Year in which the Participant’s Severance from Employment occurs or two and one-half months after his or her Severance from Employment; (ii) amounts realized from the exercise of a stock option, when restricted stock (or property) held by an Employee is includible in the Employee’s gross income, or when a stock grant is made; (iii) restricted stock dividends; (iv) disqualifying disposition of incentive stock option; (v) pay in lieu of 30 days’ notice; (vi) certain fringe benefits (such as payments for relocation expenses and any gross-up payments made with respect to such amounts, taxable mileage, car allowance, adoption assistance, tax and financial planning, tax equalization payments for expatriates, taxable education subsidy, California vacation pay out, unused vacation pay out after Severance from Employment, meal premiums); (vii) other miscellaneous income (such as associate referral, perfect attendance award, sign on bonus, final bonus, Presidents Award, ESPP gains, gift cards and other remuneration not received in cash (and any gross-up payments made with respect to such amounts)); and (b) differential wage payments (within the meaning of Code section 414(u)(12)). For purposes of allocating AC Products Discretionary Contributions and Quaker Discretionary Contributions pursuant to Section 4.7(b), only Compensation earned by an Employee while he or she is eligible to receive such a Contribution shall be taken into account. The determination of Compensation shall be made by including Deferred Compensation and salary reduction contributions made on behalf of an Employee to a plan maintained under Code section 125 or to a qualified transportation fringe benefit program described under Code section 132(f), but shall be exclusive of any distributions

attributable to unused "flex dollars" accumulated by the Employer pursuant to the Quaker Chemical Corporation Flexible Benefits Program. For purposes of determining Compensation, amounts under Code section 125 include any amounts not available to a Participant in cash in lieu of group health coverage because the Participant is unable to certify that he or she has other health coverage. An amount shall be treated as an amount under Code section 125 only if the Employer does not request or collect information regarding the Participant's other health coverage as part of the enrollment process for the health plan.

The annual Compensation of each Employee taken into account in determining allocations under the Plan for any Plan Year shall not exceed $290,000, as adjusted by the Commissioner of Internal Revenue for increases in the cost-of-living in accordance with Code section 401(a)(17)(B) for Plan Years after 2021. Annual Compensation means Compensation during the Plan Year or such other 12-consecutive-month period over which Compensation is otherwise determined under the Plan (the determination period). The cost-of-living adjustment in effect for a calendar year applies to annual Compensation for the determination period that begins with or within such calendar year. For purposes of determining a Participant's Elective Contributions and Matching Contributions, the limit set forth in this paragraph shall be applied to a Participant's Compensation on a Plan Year basis (or on a determination period basis, if the determination period is other than a Plan Year) and shall not be applied on a first-dollar basis.

Compensation, as defined above, shall include the amount that a Participant would have received from the Employer during a period of Qualified Military Service (or, if the amount of such Compensation is not reasonably certain, the Employee's average earnings from the Employer or an Affiliated Employer for the 12-month period immediately preceding the Employee's period of Qualified Military Service or, if shorter, the period of employment immediately preceding the Qualified Military Service); provided, however, that the Employee returns to work within the period during which his or her right to reemployment is protected by law.

1.15 "Contract" means a life insurance policy or annuity contract (group or individual) issued by the insurer as elected.

1.16 "Coral Participant" means a Participant who is employed by the Coral Chemical Company.

1.17 "Deferred Compensation" means, with respect to any Participant, that portion of the Participant's total Compensation which has been contributed to the Plan in accordance with the Participant's salary deferral election pursuant to Section 4.2. The term "Deferred Compensation" shall include Catch-Up Contributions except to the extent provided in Section 4.3, Code section 414(v), or final Regulations or other guidance issued by the Internal Revenue Service.

1.18 "ECLI Participant" means a Participant who is employed by ECLI Products, LLC.

1.19 "Effective Date" means January 1, 2021, the effective date of this amended and restated Plan, except as otherwise provided herein or as otherwise required by applicable law. Except where an earlier effective date is specified herein, the provisions of this amendment and restatement shall apply only to Employees who complete an Hour of Service on or after the Effective Date. The rights of individuals who terminated employment prior to the Effective Date shall otherwise be governed by the Plan as in effect on the date of their termination from employment. The original effective date of the Plan was December 31, 1953.

1.20 "Elective Contributions" means the Employer's contributions to the Plan that are made pursuant to the Participant's salary deferral election provided in Section 4.2. In addition, any Qualified Nonelective Contribution shall be considered an Elective Contribution for purposes of the Plan; provided, however, that Qualified Nonelective Contributions used to satisfy the Actual Contribution Percentage Test of Section 4.8(b) shall not be used to satisfy the Actual Deferral Percentage Test of Section 4.8(a). The term "Elective Contributions" shall include (i) Roth Elective Contributions, and (ii) Catch-Up Contributions, including Roth

Catch-Up Contributions, except to the extent provided in Section 4.3, Code section 414(v), or final Regulations or other guidance issued by the Internal Revenue Service.

1.21 "Eligible Employee" means any Employee, except as follows:

(a) An Employee who is a member of UAW Local 174 shall be deemed an "Eligible Employee" for purposes of being permitted to make Elective Contributions, receiving Matching Contributions, and receiving an allocation of Quaker Discretionary Contributions (if any) and Nonelective Contributions.

(b) Any other Employee whose employment is governed by the terms of a collective bargaining agreement between employee representatives (within the meaning of Code section 7701(a)(46)) and the Employer under which retirement benefits were the subject of good faith bargaining between the parties shall not be eligible to participate in this Plan (unless such collective bargaining agreement provides for participation in the Plan, including not limited to an Employee of the Coral Chemical Company whose employment is governed by the terms of a collective bargaining agreement between Chauffeurs, Teamsters and Helpers Local Union 301, Cartage Division or the Plant Workers Agreement and Coral Chemical Company (Local 301") who otherwise meets the eligibility requirements of Section 1.21).

(c) An Employee of an Affiliated Employer shall not be eligible to participate in this Plan unless such Affiliated Employer has specifically adopted this Plan in writing.

(d) A Leased Employee shall not be eligible to participate in this Plan.

(e) A nonresident alien who receives no earned income (within the meaning of Code section 911(d)(2)) which constitutes United States source income (within the meaning of Code section 861(a)(3)) shall not be eligible to participate in this Plan.

(f) A person shall not be eligible to participate in this Plan if he or she provides services to an Employer or Affiliated Employer pursuant to an agreement with a leasing organization (including, but not limited to, a Leased Employee), or if he or she is classified by an Employer or Affiliated Employer (i) as an independent contractor, or (ii) in any other category which is not a common law employee, as reflected in the official payroll and personnel records of the Employer or Affiliated Employer. The exclusion set forth in this subsection shall be based solely on the classification by the Employer or Affiliated Employer regardless of how such individual is classified by any government or regulatory authority or by any court. If an Employer or an Affiliated Employer reclassifies an individual as an Employee, such reclassification shall apply prospectively from the date of such reclassification (and not retroactively to the date on which he or she was found to have first become an employee for any other purpose), unless the Employer or Affiliated Employer specifically provides otherwise.

(g) Effective with respect to an Employee hired after 2010, an Employee shall not be eligible to participate in this Plan if he or she is (i) employed by an Employer for a temporary or periodic basis or without a regular work schedule pursuant to which the Employee accepts a job assignment having a fixed and limited duration, and (ii) classified by the Employer as a temporary employee.

1.22 "Employee" means any person who is employed by the Employer or an Affiliated Employer, and shall also include a Leased Employee.

1.23 "Employer" means the Company and any Affiliated Employer that has adopted this Plan in writing and joins in the corresponding trust agreement. The Affiliated Employers participating in the Plan as of January 1, 2021, are listed in Exhibit A.

1.24 “Entry Date” means the date as of which an Eligible Employee is eligible to become a Participant in the Plan, as provided in Section 3.1(a).

1.25 “Epmar Participant” means a Participant who is employed by Epmar Corporation.

1.26 “ERISA” means the Employee Retirement Income Security Act of 1974, as it may be amended from time to time.

1.27 “Excess Aggregate Contributions” means, with respect to any Plan Year, the excess of the aggregate amount of the Matching Contributions made on behalf of Highly Compensated Employees for such Plan Year, over the maximum amount of such contributions permitted under the limitations of Section 4.8(b). Excess Aggregate Contributions shall be treated as an “annual addition” pursuant to Section 4.10.

1.28 “Excess Contributions” means, with respect to any Plan Year, the excess of Elective Contributions made on behalf of Highly Compensated Employees for such Plan Year over the maximum amount of such contributions permitted under Section 4.8(a). Excess Contributions shall be treated as an “annual addition” pursuant to Section 4.10.

1.29 “Excess Deferred Compensation” means, with respect to any taxable year of a Participant, the aggregate amount of the Participant’s Deferred Compensation claimed by the Participant (pursuant to Section 4.2(d)(i)) or deemed to be claimed by the Participant (pursuant to Section 4.2(d)(ii)) as exceeding the dollar limitation provided for in Code section 402(g), which is incorporated herein by reference. Excess Deferred Compensation distributed pursuant to Section 4.2(d)(iv) shall not be treated as an “annual addition” pursuant to Section 4.10.

1.30 “Fiduciary” means any person or entity who (a) exercises any discretionary authority or discretionary control respecting management of the Plan or exercises any authority or control respecting management or disposition of its assets, (b) renders investment advice for a fee or other compensation, direct or indirect, with respect to any monies or other property of the Plan or has any authority or responsibility to do so, or (c) has any discretionary authority or discretionary responsibility in the administration of the Plan, including, but not limited to, the Trustee, the Company and its representative body, and the Administrator.

1.31 “Forfeiture” means removing that portion of the Participant’s Account that is not Vested from the Participant’s Account. Forfeiture shall occur on the earlier of (a) the date on which distribution is made to the Participant of the Participant’s Vested Aggregate Account, or (b) the last day of the Plan Year in which the Participant incurs five consecutive 1-Year Breaks in Service. In addition, the term Forfeiture shall also include amounts deemed to be Forfeitures pursuant to any other provision of this Plan. If a Participant’s Vested Aggregate Account is $0, the Participant shall be deemed to receive a distribution of his or her Vested Aggregate Account on his or her Severance from Employment.

1.32 “415 Compensation” means, effective with respect to limitation years (as defined in Section 4.10(c)) beginning on or after January 1, 2009, “compensation” as such word is defined in Regulation sections 1.415(c)-2(b) and (c) (including differential wage payments within the meaning of Code section 414(u)(12)). 415 Compensation shall not include compensation paid following a Participant’s Severance from Employment with the Company and any Affiliated Employers, except as otherwise required by Regulation section 1.415(c)-2(e)(3)(i). In no event shall a Participant’s 415 Compensation for any limitation year (as defined in Section 4.10(c)) exceed the annual compensation limit of Code section 401(a)(17) for such year.

1.33 “414(s) Compensation” means Compensation.

1.34 “Highly Compensated Employee” means, with respect to a Plan Year, an Employee who:

(a) was a 5% owner (as defined in Code section 416(i)(1)) of the Employer or an Affiliated Employer at any time during the current or the preceding Plan Year; or

(b) for the immediately preceding Plan Year had 415 Compensation from the Employer and Affiliated Employers in excess of $130,000 (as adjusted by the Secretary of Treasury pursuant to Code section 414(q) for Plan Years after 2021) and was in the top-paid group of Employees for such preceding year.

An Employee is in the top-paid group of Employees for the year if such Employee is in the group consisting of the top 20% of employees when ranked on the basis of 415 Compensation paid during such year. The determination of who is a Highly Compensated Employee, including the determination of 415 Compensation and of the number and identity of Employees in the top-paid group, shall be made in accordance with Code section 414(q) and the Regulations thereunder.

In determining who is a Highly Compensated Employee, Employees who are nonresident aliens and who received no earned income (within the meaning of Code section 911(d)(2)) from the Employer constituting United States source income within the meaning of Code section 861(a)(3) shall not be treated as Employees. All Affiliated Employers, however, shall be taken into account as a single employer.

1.35 “Houghton Participant” means a Participant who is employed by Houghton International Inc.

1.36 “Hour of Service” means (a) each hour for which an Employee is directly or indirectly compensated or entitled to compensation by the Employer for the performance of duties during the applicable computation period; (b) each hour for which an Employee is directly or indirectly compensated or entitled to compensation by the Employer (irrespective of whether the employment relationship has terminated) for reasons other than performance of duties (such as vacation, holidays, sickness, jury duty, disability, layoff, military duty, or leave of absence) during the applicable computation period; (c) each hour for which back pay is awarded or agreed to by the Employer without regard to mitigation of damages; and (d) each hour that constitutes part of the Employee’s customary work week during any period of Qualified Military Service, provided the Employee returns to service while his or her reemployment rights are protected by law. For purposes of subsection (c), these hours shall be credited to the Employee for the computation period or periods to which the award or agreement pertains rather than the computation period in which the award, agreement, or payment is made. The same Hours of Service shall not be credited both under subsection (a) or (b), as the case may be, and under subsection (c) or (d), as the case may be.

Notwithstanding the above, (i) except with respect to subsection (d), no more than 501 Hours of Service shall be credited to an Employee on account of any single continuous period during which the Employee performs no duties (whether or not such period occurs in a single computation period); (ii) an hour for which an Employee is directly or indirectly paid, or entitled to payment, on account of a period during which no duties are performed shall not be credited to the Employee if such payment is made or due under a plan maintained solely for the purpose of complying with applicable workers’ compensation, unemployment compensation, or disability insurance laws; and (iii) Hours of Service shall not be credited for a payment which solely reimburses an Employee for medical or medically related expenses incurred by the Employee.

For purposes of this Section, a payment shall be deemed to be made by or due from the Employer regardless of whether such payment is made by or due from the Employer directly, or indirectly through, among others, a trust fund or insurer, to which the Employer contributes or pays premiums, and regardless of whether contributions made or due to the trust fund, insurer, or other entity are for the benefit of particular Employees or are on behalf of a group of Employees in the aggregate.

An Hour of Service must be counted for the purposes of determining a Year of Service, a 1-Year Break in Service, and employment commencement date (or reemployment commencement date). In addition, Hours of Service shall be credited for employment with other Affiliated Employers for all purposes under the Plan other than Section 4.7(b)(iii) and (iv) (regarding eligibility to receive a Quaker Discretionary Contribution or an AC Products Discretionary Contribution). The provisions of 29 CFR §2530.200b-2(b) and (c) are incorporated herein by reference.

1.37 "Investment Manager" means an entity that (a) has the power to manage, acquire, or dispose of Plan assets and (b) acknowledges fiduciary responsibility to the Plan in writing. Such entity must be a person, firm, or corporation registered as an investment adviser under the Investment Advisers Act of 1940, a bank, or an insurance company or other person or entity described in ERISA section 3(38).

1.38 "Key Employee" means any Employee or former Employee (and the beneficiaries of such Employee) who at any time during the Plan Year that includes the Determination Date (as defined in Section 2.2(d)) was:

(a) an officer of an Employer or any Affiliated Employer having annual 415 Compensation from the Employer and the Affiliated Employer greater than $185,000 (as adjusted under Code section 416(i)(1) for Plan Years beginning after December 31, 2021);

(b) a 5% owner of an Employer or any Affiliated Employer; or

(c) a 1% owner of an Employer or any Affiliated Employer who has annual 415 Compensation from an Employer and the Affiliated Employer for a Plan Year of more than $150,000.

The determination of who is a Key Employee shall be made in accordance with Code section 416(i) and applicable Regulations and other guidance of general applicability issued thereunder.

1.39 "Leased Employee" means any person (other than a common law employee of the recipient) who, pursuant to an agreement between the recipient and any other person ("leasing organization"), has performed services for the recipient (or for the recipient and related persons determined in accordance with Code section 414(n)(6)) on a substantially full-time basis for a period of at least one year, if such services are performed under the primary direction or control by the recipient. Contributions or benefits provided to a Leased Employee by the leasing organization which are attributable to services performed for the recipient employer shall be treated as provided by the recipient employer.

1.40 "Matching Contribution" means the amount authorized by the Administrator as described in Section 4.4(a) and contributed in cash or Company Securities by the Employer.

1.41 "Nonelective Contributions" means the amount described in Section 4.5 and contributed in cash or Company Securities by the Employer.

1.42 "Nonhighly Compensated Employee" means an Employee who is not a Highly Compensated Employee.

1.43 "Non-Safe Harbor Component Plan" means the component of the Plan that covers Employees who (a) are not members of a collective bargaining unit, and (b) have either not completed a Year of Service (for purposes of Section 3.1) or not attained age 21.

1.44 "Normal Retirement Age" means the Participant's 65th birthday.

1.45 "1-Year Break in Service" means the applicable computation period during which an Employee has not completed more than 500 Hours of Service with the Employer or an Affiliated Employer. Further, solely for the purpose of determining whether a Participant has incurred a 1-Year Break in Service, Hours of Service shall be recognized for authorized leaves of absence and maternity and paternity leaves of absence. Years of Service and 1-Year Breaks in Service shall be measured using the same computation period. In addition, an Employee on Qualified Military Service shall not incur a 1-Year Break in Service, provided he or she returns to service while his or her employment rights are protected by law.

"Authorized leave of absence" means an unpaid, temporary cessation from active employment with the Employer pursuant to an established nondiscriminatory policy, whether occasioned by illness, military service, or any other reason.

A "maternity or paternity leave of absence" means an absence from work for any period by reason of the Employee's pregnancy, birth of the Employee's child, placement of a child with the Employee in connection with the adoption of such child, or any absence for the purpose of caring for such child for a period immediately following such birth or placement. For an individual who is absent from work for maternity or paternity reasons, the 12-consecutive-month period beginning on the date of such absence or the first anniversary of such absence shall not constitute a 1-Year Break in Service.

1.46 "Participant" means an Eligible Employee who is included in the Plan as provided in Article III.

1.47 "Participant's Account" means the account established and maintained by the Administrator for each Participant with respect to his or her total interest in the Plan and Trust resulting from AC Products Discretionary Contributions, Quaker Discretionary Contributions, Matching Contributions, and Nonelective Contributions. A separate accounting shall be maintained with respect to that portion of the Participant's Account attributable to Nonelective Contributions for Plan Years prior to 2008, Nonelective Contributions for Plan Years after 2007, Matching Contributions, AC Products Discretionary Contributions, and Quaker Discretionary Contributions.

1.48 "Participant's Elective Account" means the account established and maintained by the Administrator for each Participant with respect to his or her total interest in the Plan and Trust resulting from Elective Contributions which are not directed by the Participant to the Quaker Stock Fund. A separate accounting shall be maintained with respect to that portion of the Participant's Elective Account attributable to (i) pre-tax Elective Contributions pursuant to Section 4.2 or 4.3, (ii) Roth Elective Contributions (including Roth Catch-Up Contributions) pursuant to Section 4.2 or 4.3, (iii) any Qualified Nonelective Contributions made pursuant to Section 4.9(f) and (iv) After-Tax Coral Plan Contributions described in Section 11.2(a)(i) transferred to the Participant's Elective Account pursuant to Article XI.

1.49 "Plan" means the Quaker Houghton Retirement Savings Plan as set forth herein, including all amendments thereto. Prior to January 1, 2020, the Plan was the "Quaker Chemical Corporation Retirement Savings Plan". Prior to that, the Plan was known as the "Quaker Chemical Corporation Profit Sharing and Retirement Plan". With the exception of the Stock Bonus Plan portion of the Plan, the Plan is intended to be a profit-sharing plan under Code section 401(a)(27).

1.50 "Plan Year" means the Plan's accounting year of 12 months commencing on January 1 of each year and ending the following December 31.

1.51 "Quaker Discretionary Contributions" means the discretionary contributions, if any, made by the Employer pursuant to Section 4.4(b) and allocated pursuant to Section 4.7(b)(iii).

1.52 "Quaker Stock Fund" means a fund that invests in Company Securities.

1.53 “Qualified Military Service” means any service in the uniformed services (as defined in chapter 43 of title 38, United States Code) where the Employee’s right to reemployment is protected by law.

1.54 “Qualified Nonelective Contributions” means the Employer’s contributions to the Plan that are made pursuant to Section 4.9(f) and as described in Code section 401(m)(4)(C). Such contributions shall be subject to the provisions of Section 4.2(b) and (c), and either (a) considered Elective Contributions for the purposes of the Plan and used to satisfy the Actual Deferral Percentage Test of Section 4.8(a), or (b) used to satisfy the Actual Contribution Percentage Test of Section 4.8(b).

1.55 “Regulations” means the regulations promulgated by the Secretary of the Treasury from time to time.

1.56 “Rollover Account” means the accounts or subaccounts established and maintained by the Administrator for each Participant with respect to his or her Rollover Contributions and Roth Rollover Contributions. The term Rollover Account shall include Roth Rollover Contributions unless expressly distinguished or otherwise required under the Code, Regulations, or other guidance. To the extent necessary for applicable tax and recordkeeping purposes, a separate Roth Rollover subaccount shall be established.

1.57 “Rollover Contribution” means a contribution or direct rollover made pursuant to Section 4.12.

1.58 “Roth Catch-Up Contributions” means Catch-Up Contributions that are includible in a Participant’s gross income at the time deferred and have been irrevocably designated as Roth Catch-Up Contributions by the Participant, as described in Section 4.3.

1.59 “Roth Elective Contributions” means Elective Contributions that are includible in a Participant’s gross income at the time deferred and have been irrevocably designated as Roth Elective Contributions by the Participant, as described in Section 4.2. The term Roth Elective Contributions shall include Roth Catch-Up Contributions except to the extent provided in Section 4.3, Code section 414(v), or final Regulations or other guidance issued by the Internal Revenue Service.

1.60 “Safe Harbor Component Plan” means the component of the Plan that covers employees who (a) are not members of a collective bargaining unit, (b) have completed a Year of Service (for purposes of Section 3.1), and (c) have attained age 21.

1.61 “Severance from Employment” means a severance from employment within the meaning of Code section 401(k)(2)(B)(i)(I), applicable Regulations thereunder, and other guidance of general applicability issued thereunder.

1.62 “SIFCO Participant” means a Participant who is employed by SIFCO Applied Surface Concepts, LLC.“Spouse” or “Surviving Spouse” shall mean the person to whom the Participant is legally married for purposes of Federal law, provided that a former spouse shall be treated as the Spouse or Surviving Spouse to the extent provided under a qualified domestic relations order, as defined in Code section 414(p).“Stock Bonus Plan” means the portion of the Plan meant to qualify as a stock bonus plan under Code section 401(a) that invests primarily in Company Securities.

1.65 “Stock Bonus Plan Account” means the account established and maintained by the Administrator for each Participant with respect to his or her Elective Contributions, Matching Contributions, AC Products Discretionary Contributions, Quaker Discretionary Contributions, and Nonelective Contributions invested in the Quaker Stock Fund. A separate accounting shall be maintained with respect to that portion of a Participant’s Stock Bonus Plan Account attributable to (a) pre-tax Elective Contributions, (b) Roth Elective

Contributions (including Roth Catch-Up Contributions), (c) Matching Contributions, (d) AC Products Discretionary Contributions, (e) Quaker Discretionary Contributions, and (f) Nonelective Contributions.

1.66 "Summit Participant" means a Participant who is employed by Summit Lubricants Inc.

1.67 "Top-Heavy Plan" means a plan described in Section 2.2(a).

1.68 "Top-Heavy Plan Year" means a Plan Year during which the Plan is a Top-Heavy Plan.

1.69 "Total and Permanent Disability" means, (a) with respect to an Epmar Participant who had amounts transferred to the Plan from the Epmar Corporation 401(k) Profit Sharing Plan, a physical or mental condition of the Participant resulting from bodily injury, disease, or mental disorder which renders such Participant incapable of continuing any gainful occupation and which condition constitutes total disability under the Federal Social Security Acts, and (b) with respect to a Participant not described in subsection (a), a physical or mental condition of the Participant resulting from bodily injury, disease, or mental disorder that continues for a period of at least 24 consecutive months and that renders him or her eligible for disability benefits under Title II of the Social Security Act.

1.70 "Trustee" means the person(s) or entity named as trustee herein or in any separate trust forming a part of this Plan, and any successors.

1.71 "Trust Fund" or "Fund" means the assets of the Plan and Trust as the same shall exist from time to time.

1.72 "Valuation Date" means any business day that the New York Stock Exchange is open for trading.

1.73 "Vested" means the nonforfeitable portion of any account maintained on behalf of a Participant.

1.74 "Wallover Participant" means a Participant who is employed by Wallover Oil Company, Inc.

1.75 "Year of Service" means:

(a) For all purposes of this Plan except for purposes of Section 3.1, a Plan Year during which an Employee completes 1,000 or more Hours of Service; and

(b) For purposes of Section 3.1, the 12-consecutive-month period beginning with the date the Employee's employment with the Employer or any Affiliated Employer commenced (such date being the first day for which the Employee is credited with an Hour of Service) if, during such consecutive 12-month period, the Employee completes 1,000 Hours of Service; provided, however, that if, during such 12-consecutive-month period, the Employee does not complete 1,000 Hours of Service, then "Year of Service" shall mean any Plan Year beginning after the Employee's date of employment during which the Employee completes 1,000 or more Hours of Service.

(c) For purposes of Section 3.1, a Year of Service is not completed until the end of the 12-consecutive-month period or the Plan Year, as the case may be, without regard to when during that period the 1,000 Hours of Service are completed, and in determining a Participant's Years of Service the Employee shall receive credit for his or her Hours of Service for the Employer or any Affiliated Employer whether or not he or she was an Eligible Employee at the time such Hours of Service were completed.

(d) For purposes of this Plan, service with AC Products, Inc. shall be deemed to constitute service with the Employer.

(e) For purposes of this Plan, service with United Lubricants Corporation prior to March 1, 2002, shall be deemed to constitute service with the Employer.

(f) For purposes of this Plan, service with D.A. Stuart prior to July 16, 2010, shall be deemed to constitute service with the Employer.

(g) For purposes of this Plan, all service credited under the G.W. Smith Plan or the Summit Plan shall also be credited as service under this Plan.

(h) For purposes of this Plan, service with Lubricor Inc. ("Lubricor") prior to November 30, 2016 shall be deemed to constitute service with the Employer, effective January 1, 2017. Notwithstanding anything herein to the contrary, Eligible Employees who receive credit for service pursuant to this subsection shall not be eligible for Nonelective Contributions for the 2016 Plan Year.

(i) For purposes of this Plan, service with Houghton International Inc. ("Houghton") shall be deemed to constitute service with the Employer.

(j) For purposes of this Plan, service with Wallover Oil Company, Inc. ("Wallover") shall be deemed to constitute service with the Employer.

(k) For purposes of this Plan, service with SIFCO Applied Surface Concepts, LLC shall be deemed to constitute service with the Employer.

(l) For purposes of this Plan, service with Coral Chemical Company shall be deemed to constitute service with the Employer.

ARTICLE II
TOP-HEAVY RULES AND ADMINISTRATION

2.1 Top-Heavy Plan Requirements

For any Top-Heavy Plan Year, the special minimum allocation requirements of Code section 416(c) set forth in Section 4.7(d) of the Plan shall apply.

2.2 Determination of Top-Heavy Status

(a) Top-Heavy Plan. This Plan shall be a Top-Heavy Plan for any Plan Year in which, as of the Determination Date, the present value of accrued benefits of Key Employees and the sum of the Aggregate Accounts of Key Employees under this Plan and all plans of an Aggregation Group exceeds 60% of the present value of accrued benefits and the sum of the Aggregate Accounts of all Key Employees and non-Key Employees under this Plan and all plans of an Aggregation Group.

If any Participant is a non-Key Employee for any Plan Year, but such Participant was a Key Employee for any prior Plan Year, the present value of such Participant's accrued benefit and such Participant's Aggregate Account balance shall not be taken into account for purposes of determining whether this Plan is a Top-Heavy Plan (or whether any Aggregation Group which includes this Plan is a Top-Heavy Group). In addition, the accrued benefits and accounts of any individual who has not performed services for an Employer during the one-year period ending on the Determination Date shall not be taken into account.

(b) Aggregate Account. A Participant's Aggregate Account for purposes of this Article II only shall be defined as the sum of the following as of the Determination Date:

(i) The balance of his or her Aggregate Account as of the most recent valuation occurring within a 12-month period ending on the Determination Date.

(ii) An adjustment for any contributions due as of the Determination Date, which adjustment shall be the amount of any contributions actually made after the most recent Valuation Date but due on or before the Determination Date, except for the first Plan Year of the Plan when such adjustment shall also reflect the amount of any contributions made after the Determination Date that are allocated as of a date in that first Plan Year.

(iii) Any Plan distributions made with respect to the Employee under the Plan and any Plan aggregated with the Plan under Code section 416(g)(2) during the one-year period ending on the Determination Date. The preceding sentence shall also apply to distributions under a terminated plan which, had it not been terminated, would have been aggregated with the Plan under Code section 416(g)(2)(A)(i). In the case of a distribution made for a reason other than separation from service, death, or disability, this provision shall be applied by substituting "five-year period" for "one-year period."

(iv) Any Employee contributions, whether voluntary or mandatory. However, amounts attributable to tax-deductible, qualified voluntary Employee contributions shall not be considered to be a part of the Participant's Aggregate Account balance.

(v) With respect to unrelated rollovers (ones which are both initiated by the Employee and made from a plan maintained by one employer to a plan maintained by another employer), if this Plan permits the rollovers, it shall always consider such rollovers as a distribution for the purposes of this Section.

(vi) With respect to related rollovers and ones either not initiated by the Employee or made to a plan maintained by the same employer, if this Plan permits the rollovers, they shall not be counted as distributions for purposes of this Section. If this Plan is the plan accepting such rollovers, it shall consider such rollovers as part of the Participant's Aggregate Account balance, irrespective of the date on which such rollovers are accepted.

(vii) For the purposes of determining whether two employers are to be treated as the same employer in paragraphs (v) and (vi) above, all employers aggregated under Code section 414(b), (c), (m), and (o) shall be treated as the same employer.

(c) "Aggregation Group" means either a Required Aggregation Group or a Permissive Aggregation Group as hereinafter determined.

(i) Required Aggregation Group: In determining a Required Aggregation Group hereunder, each plan of the Employer in which a Key Employee is a Participant in the Plan Year containing the Determination Date or any of the four preceding Plan Years, and each other plan of the Employer which enables any plan in which a Key Employee participates to meet the requirements of Code sections 401(a)(4) or 410, shall be required to be aggregated. Such group shall be known as a "Required Aggregation Group."

In the case of a Required Aggregation Group, each plan in the group shall be considered a Top-Heavy Plan if the Required Aggregation Group is a Top-Heavy Group. No plan in the Required Aggregation Group shall be considered a Top-Heavy Plan if the Required Aggregation Group is not a Top-Heavy Group.

(ii) Permissive Aggregation Group: The Employer may also include any other plan not required to be included in the Required Aggregation Group, provided the resulting group, taken as a whole,

would continue to satisfy the provisions of Code sections 401(a)(4) and 410. Such group shall be known as a "Permissive Aggregation Group."

In the case of a Permissive Aggregation Group, only a plan that is part of the Required Aggregation Group shall be considered a Top-Heavy Plan if the Permissive Aggregation Group is a Top-Heavy Group. No plan in the Permissive Aggregation Group shall be considered a Top-Heavy Plan if the Permissive Aggregation Group is not a Top-Heavy Group.

(iii) Only those plans of the Employer in which the Determination Dates fall within the same calendar year shall be aggregated in order to determine whether such plans are Top-Heavy Plans.

(iv) An Aggregation Group shall include any terminated plan of the Employer if it was maintained within the last five years ending on the Determination Date.

(d) "Determination Date" means (i) the last day of the preceding Plan Year, or (ii) in the case of the first Plan Year, the last day of such Plan Year.

(e) "Present Value of Accrued Benefit" means, in the case of a defined benefit plan, the present value of the accrued benefit for a Participant other than a Key Employee, determined using the single accrual method used for all plans of the Employer and Affiliated Employers, or, if no such single method exists, using a method which results in benefits accruing not more rapidly than the slowest accrual rate permitted under Code section 411(b)(1)(C). The present value of the accrued benefit shall be determined as of the most recent Valuation Date that falls within or ends with the 12-month period ending on the Determination Date, except as provided in Code section 416 and the Regulations thereunder for the first and second plan years of a defined benefit plan.

(f) "Top-Heavy Group" means an Aggregation Group in which, as of the Determination Date, the sum of:

(i) the present value of accrued benefits of Key Employees under all defined benefit plans included in the group; and

(ii) the Aggregate Accounts of Key Employees under all defined contribution plans included in the group,

exceeds 60% of a similar sum determined for all Key Employees and non-Key Employees under this Plan and all plans of the Aggregation Group.

ARTICLE III
ELIGIBILITY

3.1 Conditions of Eligibility

(a) Elective Contributions and Matching Contributions. An Eligible Employee who was a Participant in the Plan on December 31, 2020, shall continue to be eligible to participate in the Plan, and to make Elective Contributions to the Plan and receive Matching Contributions, on January 1, 2021. Any other Eligible Employee shall be eligible to become a Participant in the Plan and to make Elective Contributions to the Plan and receive Matching Contributions on the date on which the Eligible Employee's employment with the Employer commences or as soon as administratively practicable thereafter.

(b) Discretionary Contributions and Nonelective Contributions. An Eligible Employee who was a Participant in the Plan and was eligible to receive an allocation of AC Products Discretionary

Contributions, Quaker Discretionary Contributions, or Nonelective Contributions on December 31, 2020, shall continue to be eligible to receive such contributions on January 1, 2021. Any other Eligible Employee shall be eligible to receive an allocation of AC Products Discretionary Contributions, Quaker Discretionary Contributions, or Nonelective Contributions only upon completing one Year of Service. Upon completing one Year of Service, an Eligible Employee shall begin to participate in the Plan for purposes of Nonelective Contributions as of the first day of the month coincident with or next following the date on which the Eligible Employee meets the one Year of Service requirement.

3.2 Procedure to Become Active Participant

An Eligible Employee who was a Participant in the Plan on December 31, 2021, shall continue to be a Participant on the Effective Date. Any other Eligible Employee shall become an active Participant effective as of his or her Entry Date by completing such forms and providing such data as are reasonably required by the Administrator at such time in advance as the Administrator may prescribe. If the Eligible Employee declines to make an Elective Contribution pursuant to Section 4.2 effective as of his or her Entry Date, he or she may thereafter elect to make Elective Contributions on the first day of any subsequent pay period on which he or she is an Eligible Employee.

3.3 Determination of Eligibility

The Administrator shall determine the eligibility of each Employee for participation in the Plan based upon information furnished by the Employer. Such determination shall be conclusive and binding upon all persons, as long as the same is made pursuant to the Plan and ERISA.

3.4 Change in Eligibility Status

(a) Return to Eligible Status. In the event a Participant is no longer an Eligible Employee and becomes ineligible to participate, such Employee shall become eligible to participate immediately upon again becoming an Eligible Employee.

(b) Change to Eligible Status. In the event an Employee who is not an Eligible Employee becomes an Eligible Employee, such Employee shall (i) be eligible to make Elective Contributions to the Plan and receive Matching Contributions immediately, and (ii) be eligible to receive an AC Products Discretionary Contribution (as described in Section 4.4(c)), Quaker Discretionary Contribution (as described in Section 4.4(b)), or a Nonelective Contribution (as described in Section 4.5) if he or she has satisfied the one Year of Service requirement. Otherwise, such an Eligible Employee shall participate on the date determined under Section 3.1.

3.5 Omission of Eligible Employee

If, in any Plan Year, any Employee who should be included as a Participant in the Plan is erroneously omitted and discovery of such omission is not made until after a contribution by his or her Employer for the year has been made, the Employer shall make a subsequent contribution with respect to the omitted Employee in the amount which the Employer would have contributed with respect to him or her had he or she not been omitted. Such contribution shall be made regardless of whether it is deductible in whole or in part in any taxable year under applicable provisions of the Code.

ARTICLE IV
CONTRIBUTION AND ALLOCATION

4.1 Formula for Determining Employer's Contribution

(a) Contributions. For each Plan Year, the Employer shall contribute to the Plan as follows:

(i) The amount of the total salary deferral elections of all Participants made pursuant to Section 4.2(a), which amount shall be deemed the Employer's Elective Contribution.

(ii) Matching Contributions made pursuant to Section 4.4(a).

(iii) Such discretionary amounts, if any, made pursuant to Section 4.4(b) and Section 4.4(c), which amount shall be deemed a Quaker Discretionary Contribution or an AC Products Discretionary Contribution, respectively.

(iv) Qualified Nonelective Contributions made pursuant to Section 4.9(f).

(v) Catch-Up Contributions made pursuant to Section 4.3.

(vi) Nonelective Contributions made pursuant to Section 4.5.

(b) Limit on Contributions. Notwithstanding the foregoing, the Employer's contributions for any Plan Year shall not exceed the maximum amount allowable as a deduction to the Employer under the provisions of Code section 404, except as provided in Section 3.5 and to the extent necessary to provide the Top-Heavy minimum allocations.

(c) Form of Contributions. All contributions by the Employer shall be made in cash or newly issued or treasury stock, or in such property as is acceptable to the Trustee.

4.2 Participant's Salary Deferral Election

(a) Deferral Election.

(i) Participant Deferral Election. Each Participant may elect to defer his or her Compensation which would have been received in the Plan Year, but for this deferral election, by any whole percentage up to 75%. A deferral election (or modification of an earlier election) may not be made with respect to Compensation which is available on or before the date the Participant executed such election. A deferral election shall specify the portion of the Participant's Elective Contribution that is made on a pre-tax basis and the portion of such contribution that is made on a Roth basis. Elective Contributions contributed to the Plan as made on a pre-tax basis may not later be reclassified as made on Roth basis and vice versa.

The amount by which the Participant's Compensation is reduced shall be the Participant's Deferred Compensation and shall be treated as an Elective Contribution and allocated to the Participant's Elective Account, unless the Participant directs all or part of his or her Elective Contributions to the Quaker Stock Fund. If the Participant directs all or part of his or her Elective Contributions to the Quaker Stock Fund, such Elective Contributions shall be allocated to the Stock Bonus Plan Account.

(ii) Automatic Pre-Tax Elective Contributions.

(A) Automatic Election. Notwithstanding the foregoing, effective January 1, 2020, an Eligible Employee shall be deemed to have elected under this Section 4.2 to have pre-tax Elective Contributions made on his behalf in an amount equal to six percent (6%) of Compensation increasing annually by one percent (1%) of Compensation up to ten percent (10%) of Compensation if he (1) has met the eligibility requirements of Article III, (2) has not elected otherwise in accordance with

Section 4.2(a)(i), and (3) is hired on or after January 1, 2020. For Eligible Employees hired on or after March 1, 2020, such deemed election shall become effective starting with the paycheck for the first pay date on or after the 30th day following the Eligible Employee's employment commencement date.

A deemed election that was in effect with respect to a Houghton Participant under the Houghton Plan shall continue to be effect under this Plan, and shall continue to increase annually by one percent (1%) of Compensation up to ten percent (10%) of Compensation under the Plan. A deemed election that was in effect under the Plan with respect to an Eligible Employee hired or rehired on or after January 1, 2017 but prior to January 1, 2020 shall continue to be in effect under the Plan and shall continue to increase annually by one percent (1%) of Compensation up to six percent (6%) of Compensation under the Plan. Wallover Participants who were participating in the Wallover Plan as of December 31, 2019 and began to participate in the Plan effective January 1, 2020 are not subject to the automatic pre-tax Elective Contributions provisions of this Section 4.2(a)(ii).

A deemed election that was in effect with respect to a SIFCO Participant under the SIFCO Plan shall continue to be effect under this Plan on and after January 1, 2022 (subject to any changes made by the Participant after that date permitted under the Plan) as a deemed election under an automatic contribution arrangement and not as a qualified automatic contribution arrangement, and shall continue to increase annually by one percent (1%) of Compensation up to ten percent (10%) of Compensation under the Plan. Coral Participants who were participating in the Coral Plan as of December 31, 2021 and began to participate in the Plan effective January 1, 2022 are not subject to the automatic pre-tax Elective Contributions provisions of this Section 4.2(a)(ii).

(B) Notice. The notice requirements of this Section 4.2(a)(ii)(B) shall apply to each Eligible Employee described in Section 4.2(a)(ii)(A) who has not made an affirmative election under Section 4.2(a)(i) to make (or not to make) Elective Contributions. At least 30 days, but not more than 90 days, before the beginning of the Plan Year, the Employer shall provide each such Eligible Employee notice of the Eligible Employee's rights and obligations under the automatic contribution arrangement described in this subparagraph (B), written in a manner calculated to be understood by the average Eligible Employee. If such an Eligible Employee becomes subject to the automatic contribution arrangement described in this subparagraph (B) after the 90th day before the beginning of the Plan Year and does not receive the notice for that reason, the notice will be provided no more than 90 days before the Eligible Employee becomes subject to the automatic contribution arrangement described in this subparagraph (B), but not later than the date the Eligible Employee becomes subject to the automatic contribution arrangement. The notice shall describe (i) the amount of automatic pre-tax Election Contribution that will be made on the Eligible Employee's behalf in the absence of an affirmative election, (ii) the Eligible Employee's right to elect to have no pre-tax Elective Contributions made on his behalf or to have a different amount of Elective Contributions made (on a pre-tax or Roth basis), and (iii) how automatic pre-tax Elective Contributions will be invested in the absence of the Eligible Employee's investment instructions.

(C) Election. In accordance with the procedures established by the Administrator, an Eligible Employee shall have a reasonable opportunity after receipt of the notice described in Section 4.2(a)(ii)(B) to make an affirmative election regarding Elective Contributions (either to have no Elective Contributions made or, subject to the limitations set forth in Section 4.2(a)(i), to have a different amount of Elective Contributions made) prior to the date pre-tax Elective Contributions are automatically made on his behalf pursuant to Section 4.2(a)(ii). Automatic pre-tax Elective Contributions being made on behalf of an Eligible Employee pursuant to Section 4.2(a)(ii) shall cease as soon as

administratively feasible after the Eligible Employee makes an affirmative election under this Section 4.2(a)(ii)(C). An Eligible Employee may also make an affirmative election pursuant to subsection 4.2(a)(i) before receipt of the notice described in Section 4.2(a)(ii)(B), or change the amount of his pre-tax Elective Contributions pursuant to Section 4.2(e).

(D) Continuing Election. A Participant's deemed election regarding pre-tax Elective Contributions shall continue in effect until the date that is as soon as administratively feasible following the earliest of (i) the date the Participant elects otherwise in accordance with Section 4.2(a)(i), (ii) the date the Administrator determines that all or part of the amount elected (or deemed to be elected) by the Participant as pre-tax Elective Contributions may not be contributed to the Trust as such because of the limitations set forth in this Article IV, or (iii) the date the Participant ceases to be an Eligible Employee.

(b) Full Vesting. The balance in each Participant's Elective Account and Stock Bonus Plan Account attributable to Elective Contributions shall be fully vested at all times and shall not be subject to forfeiture for any reason.

(c) Limits on Distributions. Elective Contribution amounts held in the Participant's Elective Account and Stock Bonus Plan Account may not be distributable earlier than:

(i) the Participant's Severance from Employment, Total and Permanent Disability, or death;

(ii) the Participant's attainment of age 59½ (only if permitted under any other Section of the Plan);

(iii) upon hardship with respect to the Participant (pursuant to Section 6.11); or

(iv) the termination of the Plan without establishment or maintenance of another defined contribution plan (other than an employee stock ownership plan as defined in Code section 4975(e)(7)) as described in Code section 401(k)(10).

(d) Maximum Amount. No Participant shall be permitted to have elective deferrals made under this Plan or any other qualified plan maintained by the Employer during any taxable year in excess of the dollar limitation contained in Code section 402(g) in effect for such taxable year, except to the extent permitted under Section 4.3 and Code section 414(v), if applicable (the "402(g) limit").

(i) If the Participant's Deferred Compensation made under this Plan (reduced by Deferred Compensation previously distributed or returned to the Participant) and the Participant's other elective deferrals to a plan or arrangement described in Code section 402(g)(3) (whether or not maintained by the Employer or an Affiliated Employer) exceed the maximum amount described in this subsection, the Participant shall allocate to the Plan or to such other plan or arrangement described in Code section 402(g)(3) the Excess Deferred Compensation. The Participant shall notify the Administrator of such allocation in writing no later than the March 1 following the Participant's taxable year in which the Excess Deferred Compensation was made.

(ii) A Participant shall be deemed to have made a claim for distribution of Excess Deferred Compensation from the Plan to the extent that the Participant's Deferred Compensation together with the Participant's elective deferrals under any other plan or arrangement maintained by the Employer or an Affiliated Employer exceeds the Code section 402(g) limit.

(iii) A Participant's Excess Deferred Compensation shall be reduced, but not below zero, by any distribution of Excess Contributions pursuant to Section 4.9 for the Plan Year beginning with or within the taxable year of the Participant.

(iv) Notwithstanding any other provisions of the Plan, not later than the April 15 following the close of the taxable year, the Administrator shall cause the Trustee to distribute to the Participant the Excess Deferred Compensation allocated (or deemed to be allocated) to the Plan by the Participant pursuant to this Section. Any Excess Deferred Compensation shall be distributed as follows: (i) Deferred Compensation to which Matching Contributions do not relate shall be distributed before Deferred Compensation to which Matching Contributions relate and (ii) for any year in which a Participant makes Elective Contributions on a pre-tax and on a Roth basis, the distribution of any Excess Deferred Compensation shall be made first from the portion of the Participant's Elective Contributions that is attributable to pre-tax contributions and second from the portion of the Participant's Elective Contributions that is attributable to Roth contributions. The amount so returned shall include the income and loss allocable thereto for the calendar year during which such elective deferrals were made as determined pursuant to Regulations, using a uniformly applicable written determination by the Administrator.

(v) Any Matching Contributions, with earnings thereon, attributable to such Excess Deferred Compensation shall be forfeited and, in the discretion of the Administrator, (A) used to pay any reasonable administrative expenses of the Plan or (B) used to reduce the Employer's obligation to making Matching Contributions under Section 4.4.

(e) Deferral Elections; Changes in Deferral Elections. The Employer and the Administrator shall implement the Participant's salary deferral elections provided for herein in accordance with the following:

(i) A Participant may commence making Deferred Compensation contributions to the Plan as of the Participant's Entry Date. If the Participant fails to make an initial salary deferral election prior to such time, then such Participant may thereafter make a salary deferral election effective as of any subsequent payroll period. The Participant shall make such an election by filing a salary deferral election in accordance with procedures established by the Administrator.

(ii) A Participant may increase or decrease the percentage of his or her Compensation to be deferred and make a new election by providing the Administrator with notice of such modification in the manner prescribed by the Administrator. Such new election shall initially be effective beginning with the pay period following the acceptance of the notice by the Administrator or as soon as practicable thereafter. Any modification shall not have retroactive effect and shall remain in force until revoked.

(iii) A Participant may elect to revoke his or her salary reduction agreement prospectively in its entirety at any time during the Plan Year by providing the Administrator with notice of such revocation in the manner prescribed by the Administrator. Such revocation shall become effective as of the beginning of the first pay period coincident with or next following the date of notice or as soon as practicable thereafter. Furthermore, the Participant's Severance from Employment, change in status to other than Eligible Employee, or the cessation of participation for any reason, shall be deemed to revoke any salary reduction agreement then in effect, effective immediately following the close of the pay period within which such termination or cessation occurs.

(iv) The Administrator may, in its sole discretion, from time to time prohibit or limit the amount of Elective Contributions made to the Plan on behalf of Highly Compensated Employees to the extent necessary to satisfy either the Actual Deferral Percentage Test set forth in Section 4.8(a) or the Actual Contribution Percentage Test set forth in Section 4.8(b). Any such limit on the amount of Elective Contributions made to the Plan on behalf of Highly Compensated Employees, as determined by the

Administrator, shall be deemed an amendment to the Plan for purposes of Regulation 1.401-1, but the adoption of such limit shall not be subject to Section 8.1.

(f) Qualified Military Service. Notwithstanding any provisions of this Plan to the contrary, all contributions with respect to periods of Qualified Military Service shall be provided in a manner consistent with Code section 414(u) as follows:

(i) The Employer shall permit a reemployed Participant to make additional Deferred Compensation contributions during the period which begins on the date of the reemployment of such Participant and has the same length as the lesser of the product of three and the period of Qualified Military Service which resulted in such rights, or five years.

(ii) The amount of additional Deferred Compensation contributions permitted under this subsection is the maximum amount of the Deferred Compensation contributions that the Participant would have been permitted to make under the Plan during the period of Qualified Military Service if the Participant had continued to be employed by the Employer during such period and received Compensation. Proper adjustment shall be made to the amount determined under the preceding sentence for any Deferred Compensation contributions actually made during the period of such Qualified Military Service.

4.3 Catch-Up Contributions

(a) In General. A Catch-Up Eligible Employee shall be eligible to make Catch-Up Contributions in accordance with, and subject to the limitations of, Code section 414(v). Such Catch-Up Contributions shall not be taken into account for purposes of the provisions of the Plan implementing the required limitations of Code sections 402(g) and 415. Furthermore, the Plan shall not be treated as failing to satisfy the provisions of the Plan implementing the requirements of Code sections 401(k)(3), 401(k)(11), 401(k)(12), 410(b), or 416, as applicable, by reason of the making of such Catch-Up Contributions.

(b) Rules Regarding Catch-Up Contributions. The Plan shall be administered in accordance with final Regulations and other guidance issued by the Internal Revenue Service under Code section 414(v). Subject to such Regulations and other guidance, the following provisions shall apply with respect to Catch-Up Contributions:

(i) A Catch-Up Eligible Employee shall be given an opportunity to elect to make Catch-Up Contributions for a Plan Year. Such election shall be made at such time and in such manner as prescribed by the Administrator and shall specify the portion of the Participant's Catch-Up Contribution that is made on a pre-tax basis and the portion of such contribution that is made on a Roth basis. Catch-Up Contributions contributed to the Plan as made on a pre-tax basis may not later be reclassified as made on Roth basis and vice versa.

(ii) No Employer Matching Contributions shall be made with respect to Catch-Up Contributions.

(iii) Except as otherwise provided in this Section, Catch-Up Contributions and earnings thereon shall be treated in the same manner as Elective Contributions made pursuant to Section 4.2 (and earnings thereon) and Deferred Compensation.

4.4 Employer Matching and Discretionary Contributions

(a) Matching Contributions. For each Participant who makes Elective Contributions with respect to one or more payroll periods for which a Matching Contribution has been authorized by the

Administrator pursuant to this subsection (the "Match Period"), the Employer shall make a Matching Contribution to the Plan on behalf of such Participant in the amount (if any) authorized by the Administrator, in its sole discretion; provided, however, that:

(i) The amount of Matching Contribution authorized by the Administrator shall not exceed 50% of such Participant's Deferred Compensation (other than Catch-Up Contributions) during the Match Period up to the first 6% of such Participant's Compensation during such period, plus a "true-up" Matching Contribution equal to the excess (if any) of (A) 50% of the Participant's Deferred Compensation (other than Catch-Up Contributions) for the Match Period (or, if less, 3% of the Participant's Compensation for the period he or she is eligible to participate in the Plan during such Match Period), over (B) the Matching Contribution already contributed to the Plan on behalf of the Participant for such Match Period;

(ii) With respect to a Participant who is a member of a unit of Employees covered by a collective bargaining unit, the Administrator shall not have the authority to decrease the Matching Contribution to less than the amount (if any) required by such collective bargaining agreement; and

(iii) With respect to a period of Qualified Military Service, the Administrator shall not have the authority to decrease the Matching Contribution to less than the amount (if any) required by Code section 414(u).

Effective with the Elective Contributions taken from the paycheck for the first pay date on or after April 17, 2020, the Matching Contribution may be made in cash or in Company Securities in the sole discretion of the Administrator. Matching Contributions made in cash will be invested according to the direction of the Participant, Beneficiary, or alternate payee under Section 4.13(a). To the extent a Matching Contribution is made in Company Securities, the contribution shall be invested in the Quaker Stock Fund, subject to any subsequent reapportionment direction of the Participant, Beneficiary, or alternate payee under Section 4.13(e).

(b) Quaker Discretionary Contributions. The Employer shall make such contributions to the Fund in respect of each calendar year during which this Plan is in effect as are determined in accordance with such formula as may from time to time be approved by the Board of Directors, in its absolute discretion. Such contributions shall be referred to as Quaker Discretionary Contributions. This subsection shall not be construed as requiring the Employer to make contributions in any specific calendar year, whether or not there exists net income out of which such contributions could be made. Notwithstanding the foregoing, no Quaker Discretionary Contributions shall be made on behalf of or allocated to the account of any AC Participant, Epmar Participant, Summit Participant, ECLI Participant, Houghton Participant, Wallover Participant, Coral Participant or SIFCO Participant.

(c) AC Products Discretionary Contributions. AC Products, Inc. shall make such contributions to the Fund in respect of each calendar year during which this Plan is in effect as are determined in accordance with such formula as may from time to time be approved by the Board of Directors of AC Products, Inc., in its absolute discretion. This provision shall not be construed as requiring AC Products, Inc. to make contributions in any specific calendar year, whether or not there exists Net Income out of which such contributions could be made. For purposes of this subsection, "Net Income" shall mean the profit from operations of AC Products, Inc., as determined by the Board of Directors of AC Products, Inc., from the internal financial statements of AC Products, Inc. for the calendar year.

4.5 Employer Nonelective Contributions

(a) Eligibility Requirements. Nonelective Contributions shall be made on behalf of each Participant who (i) is not included in a unit of Employees covered by a collective bargaining agreement, except

to the extent that the applicable collective bargaining agreement so provides (including not limited to an Eligible Employee of the Coral Chemical Company whose employment is governed by the terms of a collective bargaining agreement between Local 301, Cartage Division or the Plant Workers Agreement and Coral Chemical Company), and (ii) has met the conditions of eligibility set forth in Section 3.1(b). Notwithstanding the foregoing, Employees hired on or after February 10, 2020 who are covered by a collective bargaining agreement between the Employer and the International Chemical Workers Union Council of the United Food and Commercial Workers Union and its Local No. 125C, shall be eligible to receive Nonelective Contributions provided they have met the conditions of eligibility set forth in Section 3.1(b).

(b) Amount of Contribution. Subject to the limitations of Section 4.10, the Employer shall make Nonelective Contributions to the Fund for a Plan Year in an amount equal to 3% of the Compensation of each Participant who satisfied the eligibility requirements of subsection (a) at any time during such Plan Year; provided, however, that Compensation with respect to any period in which the Participant does not meet the eligibility requirements of subsection (a) shall be disregarded for purposes of determining the amount of the Nonelective Contribution.

(c) Investment. Effective with the first pay date on or after April 17, 2020, the Nonelective Contribution may be made in cash or in Company Securities in the sole discretion of the Administrator. Nonelective Contributions made in cash will be invested according to the direction of the Participant, Beneficiary, or alternate payee under Section 4.13(a). To the extent Nonelective Contributions are made in Company Securities, the contribution shall be invested in the Quaker Stock Fund, subject to any subsequent reapportionment direction of the Participant, Beneficiary, or alternate payee under Section 4.13(e).

4.6 Time Of Payment of Employer’s Contribution

The Employer shall pay to the Trustee Elective Contributions accumulated through payroll deductions as of the earliest date on which such contributions can be reasonably segregated from the general assets, and such amounts shall be segregated no later than the 15th business day of the month following the month in which Elective Contributions were deducted from the Participant’s Compensation. The Employer shall pay to the Trustee Matching Contributions, AC Products Discretionary Contributions, Quaker Discretionary Contributions, and Nonelective Contributions for any Plan Year under this Article IV no later than the last day on which amounts so paid may be deducted for Federal income tax purposes for the taxable year of the Employer in which the Plan Year ends. Any additional contributions made by the Employer that are allocable to a Participant’s Elective Account for a Plan Year shall be paid to the Plan no later than the end of the 12- month period immediately following the close of the Plan Year in which the contributions were made.

4.7 Allocation of Contribution And Earnings

(a) Accounts. The Administrator shall establish and maintain an account in the name of each Participant to which the Administrator shall credit all amounts allocated to each such Participant as set forth herein.

(b) Allocation of Contributions. The Employer shall provide the Administrator with all information required by the Administrator to make a proper allocation of the Employer’s contributions for each Plan Year. Within a reasonable period of time after the date of receipt by the Administrator of such information and sufficient funding, the Administrator shall allocate such contributions as follows:

(i) Elective Contributions. With respect to the Elective Contributions made pursuant to Section 4.2(a) or Section 4.3, to each Participant’s Elective Account and Stock Bonus Plan Account, as applicable, in an amount equal to each such Participant’s Deferred Compensation for the year.

(ii) Matching Contributions. With respect to Matching Contributions made pursuant to Section 4.4(a), to each Participant's Account and Stock Bonus Plan Account, as applicable, in an amount equal to the Matching Contribution made by the Employer to the applicable account on behalf of the Participant as set forth in Section 4.4(a).

(iii) Quaker Discretionary Contributions. Quaker Discretionary Contributions, if any, made pursuant to Section 4.4(b) for a Plan Year shall be allocated to each eligible Participant's account in the same proportion that each eligible Participant's Base Compensation for such Plan Year bears to the total Base Compensation of all Participants who are eligible to receive the Quaker Discretionary Contribution for such Plan Year, such amount to be allocated to the Participant's Account and Stock Bonus Plan Account, as applicable. Except as provided in Section 4.7(b)(vi), only those Participants who (A) have completed a Year of Service during the Plan Year; (B) are actively employed on the last day of the Plan Year; and (C) are not AC Participants, Epmar Participants, Summit Participants, ECLI Participants, Houghton Participants, Wallover Participants, Coral Participants or SIFCO Participant shall be eligible to share in the allocation of the Quaker Discretionary Contributions for the Plan Year.

(iv) AC Products Discretionary Contributions. The AC Products Discretionary Contributions, if any, made pursuant to Section 4.4(c) for a Plan Year shall be allocated to each eligible AC Participant's account in the same proportion that each eligible AC Participant's Compensation for such Plan Year bears to the total Compensation of all Participants who are eligible to receive the AC Products Discretionary Contribution for such Plan Year, such amount to be allocated to the Participant's Account and Stock Bonus Plan Account, as applicable. Except as provided in Section 4.7(b)(vi), only AC Participants who: (A) have completed a Year of Service during the Plan Year; and (B) are actively employed on the last day of the Plan Year, shall be eligible to receive an allocation of the AC Products Discretionary Contributions for the Plan Year.

(v) Nonelective Contributions. Nonelective Contributions made pursuant to Section 4.5 shall be allocated to each eligible Participant's Account in an amount equal to the Nonelective Contribution made by the Employer on behalf of the Participant as set forth in Section 4.5.

(vi) Exception to Last Day of Year Requirement. Notwithstanding the foregoing, Participants who are not actively employed on the last day of the Plan Year due to Retirement (Normal or Late), Total and Permanent Disability, or death shall share in the allocation of Quaker Discretionary Contributions or AC Products Discretionary Contributions for that Plan Year.

(c) Allocation of Earnings and Losses. As of the last day of each Plan Year or other Valuation Date, before allocation of Employer contributions, any earnings or losses (net appreciation or net depreciation) of the Fund shall be allocated in the same proportion that each Participant's nonsegregated accounts bear to the total of all Participants' nonsegregated accounts as of such date. Each segregated account maintained on behalf of a Participant shall be credited or charged with its separate earnings and losses.

(d) Top-Heavy Plan Year.

(i) Notwithstanding the foregoing, for any Top-Heavy Plan Year, the sum of the Employer's contributions and forfeitures allocated to the Aggregate Account of each non-Key Employee shall be equal to at least 3% of such non-Key Employee's 415 Compensation (reduced by contributions and forfeitures, if any, allocated to each non-Key Employee in any defined contribution plan included with this Plan in a Required Aggregation Group). However, if (i) the sum of the Employer's contributions and forfeitures allocated to the Aggregate Account of each Key Employee for such Top-Heavy Plan Year is less than 3% of each Key Employee's 415 Compensation and (ii) this Plan is not required to be included in an Aggregation Group to enable a defined benefit plan to meet the requirements of Code section 401(a)(4) or 410, the sum of

the Employer's contributions and Forfeitures allocated to the Aggregate Account of each non-Key Employee shall be equal to the largest percentage allocated to the Aggregate Account of any Key Employee. Employer Matching Contributions shall be taken into account for purposes of satisfying the minimum contribution requirements of Code section 416(c)(2) and this subsection. Employer Matching Contributions that are used to satisfy the minimum contribution requirements shall be treated as Matching Contributions for purposes of the actual contribution percentage test set forth in Section 4.8(b) and other requirements of Code section 401(m). However, no such minimum allocation shall be required in this Plan for any non-Key Employee who participates in another defined contribution plan subject to Code section 412 that is included with this Plan in a Required Aggregation Group.

(ii) For purposes of the minimum allocations set forth above, the percentage allocated to the Aggregate Account of any Key Employee shall be equal to the ratio of the sum of the Employer's contributions and Forfeitures allocated on behalf of such Key Employee divided by the 415 Compensation for such Key Employee.

(iii) For any Top-Heavy Plan Year, the minimum allocations set forth above shall be allocated to the Aggregate Accounts of all non-Key Employees who are Participants and who are employed by the Employer on the last day of the Plan Year, including non-Key Employees who have (A) failed to complete a Year of Service; and (B) declined to make mandatory contributions (if required) or, in the case of a cash or deferred arrangement, Elective Contributions to the Plan.

(iv) For the purposes of this Section, 415 Compensation shall be limited by and adjusted in such manner as permitted under Code section 415(d).

(e) Matching Contributions – No Hour of Service Requirement. Notwithstanding anything herein to the contrary, a Participant who terminates employment for any reason during the Plan Year, has made Elective Contributions for the Plan Year, and is otherwise eligible to receive an allocation of Matching Contributions, shall share in an allocation of the Matching Contribution made by the Employer for the year of termination without regard to the Hours of Service credited.

(f) Forfeitures. As of the last day of each Plan Year, any amounts which become a Forfeiture during such Plan Year shall, in the discretion of the Administrator, be used to (i) reduce the Employer's obligation to make Matching Contributions, AC Products Discretionary Contributions, Quaker Discretionary Contributions, and/or Nonelective Contributions, or (ii) pay any administrative expenses of the Plan.

(g) Reemployment after Break in Service. If a Participant is reemployed after five consecutive 1-Year Breaks in Service, then separate accounts shall be maintained as follows:

(i) one account for nonforfeitable benefits attributable to pre-break service; and

(ii) one account representing his or her status in the Plan attributable to post-break service.

(h) Restoration of Forfeitures. If a Participant is reemployed as an Eligible Employee, any Forfeiture of his or her Participant's Account that has occurred under Section 1.31(a) shall be restored to his or her Participant's Account by the Employer if the Participant repays to the Plan in full the amount of the distribution he or she received; provided such repayment is made not later than the earlier of (i) the close of the first period of five consecutive 1-Year Breaks in Service commencing after the distribution, or (ii) five years after the date on which the Participant again becomes an Eligible Employee.

4.8 Actual Deferral Percentage Test and Actual Contribution Percentage Test

(a) Actual Deferral Percentage Test. This subsection shall be applied separately with respect to the Non-Safe Harbor Component Plan and the Bargaining Component Plan, and the term "Plan" as used in this subsection shall refer to the component plan being tested. The safe harbor set forth in Code section 401(k)(12) shall apply to the Safe Harbor Component Plan.

(i) The actual deferral percentage for Highly Compensated Employees who have met the Plan's eligibility requirements shall not be less than or equal two at least one of the following:

(A) The actual deferral percentage for such Plan Year for all Nonhighly Compensated Employees who have met the Plan's eligibility requirements, multiplied by 1.25; or

(B) The actual deferral percentage for such Plan Year for all Nonhighly Compensated Employees who have met the Plan's eligibility requirements, multiplied by 2.0, provided that the actual deferral percentage for Highly Compensated Employees who have met the Plan's eligibility requirements does not exceed the actual deferral percentage for Nonhighly Compensated Employees who have met the Plan's eligibility requirements by more than two percentage points.

(ii) For purposes of this Section, the term "actual deferral percentage" as applied to a specified group of Employees who have met the Plan's eligibility requirements shall mean the average of the ratios, calculated separately for each such Employee in such group, of:

(A) The amount of Deferred Compensation paid to the Plan on behalf of each such Employee for such Plan Year (excluding (A) any amount of Deferred Compensation paid to the Plan by a Nonhighly Compensated Employee in excess of the Code section 402(g) limit for such Plan Year, and (B) Deferred Compensation made pursuant to Code section 414(u) by reason of a Participant's qualified military service (provided, however, that the portion of Deferred Compensation contributed from differential wage payments (within the meaning of Code section 414(u)(12)) shall be disregarded only if the nondiscrimination requirement set forth in Code section 414(u)(12)(C) is satisfied); to

(B) The Participant's 414(s) Compensation for such Plan Year; provided, however, that the Administrator may determine, for any Plan Year, to consider only that Compensation paid to an Employee while he or she is eligible to participate in the Plan.

(b) Actual Contribution Percentage Test. The Plan shall satisfy the "actual contribution percentage test," which shall mean the numerical test set forth in subsection (a), revised by disregarding any reference to component plans and substituting for the term "actual deferral percentage" the term "actual contribution percentage"; provided, however, that pursuant to Regulation section 1.401(m)-1(b)(2), the Actual Contribution Test shall not apply to the Bargaining Component Plan. The term "actual contribution percentage" as applied to a specified group of Employees shall mean the average of the ratios, calculated separately for each Employee in such group who, if he or she made Elective Deferrals, would have Matching Contributions allocated to his or her account for the year, of:

(i) the amount of Matching Contributions (excluding (A) Matching Contributions forfeited pursuant to Section 4.2(d) or Section 4.9(c), and (B) Matching Contributions made pursuant to Code section 414(u) by reason of a Participant's qualified military service (provided, however, that the portion of the Matching Contribution that is made with respect to any Deferred Compensation contributed from differential wage payments (within the meaning of Code section 414(u)(12)) shall be disregarded only if the nondiscrimination requirement set forth in Code section 414(u)(12)(C) is satisfied) paid to the Plan on behalf of such Employee for such Plan year; to

(ii) the Participant's 414(s) Compensation for such Plan Year; provided, however, that the Administrator may determine, for any Plan Year, to consider only that Compensation paid to an Employee while he or she is eligible to participate in the Plan.

(c) Nonaggregation. Pursuant to Regulation sections 1.401(k)-1(b)(4)(iii)(B) and 1.401(m)-1(b)(4)(iii)(B), the Plan cannot be tested on an aggregate basis with any other cash or deferred arrangement that uses a methodology to satisfy the actual deferral percentage test or the actual contribution percentage test that is inconsistent with the Plan's methodology to satisfy these tests.

4.9 Return of Excess Contributions, Return of Excess Aggregate Contributions, And Special Rules

Subsections (a) and (c) shall be applied separately to Highly Compensated Employees who are covered by the Non-Safe Harbor Component Plan and Highly Compensated Employees who are covered by the Bargaining Component Plan, and such subsections shall apply only to the extent of the Highly Compensated Employee's contributions under such Component Plan. Subsections (a) and (c) shall not apply to the Safe Harbor Component Plan.

(a) Determination of Aggregate Amount of Excess Contributions. Excess Contributions shall be returned to Highly Compensated Employees in the manner set forth in subsection (c) if the limitations under Section 4.8(a) are exceeded. Excess Contributions to be returned to Highly Compensated Employees shall be determined by:

(i) reducing the actual deferral percentage of the Highly Compensated Employee with the highest actual deferral percentage until the applicable nondiscrimination test of Section 4.8(a) has been satisfied or until the actual deferral percentage of such Highly Compensated Employee is equal to the actual deferral percentage of the Highly Compensated Employee with the next highest actual deferral percentage;

(ii) repeating the process in paragraph (i) above until the applicable nondiscrimination test of Section 4.8(a) is satisfied;

(iii) converting into a dollar amount any reduction in the actual deferral percentage of each affected Highly Compensated Employee; and

(iv) adding together the dollar amounts of the excess Deferred Compensation determined under paragraph (iii) above for each affected Highly Compensated Employee.

(b) Determination of Aggregate Amount of Excess Aggregate Contributions. The amount of excess Matching Contributions ("Excess Aggregate Contributions") to be returned to Highly Compensated Employees shall be determined in the manner set forth in subsection (a). Excess Aggregate Contributions, if any, shall be returned to Highly Compensated Employees in the manner set forth in subsection (d).

(c) Determination of Individual Amount of Excess Contributions. Should the actual deferral percentage of Highly Compensated Employees for a Plan Year exceed the restrictions described in Section

4.8(a), the Excess Contribution shall be distributed to Highly Compensated Employees from the Elective Account (and Stock Bonus Plan Account), starting with the Highly Compensated Employee with the greatest dollar amount of Deferred Compensation for the Plan Year or until the Deferred Compensation made by such Highly Compensated Employee equals the Deferred Compensation made by the Highly Compensated Employee with the next greatest dollar amount of Deferred Compensation for the Plan Year. For purposes of the preceding sentence, any Excess Contributions shall be distributed as follows: (i) Distributions to any Highly Compensated Employee shall first be made with respect to Deferred Compensation that is not taken into account in determining Matching Contributions pursuant to Section 4.4(a); and (ii) for any year in which a Participant makes Elective Contributions on a pre-tax and on a Roth basis, the distribution of any Excess Contribution shall be made first from the portion of the Participant's Elective Contributions that is attributable to pre-tax contributions and second from the portion of the Participant's Elective Contributions that is attributable to Roth contributions. This process shall be repeated until all the excess Deferred Compensation attributable to the applicable test has been distributed. Any Matching Contributions attributable to such Excess Contributions (regardless of whether such Excess Contributions are attributable to Elective Contributions made on a pre-tax or on a Roth basis) distributed to Highly Compensated Employees shall be forfeited in accordance with subsection (e).

(d) Determination of Individual Amount of Excess Aggregate Contributions. Should the actual contribution percentage of Highly Compensated Employees for a Plan Year exceed the restrictions described in Section 4.8(b) the Excess Aggregate Contributions shall be forfeited, if forfeitable, or, if not forfeitable, distributed, starting with the account of the Highly Compensated Employee with the greatest dollar amount of Matching Contributions in the manner described in subsection (c).

(e) Timing of Distribution/Forfeiture. The distribution or forfeiture made pursuant to subsections (c) and (d) above shall be made within two and one-half months following the close of such Plan Year, if administratively practicable, but in no event later than the last day of the 12-month period following the close of such Plan Year. Any distribution or forfeiture for purposes of the preceding sentence shall be determined after taking into account income or loss for the applicable Plan Year. Any Matching Contributions, with earnings thereon, that have been allocated to a Participant on account of Excess Contributions shall be forfeited. Amounts forfeited shall, at the discretion of the Administrator, be (i) used to pay any administrative expenses of the Plan, or (ii) used to reduce the Employer's obligation to make Matching Contributions allocated under Section 4.4(a).

(f) Special Rules.

(i) Qualified Nonelective Contribution. Notwithstanding anything to the contrary herein, within 12 months after the end of the applicable Plan Year, the Employer may make a special Qualified Nonelective Contribution in an amount that does not exceed the minimum amount necessary to satisfy the test(s) set forth in Section 4.8(a) and/or 4.8(b). Such Qualified Nonelective Contribution shall be allocated to the Elective Accounts of the minimum necessary number of Nonhighly Compensated Employees who met the Plan's eligibility requirements for the applicable Plan Year, starting with the Nonhighly Compensated Employee with the lowest Compensation for such Year, and shall be such percentage of the Nonhighly Compensated Employee's Compensation for the year that (i) results in the lowest aggregate amount of Qualified Nonelective Contributions, and (ii) satisfies the rule against disproportionate contributions set forth in Regulation section 1.401(k)-2(a)(6)(iv). For purposes of applying this subsection to Section 4.8(a), the term "Plan" shall refer to the Non-Safe Harbor Component Plan or the Bargaining Component Plan, as applicable.

(ii) Other Contributions Taken Into Account for ACP Test. For purposes of determining the actual contribution percentage and the amount of Excess Aggregate Contributions pursuant to Section 4.8(b), only Matching Contributions credited on behalf of an eligible Employee in accordance with

Regulation section 1.401(m)-2(a) for the applicable Plan Year shall be counted. In addition, the Administrator may elect to take into account elective contributions and qualified nonelective contributions (as defined in Regulation section 1.401(m)-2(a)) contributed to any plan maintained by the Employer in determining the actual contribution percentage for each applicable Employee for the applicable Plan Year, provided such amounts comply with the provisions of Regulation section 1.401(m)-2(a). Elective contributions under the Plan shall not be taken into account for purposes of Section 4.8(b).

(iii) Ratios. All ratios and averages of ratios calculated hereunder shall be calculated to the nearest 1/100 of 1%.

(iv) Highly Compensated Employee Participating in Multiple Plans. For purposes of Section 4.8(a), the actual deferral percentage of a Highly Compensated Employee who is eligible to have elective deferrals (or contributions treated as elective deferrals) allocated to his or her accounts under two or more arrangements described in Code section 401(k), that are maintained by the Employer or an Affiliated Employer, shall be determined as if such elective deferrals (or contributions treated as elective deferrals) were made under a single arrangement. If a Highly Compensated Employee participates in two or more cash or deferred arrangements of the Employer or an Affiliated Employer that have different plan years, all elective deferrals made during the Plan Year under all such arrangements shall be aggregated. For purposes of Section 4.8(b), the actual contribution percentage of a Highly Compensated Employee who is eligible to have matching contributions or employee contributions (or contributions treated as matching or employee contributions) allocated to his or her accounts under two or more plans described in Code section 401(a), or arrangements described in Code section 401(k) that are maintained by the Employer or an Affiliated Employer, shall be determined as if the total of such matching contributions or employee contributions (or contributions treated as matching or employee contributions) were made to each plan and arrangement. If a Highly Compensated Employee participates in two or more such plans or arrangements that have different plan years, all matching contributions or employee contributions (or contributions treated as matching or employee contributions) made during the Plan Year under all such plans and arrangements shall be aggregated. Notwithstanding the foregoing, certain plans shall be treated as separate if mandatorily disaggregated under Regulations under Code section 401(k) or Code section 401(m).

(v) Aggregation of Plans. For purposes of Sections 4.8 and 4.9, the Plan shall be aggregated and treated as a single plan with other plans maintained by the Employer and an Affiliated Employer to the extent that the Plan is aggregated with any such other plan for purposes of satisfying Code sections 401(a)(4) and 410(b) (other than Code section 410(b)(2)(A)(ii)). In addition, if this Plan is permissively aggregated with any other plan of the Company or an Affiliated Employer for purposes of satisfying Code section 401(k) or 401(m), this Plan and such other plan or plans shall satisfy Code section 401(a)(4) and 410(b) as if this Plan and such other plan or plans were a single plan.

(vi) Prior Year Testing. Notwithstanding anything herein to the contrary, in accordance with applicable Regulations and applicable guidance, the Employer may elect to apply the tests set forth in Sections 4.8(a) and (b) using the actual deferral percentage and the actual contribution percentage, as applicable, for the preceding Plan Year for Nonhighly Compensated Employees who have met the Plan's eligibility requirements in lieu of such percentages for the current Year.

(vii) Early Participation Rule. For purposes of Sections 4.8(a) and 4.8(b), with respect to any Plan Year for which the Employer elects to apply Code section 410(b)(4)(B) in determining whether the requirements of Code section 401(k)(3)(A)(i) (for purposes of Section 4.8(a)) or Code section 410(b) (for purposes of Section 4.8(b)) are met, the Employer may elect to exclude from consideration all Eligible Employees who are Nonhighly Compensated Employees and who have not attained age 21 and completed at least one year of eligibility service. In no event, however, shall the early participation rule described in this

subsection apply to the Safe Harbor Component Plan or the Non-Safe Harbor Component Plan for purposes of Section 4.8(a).

4.10 Maximum Annual Additions

(a) Limit on Allocations. Except to the extent permitted under Section 4.3 and Code section 414(v), if applicable, the maximum annual addition that may be contributed or allocated to a Participant's accounts under the Plan for any limitation year shall not exceed the lesser of:

(i) $58,000, as adjusted for increases in the cost-of-living under Code section 415(d) for limitation years after 2021; or

(ii) 100% of the Participant's 415 Compensation for such limitation year.

The compensation limit referred to in paragraph (ii) shall not apply to any contribution for medical benefits after separation from service (within the meaning of Code section 401(h) or 419(A)(f)(2)) which is otherwise treated as an annual addition.

(b) Annual Additions. For purposes of applying the limitations of Code section 415, "annual additions" means the sum of all contributions by the Participant, other than rollover contributions, or by the Employer or an Affiliated Employer hereunder or under any defined contribution plan maintained by either, all forfeitures allocated to the Participant's accounts under such plans, and amounts treated as part of an annual addition under the limitations of Code sections 415(l) and 419A(d)(2).

For purposes of applying the limitations of Code section 415, a Rollover Contributions is not an annual addition. In addition, the following are not Employee contributions for purposes of this subsection: (i) rollover contributions (as defined in Code sections 402(c), 403(a)(4), 403(b)(8), and 408(d)(3)); (ii) repayments of loans made to a Participant from the Plan; (iii) repayments of distributions received by an Employee pursuant to Code section 411(a)(7)(B) (cashouts); (iv) repayments of distributions received by an Employee pursuant to Code section 411(a)(3)(D) (mandatory contributions); and (v) Employee contributions to a simplified employee pension excludable from gross income under Code section 408(k)(6).

(c) Limitation Year. For purposes of applying the limitations of Code section 415, the "limitation year" shall be the Plan Year.

(d) Aggregation Rules.

(i) For the purpose of this Section, all qualified defined contribution plans (whether terminated or not) ever maintained by the Employer shall be treated as one defined contribution plan.

(ii) For the purpose of this Section, if the Employer is a member of a controlled group of corporations, trades or businesses under common control (as defined by Code section 1563(a) or Code sections 414(b) and (c) as modified by Code section 415(h)), is a member of an affiliated service group (as defined by Code section 414(m)), or is a member of a group of entities required to be aggregated pursuant to Regulations under Code section 414(o), all Employees of such Employers shall be considered to be employed by a single Employer.

(iii) If a Participant participates in more than one defined contribution plan maintained by the Employer and such plans have different Plan Years, the maximum annual additions under this Plan shall equal the maximum annual additions for the limitation year minus any annual additions previously credited to such Participant's accounts during the limitation year.

(iv) If a Participant participates in both a defined contribution plan subject to Code section 412 and a defined contribution plan not subject to Code section 412 maintained by the Employer which have the same Plan Year, annual additions shall be credited to the Participant's accounts under the defined contribution plan subject to Code section 412 prior to crediting annual additions to the Participant's accounts under the defined contribution plan not subject to Code section 412.

(v) If a Participant participates in more than one defined contribution plan not subject to Code section 412 maintained by the Employer and such plans have the same Plan Year, the maximum annual additions under this Plan shall equal the product of (A) the maximum annual additions for the limitation year minus any annual additions previously credited above, multiplied by (B) a fraction (I) the numerator of which is the annual additions which would be credited to such Participant's Account under this Plan without regard to the limitations of Code section 415 and (II) the denominator of which is such annual additions for all plans described in this subsection.

4.11 Correction of Excess Annual Additions

If there is an excess annual addition with respect to a Participant for a limitation year, such excess annual addition shall be corrected in accordance with the Internal Revenue Service Employee Plans Compliance Resolution System or as otherwise permitted by applicable law and Regulations.

4.12 Rollovers From Other Plans

(a) Rollover Contributions Accepted. With the consent of the Administrator, the Plan shall accept an eligible rollover distribution by a Participant from the following:

(i) a qualified plan described in Code section 401(a) or 403(a), excluding after-tax employee contributions;

(ii) an annuity contract described in Code section 403(b), excluding after-tax contributions;

(iii) an eligible plan under Code section 457(b) which is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state;

(iv) the portion of a distribution from an individual retirement account or annuity described in Code section 408(a) or 408(b) that would otherwise be includable in gross income; and

(v) the portion of a distribution from a designated Roth account under an applicable retirement plan described in Code section 402A, but only to the extent that (i) it is a direct rollover and (ii) is not includible in income when determined without regard to the rollover;

provided, however that (A) the rollover will not jeopardize the tax-exempt status of the Plan or Trust or create adverse tax consequences for the Employer, and (B) a distribution to which the Participant is entitled as a Surviving Spouse shall not be rolled over to the Plan. If the Administrator determines the rollover amount contains an invalid rollover amount, such amount plus any earnings shall be distributed within a reasonable time after such determination. The amounts transferred shall be set up in a separate account herein referred to as a Participant's Rollover Account. Such account shall be fully vested at all times and shall not be subject to forfeiture for any reason.

(b) Withdrawals and Distributions Limited. Amounts in a Participant's Rollover Account shall be held by the Trustee pursuant to the provisions of this Plan and may not be withdrawn by or distributed to the Participant, in whole or in part, except as provided in subsection (c).

(c) Distributions. On such date as the Participant or his or her Beneficiary shall be entitled to receive benefits, the fair market value of the Participant's Rollover Account shall be used to provide additional benefits to the Participant or his or her Beneficiary. Any distributions of amounts held in a Participant's Rollover Account shall be made in a manner which is consistent with and satisfies the provisions of Section 6.5, including, but not limited to, all notice and consent requirements of Code section 411(a)(11) and the Regulations thereunder. Furthermore, such amounts shall be considered as part of a Participant's benefit in determining whether an involuntary cash-out of benefits without the Participant's consent may be made.

(d) Evidence of Rollover Eligibility. Prior to accepting any rollovers to which this Section applies, the Administrator may require the Employee to establish that the amounts to be transferred to this Plan meet the requirements of this Section and may also require the Employee to provide an opinion of counsel satisfactory to the Employer that the amounts to be transferred meet the requirements of this Section.

4.13 Investment of Aggregate Accounts

(a) Participant Directed. Every Participant, Beneficiary, and alternate payee shall have the right to designate the investment category or categories in which the Trustee is to invest his or her Aggregate Account including, pursuant to Section 4.13(e), any contributions that are initially invested in the Quaker Stock Fund at the time of contribution pursuant to Section 4.4(a) or Section 4.5(c).

(b) ERISA Section 404(c) Plan. This Plan is intended to constitute a plan described in section 404(c) of ERISA, and regulations thereunder. Neither the Employer, nor the Administrator, nor the Trustee nor any other Fiduciary shall be liable for any losses which are the result of investment instructions provided by any Participant, Beneficiary, or alternate payee. The Administrator shall designate the available investment categories to which a Participant, Beneficiary, or alternate payee may direct the investment of amounts credited to his or her Aggregate Account. The Administrator, in its discretion, may from time to time designate additional investment categories of the same or different types or modify, cease to offer, or eliminate any existing investment categories, subject to the requirements of section 404(c) of ERISA and the regulations thereunder.

(c) Investment Direction – Future Contributions. Each Participant may, subject to the Company's insider trading policy or other restriction(s) imposed by the Company pursuant to Sections 4.13(m) or 4.13(n), designate the percentage of future contributions to be invested in any investment category, and change such designation, on any business day by giving notice, in the manner prescribed by the Trustee. Any designation or change in designation of investment categories shall be in increments of at least 1%.

(d) Default Fund. In the absence of any current written (or electronic) designation of investment category(ies) from a Participant, the Trustee shall automatically invest such funds in the default investment fund(s) designated by the Administrator.

(e) Investment Direction – Reapportionment of Aggregate Account. A Participant, Beneficiary, or alternate payee may, subject to the Company's insider trading policy or other restriction(s) imposed by the Company pursuant to Sections 4.13(m) or 4.13(n), on any business day, by giving notice in the manner prescribed by the Trustee, transfer all or any portion of the assets held on his or her behalf in any investment category or categories to any other category or categories then provided, including any

contributions that are initially invested in the Quaker Stock Fund at the time of contribution pursuant to Section 4.4(a) or Section 4.5(c).

(f) Reinvestment of Income, Etc. All interest, dividends, capital gains, distributions, and other income received with respect to any shares of an investment category credited to the separate accounts of a Participant, Beneficiary, or alternate payee under the Plan shall be reinvested by the Trustee in additional shares of the same investment fund and credited to the Participant's, Beneficiary's, or alternate payee's separate accounts.

(g) Company Securities – Rights and Equity Restructuring. Each Participant, Beneficiary, or alternate payee shall have the right to direct the Trustee as to the exercise or sale of any rights to purchase Company Securities allocated to his or her Stock Bonus Plan Account, and his or her Aggregate Account (or Stock Bonus Plan Account) shall be appropriately credited. Company Securities received by the Trustee by reason of a stock split, stock dividend, or other distribution shall be appropriately allocated to accounts holding interests in the Quaker Stock Fund.

(h) Company Securities – Voting Rights. Each Participant, Beneficiary, or alternate payee shall have the right to direct the Trustee as to the exercise of voting rights with respect to Company Securities allocated to his or her Stock Bonus Plan Account. As soon as practicable prior to the occasion for the exercise of such voting rights, the Employer shall deliver or cause to be delivered to each Participant, Beneficiary, or alternate payee all notices, prospectuses, financial statements, proxies, and proxy soliciting material relating to shares of Company Securities allocated to his or her Stock Bonus Plan Account. Instructions by Participants, Beneficiaries, or alternate payees to the Trustee shall be on such form or in such other manner and pursuant to such regulations as the Administrator shall prescribe. Any such instructions shall remain in the strict confidence of the Trustee. Any shares of Company Securities for which no instructions are received by the Trustee within such time specified in the notice shall not be voted, except to the extent that the Trustee determines otherwise consistent with the Trustee's duties under ERISA. Any shares of Company Securities which are not allocated to Participants', Beneficiaries', or alternate payees' Stock Bonus Plan Accounts shall be voted in the same proportions as the shares of Company Securities for which timely instructions were received from Participants, Beneficiaries, and alternate payees except to the extent that the Trustee determines otherwise consistent with the Trustee's duties under ERISA.

(i) Company Securities – Confidentiality. The Administrator is responsible for ensuring that:

(i) procedures are maintained by the Plan to safeguard the confidentiality of information relating to the purchase, holding, and sale of the Company Securities and the exercise of voting, tender, and similar rights with respect to the Company Securities by Participants, Beneficiaries, and alternate payees;

(ii) the procedures described in paragraph (i) are sufficient to maintain confidentiality, except to the extent necessary to comply with Federal law or state laws not preempted by ERISA;

(iii) an independent fiduciary is appointed to carry out activities relating to any situations involving a potential for Employer influence upon Participants, Beneficiaries, or alternate payees with regard to the direct or indirect exercise of shareholder rights; and

(iv) each Participant, Beneficiary, and alternate payee is afforded the appropriate number of votes with respect to the Company Securities allocated to his or her Stock Bonus Plan Accounts.

(j) Company Securities – Tender Offer. In the event of a tender offer or a self tender by the Employer for any Company Securities held in the Plan, the Employer shall as promptly as practicable request or cause to be requested of each Participant, Beneficiary, and alternate payee instructions as to the tender offer response desired by him or her in connection with the shares of Company Securities allocated to his or her Stock Bonus Plan Account and the Trustee shall be bound by the instructions received. Any such instructions shall remain in the strict confidence of the Trustee. Any shares of Company Securities for which no instructions are received by the Trustee within such time specified in the notice shall not be tendered, except to the extent that the Trustee determines otherwise consistent with the Trustee's duties under ERISA. Any shares of Company Securities which are not allocated to Participants', Beneficiary's, or alternate payee's Stock Bonus Plan Accounts shall be tendered by the Trustee in the same proportion as the shares for which timely instructions were received by the Trustee, except to the extent that the Trustee determines otherwise consistent with the Trustee's duties under ERISA.

(k) Form and Manner of Distribution. At the time of distribution or withdrawal of assets held in an Aggregate Account by a Participant, he or she shall be entitled to receive one lump-sum payment; provided, however, that the portion of a Participant's Stock Bonus Plan Account invested in the Quaker Stock Fund shall be distributed in full shares of Company Securities unless the Participant elects to take such distribution in cash in an amount realized from converting such full shares of Company Securities in the Participant's Stock Bonus Plan Account to cash. Any fractional shares of common stock of the Company shall be distributed in cash. The Employer does not guarantee that the fair market value of Company Securities will be equal to the purchase price of such stock or that the total amount withdrawable in cash with respect to any period will be equal to or greater than the amount of the Participant's contributions for such period.

(l) Change in Market Value. Each Participant assumes all risk in connection with any decrease in the market price of the Company Securities, other investments or cash allocated to his or her Stock Bonus Plan Account in accordance with the Plan.

(m) Company Securities – Securities Laws. Any transaction involving Company Securities held in the account of a Participant who is subject to Section 16(b) of the Securities Exchange Act of 1934 shall be subject to all applicable laws, rules, and regulations and to Company policies intended to assure compliance with such laws, rules or regulations as well as to such approvals by stock exchanges or governmental agencies as may be deemed necessary or appropriate by the Administrator. Each Participant may be required to give the Employer a written representation that he or she will not violate any state or Federal securities laws, including the Securities Act of 1933 and the Securities Exchange Act of 1934, as amended; the form of such written representation shall be prescribed by the Administrator.

(n) Inappropriate Trading Practices. In the event of extraordinary transactions or excessive trading, the Administrator reserves the right to adjust the Aggregate Accounts of Participants who initiated the extraordinary transactions or excessive trading to reflect the actual trades executed to fund the activity. Such adjustment may include, but shall not be limited to, adjustment to the unit price, the number of shares or units, or both. If such practices continue, the Administrator reserves the right to take further action to limit the ability of a Participant to engage in extraordinary transactions or excessive trading. The Administrator, in its sole discretion, shall determine which activities constitute extraordinary transactions or excessive trading. In addition, all designations of investment categories by a Participant, Beneficiary, or alternate payee under this Section shall be subject to procedures established by the Administrator. Such procedures may include limitations of frequency of trading (including limitations that cause otherwise available daily elections to be unavailable), circumstances under which investment instructions will not be implemented, redemption fees, and other mechanisms intended to inhibit excessive or inappropriate trading practices, whether instituted by the Administrator or the investment fund.

ARTICLE V
VALUATIONS

5.1 Valuation of The Trust Fund

The Administrator shall direct the Trustee, as of the Valuation Date, to determine the net worth of the assets comprising the Trust Fund as it exists on the Valuation Date prior to taking into consideration any contribution not yet allocated. In determining such net worth, the Trustee shall value the assets comprising the Trust Fund at their fair market value as of the Valuation Date and shall deduct all expenses for which the Trustee has not yet obtained reimbursement from the Employer or the Trust Fund.

5.2 Method of Valuation

In determining the fair market value of securities held in the Trust Fund which are listed on a registered stock exchange, the Administrator shall direct the Trustee to value the same at the prices they were last traded on such exchange preceding the close of business on the Valuation Date. If such securities were not traded on the Valuation Date, or if the exchange on which they are traded was not open for business on the Valuation Date, then the securities shall be valued at the prices at which they were last traded prior to the Valuation Date. Any unlisted security held in the Trust Fund shall be valued at its bid price next preceding the close of business on the Valuation Date, which bid price shall be obtained from a registered broker or an investment banker. In determining the fair market value of assets other than securities for which trading or bid prices can be obtained, the Trustee may appraise such assets itself, or in its discretion employ one or more appraisers for that purpose and rely on the value established by such appraiser or appraisers.

ARTICLE VI
DETERMINATION AND DISTRIBUTION OF BENEFITS

6.1 Vesting

(a) Vesting.

(i) Full Vesting. A Participant’s Elective Account and Rollover Account shall be fully vested at all times. The portion of a Participant’s Stock Bonus Plan Account attributable to Elective Contributions shall be fully vested at all times. Except as provided in paragraph (iii), the portion of a Participant’s Account attributable to AC Products Discretionary Contributions, Quaker Discretionary Contributions, and Matching Contributions shall be fully vested at all times.

(ii) Nonelective Contributions. Nonelective Contributions for Plan Years beginning before 2008 that had not become a Forfeiture before January 1, 2008, became fully vested on January 1, 2008. Nonelective Contributions for Plan Years beginning on and after January 1, 2008, shall be fully vested at all times. (Before January 1, 2008, a Participant’s Nonelective Contributions were 0% vested if the Participant had completed fewer than three Years of Service and 100% vested if the Participant had completed at least three Years of Service.)

(iii) Complete Vesting. A Participant shall be 100% vested in his or her Participant’s Account in the event of his or her attainment of Normal Retirement Age prior to Severance from Employment, Total and Permanent Disability prior to Severance from Employment, or death prior to Severance from Employment.

(b) Effect of Amendment on Nonforfeitable Percentage. The computation of a Participant’s nonforfeitable percentage of his or her interest in the Plan shall not be reduced as the result of any direct or

indirect amendment to this Plan. For this purpose, the Plan shall be treated as having been amended if the Plan provides for an automatic change in vesting due to a change in Top-Heavy status. In the event that the Plan is amended to change or modify any vesting schedule, a Participant with at least three Years of Service as of the expiration date of the election period may elect to have his or her nonforfeitable percentage computed under the Plan without regard to such amendment. If a Participant fails to make such election, then such Participant shall be subject to the new vesting schedule. The Participant's election period shall commence on the adoption date of the amendment and shall end 60 days after the latest of:

(i) the adoption date of the amendment;

(ii) the effective date of the amendment; or

(iii) the date the Participant receives written notice of the amendment from the Employer or Administrator.

(c) Effect of Break in Service. If a Participant is reemployed after a 1-Year Break in Service has occurred, Years of Service shall include Years of Service prior to his or her 1-Year Break in Service subject to the following rules:

(i) If a Participant has a 1-Year Break in Service, his or her pre-break and post-break service shall be used for computing Years of Service for vesting purposes only after he or she has been employed for one Year of Service following the date of his or her reemployment with the Employer;

(ii) A Participant who under the Plan does not have a nonforfeitable right to any interest in the Plan resulting from Employer contributions shall lose credits otherwise allowable under (i) above if his or her consecutive 1-Year Breaks in Service equal or exceed the greater of (A) five or (B) the aggregate number of his or her pre-break Years of Service; and

(iii) After five consecutive 1-Year Breaks in Service, a Participant's Vested Account balance attributable to pre-break service shall not be increased as a result of post-break service.

(d) Years of Service Excluded. In determining Years of Service for purposes of vesting under the Plan, Years of Service prior to the vesting computation period in which an Employee attained his or her 18th birthday shall be excluded.

(e) Distribution Before Fully Vested. If a distribution is made at a time when a Participant is not fully Vested in his or her Participant's Account and the Participant may increase the Vested percentage in such account:

(i) A separate account shall be established for the Participant's interest in the Plan as of the time of the distribution;

(ii) At any relevant time, the Participant's Vested portion of the separate account shall be equal to an amount ("X") determined by the formula:

X equals P(AB plus (RxD)) – (RxD)

For purposes of applying the formula: P is the Vested percentage at the relevant time, AB is the account balance at the relevant time, D is the amount of distribution, and R is the ratio of the account balance at the relevant time to the account balance after distribution.

6.2 Determination of Benefits Upon Termination

Upon a Participant's Severance from Employment, the Participant's Aggregate Account shall be subject to the Participant's investment directions in accordance with Section 4.13 and shall share in allocations of earnings and losses pursuant to Section 4.7(c) until such time as a distribution is made to the Participant. Distribution of the Participant's Vested Aggregate Account shall be made as soon as practicable following the Participant's Severance from Employment; provided, however, that in the case of a Participant whose Vested Aggregate Account balance exceeds $5,000, no distribution shall be made without the written consent of the Participant, subject to Section 6.6 (regarding Required Minimum Distributions).

Any distribution under this subsection shall be made in a manner which is consistent with and satisfies the provisions of Section 6.5, including, but not limited to, all notice and consent requirements of Code section 411(a)(11) and the Regulations thereunder.

If the value of a Participant's Vested Aggregate Account does not exceed $5,000, the Administrator shall direct the Trustee to cause the entire benefit to be paid to such Participant in a single lump sum. If the value of a Participant's Vested Aggregate Account exceeds $1,000 but does not exceed $5,000, the entire benefit shall be automatically rolled over to an IRA unless the Participant elects otherwise.

6.3 Determination of Benefits Upon Death

(a) Distribution. Upon the death of a Participant all Vested amounts credited to such Participant's Aggregate Account shall be distributed, in accordance with the provisions of Section 6.5(e), to the deceased Participant's Beneficiary.

(b) Loans. Any security interest held by the Plan by reason of an outstanding loan to a deceased Participant shall be taken into account in determining the amount of the death benefit.

(c) Proof of Death. The Administrator may require such proper proof of death and such evidence of the right of any person to receive payment of the value of the account of a deceased Participant as the Administrator may deem desirable. The Administrator's determination of death and of the right of any person to receive payment shall be conclusive.

(d) Beneficiary. The Beneficiary of the death benefit payable pursuant to this Section shall be the Participant's Spouse, except, however, the Participant may designate a Beneficiary other than his or her Spouse if:

(i) the Spouse has waived the right to be the Participant's Beneficiary;

(ii) the Participant is legally separated or has been abandoned (within the meaning of local law) and the Participant has a court order to such effect (and there is no qualified domestic relations order, as defined in Code section 414(p), which provides otherwise);

(iii) the Participant has no Spouse; or

(iv) the Spouse cannot be located.

In such event, the designation of a Beneficiary shall be made on a form satisfactory to the Administrator. A Participant may at any time revoke his or her designation of a Beneficiary or change his or her Beneficiary by filing written notice of such revocation or change with the Administrator. However, the Participant's Spouse must again consent in writing to any change in Beneficiary unless the original consent acknowledged that the Spouse had the right to limit consent only to a specific Beneficiary and that the Spouse

voluntarily elected to relinquish such right. In the event no valid designation of a Beneficiary exists at the time of the Participant's death, the death benefit shall be payable to his or her estate.

(e) Spousal Consent. Any consent by the Participant's Spouse to waive any rights to the death benefit must be in writing, must acknowledge the effect of such waiver, and must be witnessed by a Plan representative or a notary public. Further, the Spouse's consent must be irrevocable and must acknowledge the specific nonspouse Beneficiary.

(f) Death While Performing Qualified Military Service. Notwithstanding any provision of the Plan to the contrary, and in accordance with Code section 401(a)(37), in the case of a Participant who dies while performing qualified military service (as defined in Code section 414(u)), the Participant's survivors shall be entitled to any additional benefits (other than contributions relating to the period of qualified military service) provided under the Plan had the Participant resumed and then terminated employment on account of death.

6.4 Determination of Benefits In Event of Disability

In the event of a Participant's Total and Permanent Disability prior to his or her Severance from Employment, all amounts credited to such Participant's Aggregate Account shall become fully Vested, and the Trustee, in accordance with the provisions of Sections 6.5 and 6.7, shall, at the election of the Participant, distribute to such Participant all amounts credited to such Participant's Aggregate Account as though he or she had retired.

6.5 Distribution of Benefits

(a) Distribution. Subject to subsections (b) and (f), the Administrator shall direct the Trustee to distribute to the Participant or his or her Beneficiary any amount to which he or she is entitled under the Plan in one lump-sum payment in cash.

(b) Participant Consent Required. Except as provided in Section 6.6, any distribution to a Participant who has a Vested Aggregate Account balance which exceeds $5,000 shall require such Participant's consent.

(c) Required Distributions. Notwithstanding any provision in the Plan to the contrary, the distribution of a Participant's benefits shall comply with Section 6.6.

(d) Direct Rollovers. Notwithstanding any provision of the Plan to the contrary that would otherwise limit a distributee's election under this Article VI, a distributee may elect, at the time and in the manner prescribed by the Administrator, to have all or a portion of an eligible rollover distribution paid directly to an eligible retirement plan specified by the distributee in a direct rollover.

(i) For purposes of this subsection, "eligible rollover distribution" shall mean any distribution of all or any portion of the balance to the credit of the distributee, except that an eligible rollover distribution shall not include: (i) any distribution that is one of a series of substantially equal periodic payments made (not less frequently than annually) for the life (or life expectancy) of the distributee or the joint lives (or joint life expectancy) of the distributee and the distributee's designated Beneficiary, or for a specified period of ten years or more; (ii) any distribution to the extent such distribution is required under Code section 401(a)(9); and (iii) any amount that is distributed on account of hardship. A portion of a distribution shall not fail to be an eligible rollover distribution merely because the portion consists of after-tax employee contributions which are not includible in gross income. However, such portion may be transferred only to an individual retirement account or annuity described in Code sections 408(a) or (b), or to a qualified defined contribution plan

described in Code section 401(a) or Code section 403(a) or an annuity contract described in Code section 403(b), that agrees to separately account for amounts so transferred, including separately accounting for the portion of such distribution which is includible in gross income and the portion of such distribution which is not so includible.

(ii) For purposes of this subsection, "eligible retirement plan" means any of the following that accepts the distributee's eligible rollover distribution: an individual retirement account described in Code section 408(a), a Roth IRA described in Code section 408A provided the applicable conversion requirements are met, an individual retirement annuity described in Code section 408(b), an annuity plan described in Code section 403(a), a qualified trust described in Code section 401(a), an annuity contract described in Code section 403(b), or an eligible plan under Code section 457(b) which is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state which agrees to separately account for amounts transferred into such plan from this Plan. If any portion of an "eligible rollover distribution" is attributable to payments or distributions from a designated Roth account, an eligible retirement plan with respect to such portion shall include only another designated Roth account of the individual from whose account the payments or distributions were made, or a Roth IRA of such individual, his or her Surviving Spouse or his or her Beneficiary.

(iii) For purposes of this subsection, "distributee" shall include an Employee or former Employee. In addition, the Employee's or former Employee's Surviving Spouse and the Employee's or former Employee's Spouse or former Spouse who is the alternate payee under a qualified domestic relations order (as defined in Code section 414(p)) are distributees with regard to the interest of the Spouse or former spouse. The Beneficiary of a deceased Participant who is not the Surviving Spouse of the Participant is a distributee with respect to (A) a direct rollover to an individual retirement account or annuity under Code section 408(a) or Code section 408(b) established for the purpose of receiving such distribution and which will be treated as an inherited IRA pursuant to Code section 402(c)(11) and (B) a direct rollover to a Roth IRA described in Code section 408A, subject to the rules and provisions set forth in Code section 408A(e) and any related guidance issued by the Treasury Department thereunder, if such distribution otherwise meets the requirements set forth in (i) above.

(iv) For purposes of this subsection, "direct rollover" shall mean a payment by the Plan to the eligible retirement plan specified by the distributee.

(e) Death Benefit. Except as provided in subsection (f), the death benefit payable pursuant to Section 6.3 shall be paid to the Participant's Beneficiary in one lump-sum payment in cash as soon as practicable after the Participant's death, subject to the rules of Section 6.6.

(f) Distribution of Company Securities. Notwithstanding anything to the contrary herein, the portion of a Participant's Stock Bonus Plan Account invested in the Quaker Stock Fund shall be distributed in full shares of Company Securities; provided, however, that the Participant or Beneficiary may elect to take such distribution in cash in an amount realized from converting such full shares of Company Securities in the Participant's Stock Bonus Plan Account to cash. Any fractional shares of common stock of the Company shall be distributed in cash.

(g) Qualified Reservist Distributions. Effective January 1, 2020, a Participant who is, by reason of being a member of a reserve component (as defined in section 101 of title 37 of the United States Code), ordered or called to active duty for a period in excess of 179 days or for an indefinite period after September 11, 2001 may request a withdrawal of all or any part of his or her Elective Contributions and Catch-Up Contributions, but not the earnings attributable to such amounts. Such withdrawal may be made no earlier than the date of such order or call and no later than the close of the active duty period.

(h) Deemed Severance Distributions. Effective January 1, 2020, a Participant who is on active military duty for more than 30 days as defined in the Heroes Earnings Assistance and Relief Act of 2008 may elect to receive a distribution from his Elective Account; provided, however that such Participants may not make any Elective Contributions or other employee contributions for six months following such a withdrawal.

6.6 Required Minimum Distributions

(a) Precedence. The requirements of this Section shall take precedence over any inconsistent provisions of the Plan to the extent required to satisfy Code section 401(a)(9) and the Regulations thereunder. The requirements set forth in this Section repeat the requirements set forth in Code section 401(a)(9), including requirements which may not apply to the Plan because, for example, the Plan does not permit a particular form of distribution or does not permit deferral beyond a particular date. Any such requirement shall not be read as giving a Participant or Beneficiary a form of benefit or deferral not otherwise provided under the Plan.

(b) Requirements of Regulations Incorporated. All distributions required under this Section shall be determined and made in accordance with the Regulations under Code section 401(a)(9).

(c) Time and Manner of Distribution.

(i) Required Beginning Date. The Participant's entire interest shall be distributed, or begin to be distributed, to the Participant no later than the Participant's Required Beginning Date.

(ii) Death of Participant Before Distributions Begin. If the Participant dies before distributions begin, the Participant's entire interest shall be distributed, or begin to be distributed, no later than as follows:

(A) If the Participant's Surviving Spouse is the Participant's sole Designated Beneficiary, then distributions to the Surviving Spouse shall begin by December 31 of the calendar year immediately following the calendar year in which the Participant died, or by December 31 of the calendar year in which the Participant would have attained age 70½, if later.

(B) If the Participant's Surviving Spouse is not the Participant's sole Designated Beneficiary, then distributions to the Designated Beneficiary shall begin by December 31 of the calendar year immediately following the calendar year in which the Participant died.

(C) If there is no Designated Beneficiary as of September 30 of the year following the year of the Participant's death, the Participant's entire interest shall be distributed by December 31 of the calendar year containing the fifth anniversary of the Participant's death.

(D) If the Participant's Surviving Spouse is the Participant's sole Designated Beneficiary and the Surviving Spouse dies after the Participant but before distributions to the Surviving Spouse begin, this paragraph (ii), other than paragraph (ii)(A), shall apply as if the Surviving Spouse were the Participant.

For purposes of this paragraph (ii) and Section 6.6(e), unless paragraph (ii)(D) applies, distributions are considered to begin on the Participant's Required Beginning Date. If paragraph (ii)(D) applies, distributions are considered to begin on the date distributions are required to begin to the Surviving Spouse under paragraph (ii)(A). If distributions under an annuity purchased from an insurance company irrevocably commence to the Participant before the Participant's Required Beginning Date (or to the Participant's Surviving Spouse before the date distributions are required to begin to the Surviving Spouse under paragraph (ii)(A)), the date distributions are considered to begin is the date distributions actually commence.

(iii) Forms of Distribution. Unless the Participant's interest is distributed in the form of an annuity purchased from an insurance company or in a single sum on or before the Required Beginning Date, as of the first Distribution Calendar Year distributions shall be made in accordance with Section 6.6(d) and Section 6.6(e). If the Participant's interest is distributed in the form of an annuity purchased from an insurance company, distributions thereunder shall be made in accordance with the requirements of Code section 401(a)(9) and the Regulations.

(d) Required Minimum Distributions During Participant's Lifetime.

(i) Amount of Required Minimum Distributions For Each Distribution Calendar Year. During the Participant's lifetime, the minimum amount that shall be distributed for each Distribution Calendar Year is the lesser of:

(A) The quotient obtained by dividing the Participant's Account Balance by the distribution period in the Uniform Lifetime Table set forth in Regulation section 1.401(a)(9)-9, using the Participant's age as of the Participant's birthday in the Distribution Calendar Year; or

(B) If the Participant's sole Designated Beneficiary for the Distribution Calendar Year is the Participant's Spouse, the quotient obtained by dividing the Participant's Account Balance by the number in the Joint and Last Survivor Table set forth in Regulation section 1.401(a)(9)-9, using the Participant's and Spouse's attained ages as of the Participant's and Spouse's birthday in the Distribution Calendar Year.

(ii) Lifetime Required Minimum Distributions Continue Through Year of Participant's Death. Required minimum distributions shall be determined under this subsection beginning with the first Distribution Calendar Year and up to and including the Distribution Calendar Year that includes the Participant's date of death.

(e) Required Minimum Distributions After Participant's Death.

(i) Death On or After Date Distributions Begin.

(A) Participant Survived by Designated Beneficiary. If the Participant dies on or after the date distributions begin and there is a Designated Beneficiary, the minimum amount that shall be distributed for each Distribution Calendar Year after the year of the Participant's death is the quotient obtained by dividing the Participant's Account Balance by the longer of the remaining Life Expectancy of the Participant or the remaining Life Expectancy of the Participant's Designated Beneficiary, determined as follows:

(I) The Participant's remaining Life Expectancy is calculated using the age of the Participant in the year of death, reduced by one for each subsequent year.

(II) If the Participant's Surviving Spouse is the Participant's sole Designated Beneficiary, the remaining Life Expectancy of the Surviving Spouse is calculated for each Distribution Calendar Year after the year of the Participant's death using the Surviving Spouse's age as of the Spouse's birthday in that year. For Distribution Calendar Years after the year of the Surviving Spouse's death, the remaining Life Expectancy of the Surviving Spouse is calculated using the age of the Surviving Spouse as of the Spouse's birthday in the calendar year of the Spouse's death, reduced by one for each subsequent calendar year.

(III) If the Participant's Surviving Spouse is not the Participant's sole Designated Beneficiary, the Designated Beneficiary's remaining Life Expectancy is calculated using the age of

the beneficiary in the year following the year of the Participant's death, reduced by one for each subsequent year.

(B) No Designated Beneficiary. If the Participant dies on or after the date distributions begin and there is no Designated Beneficiary as of September 30 of the year after the year of the Participant's death, the minimum amount that shall be distributed for each Distribution Calendar Year after the year of the Participant's death is the quotient obtained by dividing the Participant's Account Balance by the Participant's remaining Life Expectancy calculated using the age of the Participant in the year of death, reduced by one for each subsequent year.

(ii) Death Before Date Distributions Begin.

(A) Participant Survived by Designated Beneficiary. If the Participant dies before the date distributions begin and there is a Designated Beneficiary, the minimum amount that shall be distributed for each Distribution Calendar Year after the year of the Participant's death is the quotient obtained by dividing the Participant's Account Balance by the remaining life expectancy of the Participant's designated beneficiary, determined as provided in Section 6.6(e)(i).

(B) No Designated Beneficiary. If the Participant dies before the date distributions begin and there is no Designated Beneficiary as of September 30 of the year following the year of the Participant's death, distribution of the Participant's entire interest shall be completed by December 31 of the calendar year containing the fifth anniversary of the Participant's death.

(C) Death of Surviving Spouse Before Distributions to Surviving Spouse are Required to Begin. If the Participant dies before the date distributions begin, the Participant's Surviving Spouse is the Participant's sole designated beneficiary, and the Surviving Spouse dies before distributions are required to begin to the Surviving Spouse under Section 6.6(c)(ii)(A), this paragraph (ii) shall apply as if the Surviving Spouse were the Participant.

(f) Distribution Forms. This Section shall not entitle the Participant or beneficiary to any form of distribution not otherwise available under the Plan, or delay the date as of which any benefit is to be paid under any other provision of the Plan.

(g) Definitions.

(i) Designated Beneficiary. The individual who is designated as the Beneficiary under Section 1.8 and is the designated beneficiary under Code section 401(a)(9) and Regulation section 1.401(a)(9)-1, Q&A-4.

(ii) Distribution Calendar Year. A calendar year for which a minimum distribution is required. For distributions beginning before the Participant's death, the first Distribution Calendar Year is the calendar year immediately preceding the calendar year which contains the Participant's Required Beginning Date. For distributions beginning after the Participant's death, the first Distribution Calendar Year is the calendar year in which distributions are required to begin under Section 6.6(c)(ii). The required minimum distribution for the Participant's first Distribution Calendar Year shall be made on or before the Participant's Required Beginning Date. The required minimum distribution for other Distribution Calendar Years, including the required minimum distribution for the Distribution Calendar Year in which the Participant's Required Beginning Date occurs, shall be made on or before December 31 of that Distribution Calendar Year.

(iii) Life Expectancy. Life expectancy as computed by use of the Single Life Table in Regulation section 1.401(a)(9)-9.

(iv) Participant's Account Balance. The balance in the Participant's Aggregate Account as of the last valuation date in the calendar year immediately preceding the Distribution Calendar Year ("Valuation Calendar Year") increased by the amount of any contributions made and allocated or forfeitures allocated to the Participant's Aggregate Account as of dates in the Valuation Calendar Year after the valuation date and decreased by distributions made in the Valuation Calendar Year after the valuation date. The balance in the Participant's Aggregate Account for the Valuation Calendar Year includes any amounts rolled over or transferred to the Plan either in the Valuation Calendar Year or in the Distribution Calendar Year if distributed or transferred in the Valuation Calendar Year.

(v) Required Beginning Date. Effective for Participants who attain age 70½ on or after January 1, 1997, a Participant's Required Beginning Date shall mean the April 1 following the later of (i) the calendar year in which the Participant attains age 70½ or (ii) the calendar year in which the Participant retires; provided, however, that the Required Beginning Date for a Participant who is a 5% owner (as defined in Code section 416(i)) at any time during the five Plan Year period ending in the calendar year in which he or she attains age 70½, or in the case of a Participant who becomes a 5% owner during any subsequent Plan Year, shall be the April 1 following the calendar year in which he or she attains age 70½. Notwithstanding the foregoing, a Participant (who is not a 5% owner) who attained age 70½ on or after January 1, 1997, but prior to January 1, 2002, may elect to commence distribution on the April 1 of the calendar year following the calendar year in which he or she attains age 70½.

6.7 Latest Date of Commencement of Payments

Unless the Participant elects otherwise, the payments of benefits shall occur not later than (a) the 60th day after the close of the Plan Year in which the Participant attains his or her Normal Retirement Age, (b) the tenth anniversary of the year in which the Participant commenced participation in the Plan, or (c) the date the Participant terminates his or her service with the Employer. A Participant's failure to apply for benefits shall be deemed an election to defer commencement of benefits for purposes of this Section.

6.8 Distribution for Minor Beneficiary

In the event a distribution is to be made to a minor, the Administrator may direct that such distribution be paid to the legal guardian or, if none, to a parent of such Beneficiary or a responsible adult with whom the Beneficiary maintains his or her residence, or to the custodian for such Beneficiary under the Uniform Transfers to Minors Act, if such is permitted by the laws of the state in which such Beneficiary resides. Such a payment to the legal guardian, custodian or parent of a minor Beneficiary shall fully discharge the Trustee, Employer, and Plan from further liability on account thereof.

6.9 Location of Participant or Beneficiary Unknown

In the event that all, or any portion, of the distribution payable to a Participant or his or her Beneficiary hereunder shall, at his or her Normal Retirement Age, remain unpaid solely by reason of the inability of the Administrator, after sending a registered letter, return receipt requested, to the last known address, and after further diligent effort, to ascertain the whereabouts of such Participant or his or her Beneficiary, the amount so distributable shall be forfeited and used as provided in Section 4.7(f). In the event a Participant or Beneficiary is located subsequent to his or her benefit being reallocated, such benefit shall be restored.

6.10 Limitations on Benefits and Distributions

All rights and benefits, including elections, provided to a Participant in this Plan shall be subject to the rights afforded to any alternate payee under a qualified domestic relations order. Furthermore, a

distribution to an alternate payee shall be permitted if such distribution is authorized by a qualified domestic relations order, even if the affected Participant has not reached the earliest retirement age under the Plan. For the purposes of this Section, "alternate payee," "qualified domestic relations order," and "earliest retirement age" shall have the meanings set forth under Code section 414(p).

6.11 Hardship Distributions

(a) In General. Distributions of any vested amounts (including Qualified Nonelective Contributions) may be made to a Participant in the event of hardship. For the purposes of this Section, hardship is defined as an immediate and heavy financial need of the Participant where such Participant lacks other available resources. Hardship distributions shall be made in the minimum amount of $1,000 or to the extent of all available vested amounts, if less.

(b) Immediate and Heavy Financial Need. For purposes of this Section, an "immediate and heavy financial need," as such term is defined under Code section 401(k) and the Regulations thereunder, shall include the following: (i) expenses incurred or necessary for medical care that would be deductible under Code section 213(d) (determined without regard to whether the expenses exceed 7.5% of adjusted gross income); (ii) costs directly related to the purchase (excluding mortgage payments) of a principal residence for the Participant; (iii) payment of tuition, room and board, and related educational fees for up to the next 12 months of post-secondary education for the Participant, Participant's Spouse, children, or dependents (as defined in Code section 152 without regard to Code sections 152(b)(1), (b)(2), and (d)(1)(B)); (iv) payments necessary to prevent the eviction of the Participant from, or a foreclosure on the mortgage of, the Participant's principal residence; (v) payment of burial or funeral expenses for the Participant's deceased parent, Spouse, children, or dependents (as defined in Code section 152 without regard to Code section 152(d)(1)(B)); (vi) expenses for the repair of damage to the Participant's principal residence that would qualify for the casualty deduction under Code section 165 (determined without regard to Code section 165(h)(5) and whether the loss exceeds 10% of adjusted gross income); (vii) expenses and losses (including loss of income) incurred by the Participant on account of a disaster declared by the Federal Emergency Management Agency ("FEMA") if the Participant's principal residence or principal place of employment at the time of the disaster was located in an area designated by FEMA for individual assistance; and (viii) any other type of immediate and heavy financial need permissible under Code section 401(k) and the Regulations thereunder.

(c) Distribution Necessary to Satisfy Need. A distribution shall be considered as necessary to satisfy an immediate and heavy financial need of the Participant only if:

(i) the Participant has obtained all distributions, other than hardship distributions, under all plans maintained by the Employer;

(ii) the distribution is not in excess of the amount of an immediate and heavy financial need (including amounts necessary to pay any Federal, state, or local income taxes or penalties reasonably anticipated to result from the distribution); and

(iii) the Participant has provided to the Administrator a written representation that he or she has insufficient cash or liquid assets reasonably available to satisfy the need, and the Administrator does not have actual knowledge to the contrary.

(d) Investment Funds. A distribution pursuant to this Section shall be made from one or more of the investment categories designated by the Participant for investment of his or her Account pursuant to Section 4.13.

6.12 Withdrawals of Previously Contributed Amounts

With respect to Discretionary Contributions made in Plan Years ending before January 1, 1992 only ("Pre-1992 Discretionary Contributions"), each Participant who has received an allocation of such Pre-1992 Discretionary Contributions shall have the right to elect, in writing on forms provided by the Administrator, to withdraw (i) 100%, (ii) 50%, or (iii) 0% of the Pre-1992 Discretionary Contributions allocated to his or her account. Such permitted withdrawals shall be in cash and made as promptly as practicable after the end of the Plan Year in which the election is made. Such amount shall be adjusted (as of the last day of the calendar year preceding the date of the withdrawal) to the fair market value of the assets of the Fund attributable to such deferred, allocated amount. All elections under this Section shall be made on or before the November 30 preceding the date of the withdrawal. Failure to timely file a written election with respect to the withdrawal privilege for the respective Plan Year shall constitute a binding election to waive the right of withdrawal.

6.13 Loans

(a) In General. Loans to Participants shall be allowed if such loans comply with this Section. Subject to such uniform and nondiscriminatory rules as may from time to time be adopted by the Administrator, the Trustee, upon instructions from the Administrator, may make a loan or loans to a Participant; provided, however, that a Participant may only have up to two loans outstanding at any time. All loans to Participants shall be considered investments of the Fund.

(b) Limits on Loans. A Participant's loan (when added to the outstanding balance of all other loans from the Plan) shall be limited to the lesser of (i) $50,000 reduced by the excess, if any, of the highest outstanding balance of loans during the one-year period ending on the day before the loan is made over the outstanding balance of loans on the date the loan is made or (ii) 50% of the vested interest in the Participant's Aggregate Account as of the date on which the loan is made. For purposes of this limit, all loans from all other plans maintained by the Employer or by any Affiliated Employer other entity shall be considered as a loan from the Plan.

(c) Quaker Stock Fund Not Available for Loans. Amounts invested in the Quaker Stock Fund shall be taken into account in calculating the amount of the loan, but such amounts may not be borrowed from the Plan.

(d) No Offset Until Distributable Event. In the event of default, foreclosure on the note and attachment of security shall not occur until a distributable event occurs under the terms of the Plan.

(e) Security. All loans to Participants made by the Trustee shall be secured by the pledge of no more than 50% of the Participant's interest in the Fund.

(f) Interest Rate. Interest shall be charged at a reasonable rate equal to the prevailing rate of interest charged for similar loans by lending institutions in the community plus 1% on the date of the loan; provided, however, that in no event shall the interest rate charged be in violation of any applicable state usury law or 29 CFR §2550.408b-1(E). Notwithstanding the foregoing, in the case of a loan taken by a Participant prior to commencement of "military service" (as defined for purposes of the Servicemembers Civil Relief Act or any successor thereto), the interest charged on such loan shall not exceed 6% for the duration of such military service.

(g) General Term of Loan. The Administrator shall determine the term of the loan (which, except as provided in subsection (h), may not be more than five years). To the extent that a Participant becomes entitled to payments of benefits or withdraws all or a portion of the Participant's Aggregate Account, the payments or withdrawals, as the case may be, shall be immediately applied against the balance outstanding, including interest on the loan, and such amount shall then be deemed immediately due and payable. Loans shall be nonrenewable and nonextendable.

(h) Term of Principal Residence Loan. To the extent that a loan to a Participant is made for the express purpose of acquiring or constructing a principal residence of the Participant, the loan shall generally be for a term the Administrator determines to be appropriate, but in no event shall the term exceed the maximum period of time prescribed by the Code and the rulings, announcements, and Regulations issued thereunder.

(i) Amortization. Loans shall be amortized in level payments not less frequently than quarterly. The level amortization requirement shall not apply (A) for a period, not longer than one year, that a Participant is on a bona fide leave of absence either without pay or at a rate of pay (after applicable employment tax withholdings) that is less than the amount of the installment payments required under the terms of the loan, and (B) during a period the Participant is performing service in the uniformed services (as defined in Chapter 43 of Title 38 of the United States Code), both as described in Regulation section 1.72(p)-1.

(j) Offset on Default. Except as described in subsection (d), if a loan is not paid as and when due, such outstanding loan or loans may be deducted from any benefit which is or becomes payable to the borrower-Participant, and any other security pledged shall be sold by the Trustee at public or private sale as soon as is practicable after such default. The proceeds of any sale shall first be applied to pay the expenses of conducting the sale, including reasonable attorneys' fees, and then to pay any sums due from the borrower-Participant to the Fund, with such payment to be applied first to accrued interest and then to principal. The Participant shall remain liable for any deficiency, and any surplus remaining shall be paid to the Participant.

(k) Repayments. All loan repayments shall be allocated to the designated investment categories in accordance with the Participant's investment designation applicable at the time of the repayment. The Employer shall be permitted to implement salary withholding as a means of facilitating the repayment of any loan.

(l) Loan Under Prior Plans. Notwithstanding the foregoing, any loan under a plan which is merged with and into the Plan ("Merged Plan") which is outstanding at the time of such merger shall continue in accordance with the terms of the loan as made under the Merged Plan.

6.14 Distributions From the Rollover Account

(a) Timing of Distribution. Amounts credited to a Participant's Rollover Account may be distributed at any time upon a request by the Participant in accordance with the procedures established by the Administrator.

(b) Investment Funds. A distribution pursuant to this Section shall be made from one or more of the investment categories designated by the Participant for investment of his or her Account pursuant to Section 4.13.

6.15 Distributions at or After Age 59½.

(a) Timing of Distribution. Amounts credited to a Participant's Aggregate Account may be distributed at any time upon a request by the Participant after attainment of age 59½ in accordance with the procedures established by the Administrator.

(b) Investment Funds. A distribution pursuant to this Section shall be made from one or more of the investment categories designated by the Participant for investment of his or her Account pursuant to Section 4.13.

6.16 Distributions of G.W. Smith Accounts. Notwithstanding any other provision of the Plan to the contrary, any amounts attributable to employer contributions under the G.W. Smith & Sons, Inc. 401(k) Profit Sharing Plan (the "G.W. Smith Plan") which (i) were transferred to this Plan in connection with the merger of the G.W. Smith Plan with and into this Plan effective January 1, 2014, and (ii) were available under the terms of the G.W. Smith Plan for withdrawal at age 55 shall remain available for withdrawal at age 55, provided that no more than two such withdrawals shall be permitted in any 12-month period until attainment of age 59½. Separate subaccounts shall be maintained under this Plan for such amounts to the extent necessary.

6.17 Disclaimer . An individual who has been designated as a Beneficiary under this Article VI may disclaim the benefit payable to him or her under the Plan by submitting a qualified disclaimer in accordance with Code section 2518.

ARTICLE VII
ADMINISTRATION

7.1 Powers and Responsibilities of the Company

(a) Appointment and Removal of Trustee and Administrator. The Company shall be empowered to appoint and remove the Trustee and the Administrator from time to time as it deems necessary for the proper administration of the Plan to assure that the Plan is being operated for the exclusive benefit of the Participants and their Beneficiaries in accordance with the terms of the Plan, the Code, and ERISA.

(b) Funding Policy and Method. The Company shall establish a "funding policy and method," i.e., it shall determine whether the Plan has a short-run need for liquidity (e.g., to pay benefits) or whether liquidity is a long-run goal and investment growth (and stability of same) is a more current need, or shall appoint a qualified person to do so. The Company or its delegate shall communicate such needs and goals to the Trustee, who shall coordinate such Plan needs with its investment policy. The communication of such a funding policy and method shall not, however, constitute a directive to the Trustee as to investment of the Trust Fund. Such funding policy and method shall be consistent with the objectives of this Plan and with the requirements of Title I of ERISA.

(c) Periodic Review of Fiduciaries. The Company shall periodically review the performance of any Fiduciary or other person to whom duties have been delegated or allocated by it under the provisions of this Plan or pursuant to procedures established hereunder. This requirement may be satisfied by formal periodic review by the Company or by a qualified person specifically designated by the Company, through day-to-day conduct and evaluation, or through other appropriate ways.

7.2 Designation of Administrative Authority

The Administrator shall consist of a committee of two or more individuals appointed by the Company. Any person, including, but not limited to, an Employee of the Employer, shall be eligible to serve on the committee. Any person so appointed shall signify his or her acceptance by filing written acceptance with the Company. A member of the committee may resign by delivering his or her written resignation to the Company or be removed by the Company by delivery of written notice of removal, to take effect at a date specified therein, or upon delivery to the committee member if no date is specified. The committee shall act in accordance with bylaws or procedures adopted by the committee and approved by the Company.

The Company, upon the resignation or removal of a committee member, shall promptly designate in writing a successor to this position. If the Company does not appoint a committee, the Company shall function as the Administrator.

7.3 Allocation and Delegation of Responsibilities

If more than one person is appointed as Administrator, the responsibilities of each Administrator may be specified by the Company and accepted in writing by each Administrator. In the event that no such delegation is made by the Company, the Administrators may allocate the responsibilities among themselves, in which event the Administrators shall notify the Company and the Trustee in writing of such action and specify the responsibilities of each Administrator. The Trustee thereafter shall accept and rely upon any documents executed by the appropriate Administrator until such time as the Company or the Administrators file with the Trustee a written revocation of such designation.

7.4 Powers and Duties of the Administrator

The primary responsibility of the Administrator is to administer the Plan for the exclusive benefit of the Participants and their Beneficiaries, subject to the specific terms of the Plan. The Administrator shall administer the Plan in accordance with its terms and shall have the power and discretion to construe the terms of the Plan and to determine all questions arising in connection with the administration, interpretation, and application of the Plan. Any such determination by the Administrator shall be conclusive and binding upon all persons. The Administrator may establish procedures, supply any information, or reconcile any inconsistency in such manner and to such extent as shall be deemed necessary or advisable to carry out the purpose of the Plan; provided, however, that any procedure, discretionary act, interpretation, or construction shall be done in a nondiscriminatory manner based upon uniform principles consistently applied and shall be consistent with the intent that the Plan shall continue to be deemed a qualified plan under the terms of Code section 401(a), and shall comply with the terms of ERISA and all regulations issued pursuant thereto. The Administrator shall have all powers necessary or appropriate to accomplish his or her duties under its Plan.

The Administrator shall be charged with the duties of the general administration of the Plan, including, but not limited to, the following:

(a) the discretion to determine all questions relating to the eligibility of an Employee to become a Participant or remain a Participant hereunder and to receive benefits under the Plan;

(b) to correct any defect, reconcile any inconsistency, resolve any ambiguity, or supply any omission with respect to the Plan;

(c) to make all other determinations, factual or otherwise, necessary or advisable for the discharge of the Administrator’s duties under the Plan;

(d) to compute, certify, and direct the Trustee with respect to the amount and the kind of benefits to which any Participant shall be entitled hereunder;

(e) to authorize and direct the Trustee with respect to all nondiscretionary or otherwise directed disbursements from the Trust;

(f) to maintain all necessary records for the administration of the Plan;

(g) to interpret the provisions of the Plan and to make and publish such rules for regulation of the Plan as are consistent with the terms hereof;

(h) to determine the size and type of any Contract to be purchased from any insurer, and to designate the insurer from which such Contract shall be purchased;

(i) to compute and certify to the Employer and to the Trustee from time to time the sums of money necessary or desirable to be contributed to the Plan;

(j) to consult with the Company and the Trustee regarding the short- and long-term liquidity needs of the Plan in order that the Trustee can exercise any investment discretion in a manner designed to accomplish specific objectives;

(k) to prepare and implement a procedure to notify Eligible Employees that they may elect to have a portion of their Compensation deferred or paid to them in cash;

(l) to assist any Participant regarding his or her rights, benefits, or elections available under the Plan; and

(m) to determine whether any domestic relations order constitutes a qualified domestic relations order, as defined in Code section 414(p), and to take such action as the Administrator deems appropriate in light of such domestic relation order.

7.5 Records and Reports

The Administrator shall keep a record of all actions taken and shall keep all other books of account, records, and other data that may be necessary for proper administration of the Plan and shall be responsible for supplying all information and reports to the Internal Revenue Service, Department of Labor, Participants, Beneficiaries and others as required by law.

7.6 Appointment of Advisers

The Administrator or Trustee, with the consent of the Company, may appoint counsel, specialists, advisers, and other persons as the Administrator or Trustee deems necessary or desirable in connection with the administration of this Plan.

7.7 Information from Employer

To enable the Administrator to perform its functions, the Employer shall supply full and timely information to the Administrator on all matters relating to the Compensation of all Participants, their Hours of Service, their Years of Service, their retirement, death, disability, or Severance from Employment and such other pertinent facts as the Administrator may require; and the Administrator shall advise the Trustee of such of the foregoing facts as may be pertinent to the Trustee’s duties under the Plan. The Administrator may rely upon such information as is supplied by the Employer and shall have no duty or responsibility to verify such information.

7.8 Payment of Expenses

All expenses of administration may be paid out of the Fund unless paid by the Employer. Such expenses shall include any expenses incident to the functioning of the Administrator, including, but not limited to, fees of accountants, counsel, and other specialists and their agents, and other costs of administering the Plan. Until paid, the expenses shall constitute a liability of the Fund. However, the Employer may reimburse the Fund for any administration expense incurred. Any administration expense paid to the Fund as a reimbursement shall not be considered an Employer contribution.

7.9 Majority Actions

The members of the committee shall act by a majority of their number, but may authorize one or more of them to sign all papers on their behalf.

7.10 Claims Procedure

(a) Initial Claim. A Participant, Spouse, or Beneficiary ("claimant") who believes he or she is entitled to benefits hereunder, may claim those benefits by submitting to the Administrator a written notification of any claim of right to such benefits. The Administrator shall make all determinations as to the right of any person to receive benefits under the Plan. If such benefits are wholly or partially denied, the Administrator shall notify the claimant of the denial of the claim.

(b) Notice of Denial of Claim. Any notice of denial of a claim shall:

(i) be in writing and sent to the claimant by registered or certified mail (or by means of an electronic medium that satisfies the requirements of 29 CFR §2520.104b-1(c)(1)(i), (iii), and (iv));

(ii) be written in a manner calculated to be understood by the claimant;

(iii) contain (A) the specific reason or reasons for the denial of the claim, (B) specific reference to the pertinent provisions of the Plan upon which the denial is based, (C) a description of the required documentation and procedures necessary to perfect the claim, along with an explanation of why such material or information is necessary, (D) an explanation of the claims review procedure, including time limits applicable to the procedure, and (E) a statement of the claimant's right to bring a civil action under section 502(a) of the Act following an adverse determination on review; and

(iv) be given to a claimant within 90 days after receipt of his or her claim by the Administrator unless special circumstances require an extension of time for processing of the claim. If such extension of time for processing is required, written notice of the extension shall be furnished to the claimant prior to the termination of such 90-day period, and such notice shall indicate the special circumstances which make the postponement appropriate and the date the determination is expected. In no event may the extension exceed a total of 180 days from the date of the original receipt of the claim.

(c) Procedure for Appeal. In case of a denial as outlined in Section 7.10(b), the claimant or his or her representative shall have the opportunity to appeal to the Administrator for review thereof by requesting such review in writing to the Administrator; provided, however, that such written request must be received by the Administrator (or his or her delegate to receive such requests) within 60 days after receipt by the claimant of written notification of the denial or limitation of the claim. The claimant or his or her representative shall have a right to review all pertinent documents and submit comments in writing. The claimant or his or her duly authorized representative shall also be provided, upon request and without charge, reasonable access to and copies of, all documents, records, or other information relevant to the claim. The claimant or his or her duly authorized representative shall also be permitted to submit to the Administrator documents, records, and other information relating to the claim.

(d) Decision on Appeal. No later than 60 days after its receipt of the request for review, the Administrator shall render a decision in writing (or by means of an electronic medium that satisfies the requirements of 29 CFR §2520.104b-1(c)(1)(i), (iii), and (iv)) stating specific reasons therefor and citing specific Plan references. If special circumstances require extension, and upon prior written notice to the claimant, the Administrator's decision may be given within 120 days after receipt of the request for review. The

extension notice shall indicate the special circumstances requiring an extension and the date that the determination on review is expected.

Notwithstanding the foregoing, if the Administrator is a committee that holds regularly scheduled meetings at least quarterly, an individual's request for review shall be acted upon at the meeting immediately following the receipt of the individual's request, unless such request is filed within 30 days preceding such meeting. In such instance, the decision shall be made no later than the date of the second meeting following receipt of such request. If special circumstances (such as a need to hold a hearing) require a further extension of time for processing a request, a decision shall be rendered not later than the third meeting of the Administrator following the receipt of such request for review and written notice of the extension shall be furnished to the individual prior to the commencement of the extension. The extension notice shall indicate the special circumstances requiring an extension and the date that the determination on review will be made. The Administrator shall notify the claimant or his or her representative of the determination as soon as possible, but not later than five days after the determination is made.

In the event that the decision denies in whole or in part a claim on appeal, the notice furnished to the claimant shall also specify that the claimant or his or her duly authorized representative has a right to be provided, upon request and without charge, reasonable access to, and copies of, all documents, records, or other information relevant to the claim and specify that the claimant has a right to bring a civil action under section 502(a) of the Act. Claims for benefits under the Plan may be filed in writing with the Administrator. Written notice of the disposition of a claim shall be furnished to the claimant within 90 days after the application is filed. In the event the claim is denied, the reasons for the denial shall be specifically set forth in the notice in language calculated to be understood by the claimant, pertinent provisions of the Plan shall be cited, and, where appropriate, an explanation as to how the claimant can perfect the claim shall be provided. In addition, the claimant shall be furnished with an explanation of the Plan's claims review procedure.

(e) Notwithstanding the foregoing, a claim that involves a determination regarding disability shall be subject to the special rules for disability claims set forth in the regulations under Section 503 of ERISA.

7.11 Limitations on Actions

(a) A claimant (as defined in Section 7.10) shall have no right to bring any action at law or in equity regarding a claim for benefits, unless and until he or she exhausts his or her rights to review under Section 7.10 in accordance with the time frames set forth in those procedures.

(b) No action at law or in equity shall be brought to recover benefits under the Plan later than two years from the date of the final adverse benefit determination of the claimant's appeal of the denial of his or her claim for benefits under Section 7.10. Notwithstanding the foregoing, if the applicable, analogous Pennsylvania statute of limitations has run or will run before the aforementioned two-year period, the Pennsylvania statute of limitations is controlling.

(c) No action at law or in equity shall be brought in connection with the Plan except in Federal district court in Philadelphia, Pennsylvania.

7.12 Discretionary Authority

The Administrator (or its designee, in the case of any delegated duties) shall have sole discretion to carry out its responsibilities under this Article VII, to construe and interpret the provisions of the Plan and to determine all questions concerning benefit entitlements, including the power to construe and determine disputed

or doubtful terms. To the maximum extent permissible under law, the Administrator's (or its designee's) determinations on all such matters shall be final and binding upon all persons involved.

ARTICLE VIII
AMENDMENT, TERMINATION AND MERGERS

8.1 Right to Amend

(a) By The Board of Directors. The Board of Directors of the Company shall have the right to amend the Plan at any time by resolution, subject to the following limitations:

(i) No such amendment shall cause any part of the Trust assets to be used for or diverted to any purpose other than the exclusive benefit of the Participants or their Beneficiaries, except as provided in Section 9.6(b).

(ii) No such amendment shall cause any reduction in the amount of any Participant's accrued benefit. For purposes of this paragraph, an amendment which has the effect of (A) eliminating or reducing an early retirement benefit or a retirement-type subsidy, or (B) eliminating an optional form of benefit, with respect to benefits attributable to service before the amendment, shall be treated as reducing accrued benefits except as provided in Code section 411(d)(6) and the Regulations thereunder.

(iii) No such amendment shall change any vesting schedule unless, in the case of an Employee who is a Participant on:

(A) The date the amendment is adopted; or

(B) The date the amendment is effective, if later,

the vested percentage of such Participant's right to his or her Aggregate Account is not less than such percentage computed under the Plan without regard to such amendment. Furthermore, no such amendment shall otherwise change any vesting schedule unless each Participant having three or more Years of Service is permitted to elect, in accordance with the Code and applicable Regulations, to have the vested percentage of his or her Aggregate Account determined under the Plan without regard to such amendment; provided, however, that no election shall be given to any Participant whose vested percentage under the Plan as amended cannot at any time be less than such percentage determined without regard to such amendment.

(b) By the Administrator. The Administrator shall have the right to amend the Plan at any time, subject to the limitations set forth in Section 8.1(a), except to the extent the Board of Directors of the Company has retained amendment authority. The Board has retained amendment authority with respect to (i) any increase in the rate of Matching Contributions under the Plan (except as provided in Section 4.4(a)), (ii) any increase in the rate of Nonelective Contributions above 3% of Compensation, (iii) any new type of employer contribution under the Plan, (iv) any increase in the amount of any benefit payable to a terminated Participant or Beneficiary, and (v) any amendment authorizing one or more new groups of employees to become Participants in the Plan if the aggregate number of Participants added is 5% or more of the number of Participants at the beginning of the Plan Year, except, in the case of clauses (i) and (ii), to the extent such amendment is required under the terms of a collective bargaining agreement between employee representatives (within the meaning of Code section 7701(a)(46)) and the Employer under which retirement benefits were the subject of good faith bargaining between the parties. The Administrator shall supply the Secretary of the Board of Directors of the Company with copies of all Plan amendments adopted by the Administrator as well as signed resolutions adopting such amendment.

8.2 Termination

(a) Right to Terminate. The Company shall have the right to terminate the Plan at any time and for any reason by delivering to the Trustee and Administrator written notice of such termination. Upon any full or partial termination or complete discontinuance of the Employer's contributions to the Plan, all amounts credited to the affected Participants' Aggregate Accounts shall be 100% Vested and shall not thereafter be subject to forfeiture, and any unallocated amounts shall be allocated to the accounts of all Participants in accordance with the provisions hereof.

(b) Distribution Upon Termination. Upon the full termination of the Plan, the Company shall direct the distribution of the assets of the Fund to Participants in a manner which is consistent with and satisfies the provisions of Section 6.5, except that Participant consent shall not be required if not required under applicable Regulations. Distributions to a Participant shall be made in cash or through the purchase of irrevocable nontransferable deferred commitments from an insurer. Except as permitted by Regulations, the termination of the Plan shall not result in the reduction of section 411(d)(6) protected benefits. Notwithstanding the foregoing, amounts held by a Participant's Aggregate Account that are attributable to Nonelective Contributions for a Plan Year beginning on or after January 1, 2008 or Elective Contributions shall not be distributed on termination of the Plan unless (i) distribution is permitted under another Section of the Plan (e.g., on account of Severance from Employment), or (ii) distribution may be made pursuant to Regulation section 1.401(k)-1(d)(4) (or any successor thereto).

8.3 Merger or Consolidation

This Plan and Trust may be merged or consolidated with, or its assets and/or liabilities may be transferred to, any other plan and trust only if the benefits which would be received by a Participant of this Plan, in the event of a termination of the Plan immediately after such transfer, merger or consolidation, are at least equal to the benefits the Participant would have received if the Plan had terminated immediately before the transfer, merger or consolidation, and such transfer, merger or consolidation does not otherwise result in the elimination or reduction of any section 411(d)(6) protected benefits.

ARTICLE IX
MISCELLANEOUS

9.1 Participant's Rights

This Plan shall not be deemed to constitute a contract between the Employer and any Participant or to be a consideration or an inducement for the employment of any Participant or Employee. Nothing contained in this Plan shall be deemed to give any Participant or Employee the right to be retained in the service of the Employer or to interfere with the right of the Employer to discharge any Participant or Employee at any time regardless of the effect which such discharge shall have upon him or her as a Participant of this Plan.

9.2 Alienation

(a) In General. Subject to the exceptions provided below, no benefit which shall be payable under the Plan to any person (including a Participant or his or her Beneficiary) shall be subject in any manner to anticipation, alienation, sale, transfer, assignment, pledge, encumbrance, or charge, and any attempt to anticipate, alienate, sell, transfer, assign, pledge, encumber, or charge the same shall be void; and no such benefit shall in any manner be liable for, or subject to, the debts, contracts, liabilities, engagements, or torts of any such person, nor shall it be subject to attachment or legal process for or against such person, and the same shall not be recognized by the Trustee, except to such extent as may be required by law.

(b) Loans. Subsection (a) shall not apply to the extent a Participant or Beneficiary is indebted to the Plan as a result of a loan from the Plan. At the time a distribution is to be made to or for a Participant's or Beneficiary's benefit, such proportion of the amount distributed as shall equal such loan indebtedness shall be paid by the Trustee to the Trustee or the Administrator, at the direction of the Administrator, to apply against or discharge such loan indebtedness. Prior to making a payment, however, the Participant or Beneficiary must be given written notice by the Administrator that such loan indebtedness is to be so paid in whole or part from his or her Aggregate Account. If the Participant or Beneficiary does not agree that the loan indebtedness is a valid claim against his or her Aggregate Account, he or she shall be entitled to a review of the validity of the claim in accordance with procedures provided in Section 7.10.

(c) Qualified Domestic Relations Orders. Subsection (a) shall not apply to a qualified domestic relations order as defined in Code section 414(p), and those other domestic relations orders permitted to be so treated by the Administrator under the provisions of ERISA. The Administrator shall establish a written procedure to determine the qualified status of domestic relations orders and to administer distributions under such qualified orders. Further, to the extent provided under a qualified domestic relations order, a former spouse of a Participant shall be treated as the Spouse or Surviving Spouse for all purposes under the Plan.

(d) Other Exceptions to Nonalienation. Subsection (a) shall not apply to an amount necessary to satisfy a Federal tax levy made pursuant to Code section 6331 or, subject to the provisions of Code section 401(a)(13), a judgment relating to the Participant's conviction of a crime involving the Plan, to a judgment, order, decree, or settlement agreement between the Participant and the Secretary of Labor relating to a violation (or an alleged violation) of part 4 of subtitle B of title I of ERISA. Notwithstanding anything in the Plan or this Section to the contrary, this Section is intended to address the requirements of Code section 401(a)(13) and Section 206 of ERISA and Federal rulings and regulations issued thereunder, and to permit action by Plan fiduciaries (including, but not limited to, the recovery of benefit overpayments by reducing Plan benefits or the withholding of taxes from Plan benefits) that do not violate the principles of Code section 401(a)(13) or section 206 of ERISA as described in such rulings and regulations.

9.3 Construction of Plan

Construction, validity, and administration of this Plan shall be governed by the laws of the Commonwealth of Pennsylvania (without reference to principles of conflicts of laws) except to the extent that such laws have been superseded by ERISA.

9.4 Gender and Number

Wherever any words are used herein in the masculine, feminine, or neuter gender, they shall be construed as though they were also used in another gender in all cases where they would so apply, and whenever any words are used herein in the singular or plural form, they shall be construed as though they were also used in the other form in all cases where they would so apply.

9.5 Legal Action

In the event any claim, suit, or proceeding is brought regarding the Trust and/or Plan established hereunder to which the Trustee or the Administrator may be a party, and such claim, suit, or proceeding is resolved in favor of the Trustee or Administrator, the Trustee or Administrator shall be entitled to be reimbursed from the Trust Fund for any and all costs, attorneys' fees, and other expenses pertaining thereto incurred by the Trustee or Administrator for which the Trustee or Administrator shall have become liable.

9.6 Prohibition Against Diversion of Funds

(a) Exclusive Benefit Rule. Except as provided below and otherwise specifically permitted by law, it shall be impossible by operation of the Plan or of the Trust, by termination of either, by power of revocation or amendment, by the happening of any contingency, by collateral arrangement, or by any other means, for any part of the corpus or income of any trust fund maintained pursuant to the Plan or any funds contributed thereto to be used for, or diverted to, purposes other than the exclusive benefit of Participants or their Beneficiaries.

(b) Exceptions.

(i) In the event the Employer shall make an excessive contribution under a mistake of fact pursuant to ERISA section 403(c)(2)(A), the Employer may demand repayment of such excessive contribution at any time within one year following the time of payment and the Trustee shall return such amount to the Employer within the one year period. Earnings of the Plan attributable to the excess contributions may not be returned to the Employer but any losses attributable thereto must reduce the amount so returned.

(ii) Notwithstanding any provision of the Plan to the contrary, except Section 3.5, any contribution by the Employer to the Trust Fund is conditioned upon the deductibility of the contribution by the Employer under the Code and, to the extent any such deduction is disallowed, the Employer may, within one year following the disallowance of the deduction, demand repayment of such disallowed contribution, and the Trustee shall return such contribution within one year following the disallowance. Earnings of the Plan attributable to the excess contribution may not be returned to the Employer, but any losses attributable thereto must reduce the amount so returned.

9.7 Bonding

Every Fiduciary, except a bank or an insurance company, unless exempted by ERISA and the regulations thereunder, shall be bonded in an amount required by law and in a form required by law. Notwithstanding anything in the Plan to the contrary, the cost of such bonds shall be an expense of and may, at the election of the Administrator, be paid from the Fund or by the Employer. No bonding in excess of the amount required by law shall be considered required by the Plan.

9.8 Receipt and Release for Payments

Any payment to any Participant, his or her legal representative, Beneficiary, or to any guardian or committee appointed for such Participant or Beneficiary in accordance with the provisions of the Plan, shall, to the extent thereof, be in full satisfaction of all claims hereunder against the Trustee and the Employer, either of whom may require such Participant, legal representative, Beneficiary, guardian, or committee, as a condition precedent to such payment, to execute a receipt and release thereof in such form as shall be determined by the Trustee or Employer.

9.9 Action by the Employer

Whenever the Employer under the terms of the Plan is permitted or required to do or perform any act or matter or thing, it shall be done and performed by a person duly authorized by its legally constituted authority.

9.10 Named Fiduciaries and Allocation of Responsibility

The “Named Fiduciaries” of this Plan are (1) the Company, (2) the Administrator, and (3) the Trustee. The Named Fiduciaries shall have only those specific powers, duties, responsibilities, and obligations as are specifically given them under the Plan. In general, the Company (and any other Employer) shall have the sole responsibility for making the contributions provided for under Section 4.1. The Company shall have the sole authority to appoint and remove the Trustee and the Administrator, to formulate the Plan’s funding policy and method, and to amend or terminate, in whole or in part, the Plan. The Administrator shall have the sole responsibility for the administration of the Plan, which responsibility is specifically described in the Plan. The Trustee shall have the sole responsibility for the management of the assets held under the Trust, except those assets the management of which has been assigned to an Investment Manager, who shall be solely responsible for the management of the assets assigned to it, all as specifically provided in the Plan. Each Named Fiduciary warrants that any directions given, information furnished, or action taken by it shall be in accordance with the provisions of the Plan, authorizing or providing for such direction, information, or action. Furthermore, each Named Fiduciary may rely upon any such direction, information, or action of another Named Fiduciary as being proper under the Plan, and is not required under the Plan to inquire into the propriety of any such direction, information, or action. It is intended under the Plan that each Named Fiduciary shall be responsible for the proper exercise of its own powers, duties, responsibilities, and obligations under the Plan. No Named Fiduciary shall guarantee the Trust Fund in any manner against investment loss or depreciation in asset value. Any person or group may serve in more than one fiduciary capacity.

9.11 Headings

The headings and subheadings of this Plan have been inserted for convenience of reference and are to be ignored in any construction of the provisions hereof.

9.12 Electronic Media

Whenever elections, notices, consents, or other communications are required to be in writing herein, the Administrator may designate that such elections, notices, consents, or other communications shall be by other means, including the use of electronic media, if such use is permitted by law; provided, however, that such elections, notices, consents, or other communications shall be in such form as the Administrator shall specify and approve.

9.13 Clerical Error

If any fact pertaining to eligibility for an amount of benefits payable under the Plan to a Participant or other payee has been misstated, or in the event of clerical error, the benefits shall be adjusted by the committee or its delegate on the basis of the correct facts in a manner precluding individual selection.

9.14 Uniformity

All provisions of this Plan shall be interpreted and applied in a uniform, nondiscriminatory manner. In the event of any conflict between the terms of this Plan and any Contract purchased hereunder, the Plan provisions shall control.

ARTICLE X
MERGER OF HOUGHTON PLAN AND WALLOVER PLAN

10.1 Plan Mergers

(a) In General. Effective January 1, 2020, the Houghton Plan and the Wallover Plan were merged with and into the Plan. Upon the merger, the account balance of each participant in the Houghton Plan

and the Wallover Plan shall be transferred to this Plan in the manner described in Section 10.2. Accounts transferred from a Participant's Houghton Plan accounts and future earnings thereon are referred to as the Participant's "Houghton Accounts" for purposes of this Article X. Accounts transferred from a Participant's Wallover Plan accounts and future earnings thereon are referred to as the Participant's "Wallover Accounts" for purposes of this Article X.

(b) Full Vesting. Effective December 31, 2019, all amounts under the Houghton Accounts and Wallover Accounts shall be fully vested.

(c) Participation. Except as provided in Section 1.21 (relating to the definition of an Eligible Employee), any Eligible Employee employed by Houghton or Wallover Oil Company, Inc. on December 31, 2019 became a Participant in the Plan as of January 1, 2020.

10.2 Transfer of Accounts

(a) Transfer of Houghton Accounts. Effective January 1, 2020, amounts in the Houghton Accounts were transferred to the corresponding Plan accounts as follows:

(i) Any amounts in the Participant's Houghton Accounts that correspond to contributions under the Participant's Elective Account as defined under Section 1.48 were transferred to his or her Participant's Elective Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.48.

(ii) Any amounts in the Participant's Houghton Accounts that correspond to contributions under the Participant's Account as defined under Section 1.47 were transferred to his or her Participant's Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.47.

(iii) Any amounts in the Participant's Houghton Accounts attributable to rollover contributions were transferred to his or her Rollover Account under the Plan.

(b) Transfer of Wallover Accounts. Effective January 1, 2020, amounts in the Wallover Accounts were transferred to the corresponding Plan accounts as follows.

(i) Any amounts in the Participant's Wallover Accounts that correspond to contributions under the Participant's Elective Account as defined under Section 1.48 were transferred to his or her Participant's Elective Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.48.

(ii) Any amounts in the Participant's Wallover Accounts that correspond to contributions under the Participant's Account as defined under Section 1.47 were transferred to his or her Participant's Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.47.

(iii) Any amounts in the Participant's Wallover Accounts attributable to rollover contributions were transferred to his or her Rollover Account under the Plan.

10.3 Special Rules Relating To Loans

Notwithstanding Section 6.13, any loan outstanding under the Houghton Plan or Wallover Plan at the time of the merger under Section 10.1 shall continue in accordance with the terms of the loan as made under the Houghton Plan or Wallover Plan, as applicable.

10.4 Distribution Forms

A lump sum payment shall be the sole form of distribution for all amounts transferred to the Plan from the Houghton Accounts and Wallover Accounts.

ARTICLE XI
MERGER OF CORAL PLAN AND SIFCO PLAN

11.1 Merger of the Coral Plan and SIFCO Plan

(a) In General. Effective January 1, 2022, the Coral Plan and the SIFCO Plan shall be merged with and into the Plan. Upon the merger, the account balance of each participant in the Coral Plan and the SIFCO Plan shall be transferred to this Plan in the manner described in Section 11.2. Accounts transferred from a Participant's Coral Plan accounts and future earnings thereon are referred to as the Participant's "Coral Accounts" for purposes of this Article XI. Accounts transferred from a Participant's SIFCO Plan accounts and future earnings thereon are referred to as the Participant's "SIFCO Accounts" for purposes of this Article XI.

(b) Full Vesting. Effective December 31, 2021, all amounts under the Coral Accounts and SIFCO Accounts shall be fully vested.

(c) Participation. Except as provided in Section 1.21 (relating to the definition of an Eligible Employee), any Eligible Employee employed by Coral or SIFCO on December 31, 2021 shall became a Participant in the Plan as of January 1, 2022.

11.2 Transfer of Accounts

(a) Transfer of Coral Accounts. Effective January 1, 2022, amounts in the Coral Accounts shall be transferred to the corresponding Plan Accounts as follows:

(i) Any amounts in the Participant's Accounts that correspond to contributions under the Participant's Elective Account as defined under Section 1.48 were transferred to his or her Participant's Elective Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.48. After-tax contributions (other than Roth contributions) contributed by the Participant to the Coral Plan "After-Tax Coral Plan Contributions") shall be transferred to the Participant's Elective Account and maintained in a separate accounting.

(ii) Any amounts in the Participant's Coral Accounts that correspond to contributions under the Participant's Account as defined under Section 1.47 were transferred to his or her Participant's Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.47.

(iii) Any amounts in the Participant's Coral Accounts attributable to rollover contributions were transferred to his or her Rollover Account under the Plan.

(b) Transfer of SIFCO Accounts. Effective January 1, 2022, amounts in the SIFCO Accounts were transferred to the corresponding Plan accounts as follows.

(i) Any amounts in the Participant's SIFCO Accounts that correspond to contributions under the Participant's Elective Account as defined under Section 1.48 were transferred to his or her Participant's Elective Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.48.

(ii) Any amounts in the Participant's SIFCO Accounts that correspond to contributions under the Participant's Account as defined under Section 1.47 were transferred to his or her Participant's Account under the Plan, and a separate accounting shall be maintained with respect to each applicable classification under Section 1.47.

(iii) Any amounts in the Participant's SIFCO Accounts attributable to rollover contributions were transferred to his or her Rollover Account under the Plan.

11.3 Special Rules Relating To Loans

Notwithstanding Section 6.13, any loan outstanding under the Coral Plan or SIFCO Plan at the time of the merger under Section 11.1 shall continue in accordance with the terms of the loan as made under the Coral Plan or SIFCO Plan, as applicable.

11.4 Distribution Forms

A lump sum payment shall be the sole form of distribution for all amounts transferred to the Plan from the Coral Accounts and SIFCO Accounts.

11.5 In-service Distribution of After-Tax Coral Plan Contributions

Amounts credited to a Participant's Elective Account which are After-Tax Coral Plan Contributions and earnings credited thereto may be distributed at any time upon a request by the Participant in accordance with the procedures established by the Administrator. A distribution pursuant to this Section shall be made from one or more of the investment categories designated by the Participant for investment of his or Account pursuant to Section 4.13.

IN WITNESS WHEREOF, Quaker Chemical Corporation has caused these presents to be duly executed on this ______1______ day of ______November____, 2021.

QUAKER CHEMICAL CORPORATION

Attest:____________________ By: /s/ Shane W. Hostetter______

Shane Hostetter

SVP CFO

EXHIBIT A

PARTICIPATING EMPLOYERS

The following Affiliated Employers were participating in the Plan as of January 1, 2021, unless otherwise noted:

AC Products, Inc.
ECLI Products, LLC
Epmar Corporation
Houghton International Inc.
Summit Lubricants Inc.
Wallover Oil Company, Inc.
Ultraseal America, Inc.
Coral Chemical Company – participation effective January 1, 2022
SIFCO Applied Surface Concepts, LLC – participation effective January 1, 2022

EXHIBIT 10.27

QUAKER HOUGHTON
ANNUAL INCENTIVE PLAN

(As Amended and Restated Effective November 17, 2021)

WHEREAS, Quaker Chemical Corporation (the "Company") established the Quaker Chemical Corporation Global Annual Incentive Plan (the "Prior Plan"); and

WHEREAS, the Company desires to amend and restate the Prior Plan as the Quaker Houghton Annual Incentive Plan (the "Plan") to update the Plan for statutory changes and to make certain other changes;

NOW, THEREFORE, the Plan is amended and restated, effective as of November 17, 2021, as follows:

PURPOSE AND APPLICATION

The Plan is designed to reward certain employees of the Company for achieving performance objectives that are important to the Company and its shareholders. The Plan is intended to provide an incentive for superior work and to motivate participating employees toward even higher achievement and business results, to increase shareholder value, to tie their goals and interests to those of the Company and its shareholders, and to enable the Company to attract and retain highly qualified executive officers.

The Plan, as amended and restated effective November 17, 2021, shall apply to any bonus compensation payable with respect to Performance Periods beginning on or after such date; *provided however,* that payment of any bonus compensation in Common Stock shall be subject to approval of the Plan by the Company's shareholders pursuant to the rules of the New York Stock Exchange.

ARTICLE 1

DEFINITIONS

The following terms, when used herein, shall have the following meanings unless otherwise required by the context:

1.1 "Annual Base Salary" shall mean the salary of a Participant determined on an annualized basis by reference to the base rate of pay in effect for such Participant.

1.2 "Board" shall mean the Board of Directors of the Company.

1.3 "Code" shall mean the Internal Revenue Code of 1986, as amended.

1.4 "Committee" shall mean the Compensation/Management Development Committee of the Board and such other committee or committees as may be designated to act as the administrative committee under the Plan by the Board, at its discretion, from time to time. Where more than one committee has been designated for these purposes, each such committee shall act as the Committee under the Plan with respect to different Participants or groups of Participants (which may be designated individually or by classification) as established at the time any such committee is established.

1.5 "Common Stock" shall mean shares of the Company's common stock, $1.00 par value.

1.6 “Company” shall mean Quaker Chemical Corporation, or any successor by merger, purchase or otherwise, and, as appropriate, with respect to eligibility to participate in the Plan, the majority-owned subsidiaries of Quaker Chemical Corporation.

1.7 “Exchange Act” shall mean the Securities Exchange Act of 1934, as amended.

1.8 “Participant” shall mean, with respect to a Performance Period, an employee of the Company who has been designated by the Committee as a Participant in the Plan for such Performance Period.

1.9 “Performance Goal” shall mean, with respect to a Performance Period, an objective performance goal established by the Committee, consistent with the express terms of the Plan, which must be met in order for a bonus to be payable to a Participant with respect to such Performance Period, except as provided in Section 5.4.

1.10 “Performance Period” shall mean the Plan Year or such other period or periods as may be established as a Performance Period by the Committee from time to time. Nothing herein shall prohibit the creation of multiple Performance Periods which may overlap with other Performance Periods established under the Plan.

1.11 “Plan” shall mean the Quaker Houghton Global Annual Incentive Plan, as amended and restated effective November 17, 2021, and as may be amended from time to time.

1.12 “Plan Year” shall mean the calendar year.

1.13 “Short-Term Deferral Date” shall mean, with respect to bonus compensation payable for a Performance Period, a date within the 2 1/2 month period immediately following the last day of such Performance Period; provided that such period (measured from the last day of the period) shall be less than 2 1/2 months to the extent necessary to cause such period to be within one calendar year. A Participant shall have no right to interest as a result of payment on a date after the first day of such period. Notwithstanding the foregoing, for purposes of determining the date the bonus award “would otherwise be payable” under Section 5.1 and the “payment date” under Section 4.1(c), the date the bonus award is actually paid to similarly situated Participants with respect to the Performance Period shall be determinative, and not the Short-Term Deferral Date.

ARTICLE 2

ELIGIBILITY AND PARTICIPATION

2.1 Designation of Participants. Those employees of the Company who are designated as Participants in the Plan by the Committee shall be eligible to participate in the Plan. Prior to or at the time Performance Goals are established for a specified Performance Period, the Committee shall identify the employees of the Company (by name, title, salary grade or similar classification) who are to be Participants in the Plan with respect to such Performance Period.

2.2 Considerations. In making its determination as to eligibility for participation in the Plan, the Committee shall take into account an employee’s position in the Company and the extent to which the employee’s position affords him or her the opportunity to have a significant impact on the attainment of the Company’s objectives.

ARTICLE 3

PERFORMANCE GOALS

3.1 Establishment of Performance Goals. Prior to or within the first ninety (90) days of a Performance Period, the Committee shall establish in writing with respect to such Performance Period, one or more objective Performance Goals, stated in terms of an objective formula or formulas or such other appropriate method, for computing the amount of bonus compensation which may be payable to each Participant if the specified Performance Goals or levels thereof are attained.

(a) Notwithstanding the foregoing sentence, the Performance Goals for any Performance Period may not be established after 25% of the period of service represented by the Performance Period has elapsed, and the outcome must be substantially uncertain when the Performance Goals are established.

(b) Subject to the specific limitations set forth in the Plan, nothing herein shall limit the authority of the Committee to establish more than one Performance Goal and more than one formula with respect to bonus compensation of a Participant, nor limit a Participant's ability to receive more than one bonus payment with respect to a single Performance Period.

3.2 Business Criteria, Adjustments and Measurement. Performance Goals may be based upon one or more of the following business criteria (which may be determined for these purposes by reference to (i) the Company as a whole, (ii) any of the Company's subsidiaries, operating divisions, regional business units or other operating units, or (iii) any combination thereof): profit before taxes, profit after taxes, earnings before or after taxes, interest, depreciation and/or amortization, stock price, market share, gross revenue, net revenue, pretax income, operating income, cash flow, earnings per share, return on equity, return on invested capital or assets, cost reductions and savings, return on revenues or productivity, or any variations of the preceding business criteria, which may be modified at the discretion of the Committee to take into account significant nonrecurring items or which may be adjusted to reflect such costs or expense as the Committee deems appropriate.

(a) Performance Goals may also be based upon a Participant's attainment of personal objectives with respect to any of the foregoing business criteria or implementing policies and plans, negotiating transactions and sales, developing long-term business goals or exercising managerial responsibility.

(b) The Committee may provide for appropriate adjustments to any business criteria used in connection with measuring attainment of Performance Goals to take into account fluctuations in exchange rates, where relevant.

3.3 Changes In Eligibility During the Performance Period. The Committee may, but is not required to, establish special rules for any employee who first becomes a Participant during a Performance Period, or whose level of participation the Committee determines should be changed during a Performance Period.

ARTICLE 4

DETERMINATION OF BONUS AWARDS AND LIMITATIONS

4.1 Determination of Bonus Payment. As soon as practicable following the end of a Performance Period, the Committee shall determine whether and to what extent the Performance Goal or Performance Goals

established for a Participant for such Performance Period have been achieved, including the specific target objective or objectives and the satisfaction of any other material terms of the bonus award, and shall certify such determination in writing, which certification may take the form of minutes of the Committee documenting such determination.

(a) The Committee shall then calculate the amount of each Participant's bonus or bonuses for such Performance Period based upon the levels of achievement of the relevant Performance Goals and the formula(s) established for such purposes with respect to such Performance Period, subject to the limitations set forth in this Article IV and the employment and proration rules set forth in Article V.

(b) The Committee may, notwithstanding anything contained herein to the contrary, reduce the amount of or totally eliminate any Participant's bonus, if it determines, in its absolute and sole discretion, that such a reduction or elimination is appropriate in order to reflect the Participant's individual performance or to take into account any other factors the Committee deems appropriate.

(c) At any time before a bonus is payable under the Plan, the Committee in its sole discretion shall determine whether the medium of payment shall be cash and/or Common Stock. To the extent an objective formula established under Section 3.1 for a Participant for a Performance Period is stated in terms of a medium other than the final medium of payment determined by the Committee under this subsection (c), conversion to the final medium of payment shall be determined by the last sale price for a share of Common Stock as quoted on the New York Stock Exchange for the payment date (or the trading day immediately preceding the payment date if the payment date is not a trading day).

4.2 Limitations. No Participant shall be entitled to receive a bonus or bonuses in excess of the following limitations:

(a) For bonuses paid in cash, the maximum bonus payable with respect to all Performance Periods ending in any one Plan Year shall not exceed three hundred percent (300%) of such Participant's Annual Base Salary in effect as of September 30th during such Plan Year.

(b) A Participant's Annual Base Salary shall be deemed for these purposes to be the lesser of his or her actual Annual Base Salary or $1,000,000.

4.3 Common Stock Available. Shares of Common Stock transferable under the Plan shall be shares of authorized, but not issued Common Stock or Common Stock held in treasury. The maximum number of shares of Common Stock which may be issued under the Plan shall not exceed 500,000 shares. If a bonus award terminates for any reason or is canceled, forfeited or settled in cash rather than stock, the number of shares of Common Stock with respect to which such bonus award terminated or was canceled, forfeited or settled in cash, shall be available for future grants of bonus awards under the Plan. If tax withholding requirements are satisfied by withholding Common Stock, only the number of shares issued net of Common Stock withheld shall be deemed delivered for purposes of applying the limits set forth in this Section.

(a) Bonuses payable in the form of a transfer of shares may be evidenced by written grant documents in such form as the Committee shall from time to time approve, and shall set forth such terms and conditions as the Committee shall, from time to time, at its discretion, impose on such transferred shares; provided, however, that any such terms and conditions may not be inconsistent with any specific terms of the Plan.

(b) In the event of changes to the outstanding shares of Common Stock of the Company through reorganization, merger, consolidation, recapitalization, reclassification, stock splits, stock dividend, spin-off, stock consolidation or otherwise, or in the event of a sale of all or substantially all of the

assets of the Company, an appropriate and proportionate adjustment shall be made in (i) the number and kind of shares available for use under the Plan, (ii) the annual limitations on awards of Common Stock, and (iii) the number and kind of shares of Common Stock payable under the formula(s), if any, for the Performance Period in which such event occurs. Adjustments or changes under this Section shall be made by the Committee, whose determination as to what adjustments or changes shall be made, and the extent thereof, shall be final, binding, and conclusive.

ARTICLE 5

PAYMENT OF AWARDS

5.1 Employment Requirement. No bonus shall be payable under the Plan to any Participant who is not employed by the Company (or an affiliate of the Company) on the date such bonus would otherwise be payable unless:

(a) The Participant's employment terminates prior to such date on account of his or her death, disability (as determined by the Committee, in its sole discretion), or under such other circumstances as the Committee shall, in its sole discretion, determine;

(b) The Participant's employment terminates prior to such date on or after attainment of age 60;

(c) An amount is payable pursuant to Section 5.4; or

(d) The Committee, in its sole discretion, specifically allows the Participant's bonus award to remain payable, in full or in part (as determined by the Committee), if the Participant's employment terminates prior to such date.

If a Participant's employment terminates prior to the date a bonus award would otherwise be payable under any circumstances other than those described above, no bonus award shall be payable to such Participant.

5.2 Proration of Bonus.

(a) If a Participant is on a leave of absence during a Performance Period, any bonus award payable shall be prorated based on active service during the Performance Period, except as provided in Section 5.4.

(b) If a Participant's employment terminates under the circumstances set forth in Section 5.1(a) or (b), any bonus award payable will be prorated based on active service during the Performance Period, except as provided in Section 5.4.

5.3 Payment Date. Except as provided in this Section 5.3 or in Section 5.4, no Participant may receive any payment with respect to a bonus award unless and until the Committee has certified in writing that the relevant Performance Goals for a Performance Period have been achieved. Notwithstanding anything herein to the contrary, if a Participant terminates employment under the circumstances set forth in Section 5.1(a), (b), or (d), the Committee shall have the discretion to provide for payment in respect of a bonus award for a Performance Period regardless of whether the Performance Goals for such Performance Period have been achieved. After the Committee has certified in writing that the relevant Performance Goals have been achieved, bonus awards shall be paid by the Company on the Short-Term Deferral Date, to the Participant or to his or her estate in the event of death.

5.4 Change in Control. Notwithstanding any provision of the Plan to the contrary, in the event of a Change in Control (as defined in the Quaker Chemical Corporation 2016 Long-Term Performance Incentive Plan), each Participant who is employed by the Company on the day before such Change in Control shall be paid (a) any bonus with respect to any Performance Period ending prior to such Change in Control (based on achievement during such Period) that has not been paid to the Participant, such payment to be made on the Short-Term Deferral Date for such Performance Period, and (b) with respect to the Performance Period in which such Change in Control occurs, the amount of the bonus that would have been payable had the target level of performance been achieved for such Performance Period, such payment to be made on the Short-Term Deferral Date for such Performance Period.

5.5 Section 409A of the Code. Notwithstanding any provision of this Plan to the contrary, if a Participant is a specified employee (as defined in Treas. Reg. §1.409A-1(i)), any payment or benefit under this Plan that constitutes deferred compensation subject to Section 409A of the Code and for which the payment event is separation from service (as defined in Treas. Reg. §1.409A-1(h)) shall not be made or provided to the Participant before the date that is six months after the date of the Participant's separation from service. Any payment or benefit that is delayed pursuant to this Section 5.5 shall be made or provided on the first business day of the seventh month following the month in which the Participant's separation from service occurs. With respect to any cash payment delayed pursuant to this Section 5.5, the delayed payment shall include interest, at the Wall Street Journal Prime Rate published in the Wall Street Journal on the date of the Participant's separation from service (or the previous business day if such date is not a business day), for the period from the date the payment would have been made but for this Section 5.5 through the date payment is made. The provisions of this Section 5.5 shall apply only to the extent required to avoid a Participant's incurrence of any additional tax or interest under Section 409A of the Code. To the extent any payment or benefit under the Plan constitutes deferred compensation subject to Section 409A of the Code, this Plan is intended to comply with Section 409A of the Code and shall be administered, interpreted and construed in accordance therewith to avoid the imposition of additional tax under Section 409A of the Code.

ARTICLE 6

OTHER TERMS AND CONDITIONS

6.1 Shareholder Approval. No bonus awards shall be paid in Common Stock unless and until the material terms of the Plan are disclosed to and approved by the Company's shareholders pursuant to the rules of the New York Stock Exchange.

6.2 Nontransferability; Unfunded Plan. Except as may be otherwise required by law, bonus awards under the Plan shall not be subject in any manner to anticipation, alienation, sale, transfer, assignment, pledge, encumbrance, charge, garnishment, execution, or levy of any kind, either voluntary or involuntary. Bonuses awarded under the Plan shall be payable from the general assets of the Company and no Participant shall have any claim with respect to any specific assets of the Company.

6.3 Rights. No person shall have any legal claim to be granted an award under the Plan and the Committee shall have no obligation to treat Participants uniformly. Neither the Plan nor any action taken under the Plan shall be construed as giving any employee the right to be retained in the employ of the Company or any subsidiary or to maintain any Participant's compensation at any level.

6.4 Withholding. The Company or any of its subsidiaries may deduct from any award any applicable withholding taxes or any amounts owed by the employee to the Company or any of its subsidiaries, or take any other actions it deems necessary or appropriate in connection with any applicable withholding requirements.

6.5 Common Stock. No Common Stock will be delivered under the Plan except in compliance with all applicable Federal and state laws and regulations including, without limitation, compliance with all Federal and state securities laws and with the rules of the New York Stock Exchange and of all domestic stock exchanges on which the Common Stock may be listed. Any certificate issued to evidence shares of Common Stock awarded pursuant to the Plan may bear legends and statements the Committee shall deem advisable to assure compliance with Federal and state laws and regulations. No shares of Common Stock shall be delivered under the Plan until the Company has obtained consent or approval from regulatory bodies, Federal or state, having jurisdiction over such matters as the Committee may deem advisable. In the case of a person or estate acquiring the right to an award of Common Stock made pursuant to the Plan as a result of the death of the Participant, the Committee may require reasonable evidence as to the ownership of the Common Stock and may require consents and releases of taxing authorities that it may deem advisable.

6.6 Recoupment Policy. A Participant's right to receive payment of a bonus under the Plan, to retain the bonus and, in the case of a non-cash bonus, to retain the profit or gain the Participant realized in connection with such a bonus shall be subject to any recoupment or "clawback" policy adopted by the Company.

ARTICLE 7

ADMINISTRATION

7.1 The Committee. Until changed by the Board, the Compensation/Management Development Committee of the Board shall constitute the Committee hereunder. All actions taken under the terms of the Plan with respect to any employee who is subject to the reporting requirements of Section 16(a) of the Exchange Act shall be taken by a Committee consisting solely of two or more members of the Board who qualify as "non-employee directors" (as that term is used for purposes of Section 16 of the Exchange Act).

7.2 Committee's Authority. The Committee shall have full power and authority to administer and interpret the provisions of the Plan and to adopt such rules, regulations, agreements, guidelines, and instruments for the administration of the Plan and for the conduct of its business as the Committee deems necessary or advisable.

7.3 Delegation of Authority. The Committee shall have full power to delegate to any officer or employee of the Company the authority to administer and interpret the procedural aspects of the Plan, subject to the Plan's terms, including adopting and enforcing rules to decide procedural and administrative issues.

7.4 Reliance. The Committee may rely on opinions, reports or statements of officers or employees of the Company or any subsidiary thereof and of Company counsel (inside or retained counsel), public accountants, and other professional or expert persons.

7.5 Liability; Indemnification. No member of the Committee shall be liable for any action taken or omitted to be taken or for any determination made by him or her in good faith with respect to the Plan, and the Company shall indemnify and hold harmless each member of the Committee against any cost or expense (including counsel fees) or liability (including any sum paid in settlement of a claim with the approval of the Committee) arising out of any act or omission in connection with the administration or interpretation of the Plan, unless arising out of such person's own fraud or bad faith.

7.6 Governing Law. The place of administration of the Plan shall be in the Commonwealth of Pennsylvania, and the validity, construction, interpretation, administration, and effect of the Plan and of its rules and regulations, and rights relating to the Plan, shall be determined solely in accordance with the laws of the Commonwealth of Pennsylvania (without reference to principles of conflicts of laws) to the extent Federal law is not applicable.

ARTICLE 8

TERM OF PLAN, AMENDMENT AND TERMINATION

8.1 Further Shareholder Approval. The Plan shall terminate as of the date of the first meeting of the shareholders of the Company that occurs in 2032, unless the material terms of the Plan are disclosed to and approved by shareholders on or before the date of such shareholders meeting.

8.2 Amendment, Suspension and Termination. The Plan may be suspended, terminated, or reinstated, in whole or in part, at any time by the Board. The Board may from time to time make such amendments to the Plan as it may deem advisable. Notwithstanding the foregoing, no amendment to the Plan shall be made without the approval of the Company's shareholders if it (i) increases the number of shares of Common Stock made available under the Plan, (ii) expands the class of persons eligible for a bonus under the Plan, (iii) materially extends the term of the Plan, or (iv) otherwise requires shareholder approval under the rules of the exchange or market on which Common Stock is listed or traded.

8.3 Effect of Termination/Amendment. Termination or amendment of the Plan shall not, without the consent of the Participant, diminish a Participant's rights with respect to any bonus program in effect with respect to the Performance Period in which such amendment or termination occurs except to the extent that such amendment or termination is determined by the Committee to be necessary or appropriate under applicable law.

EXHIBIT 10.46

Execution Version

AMENDMENT NO. 2 TO CREDIT AGREEMENT (LIBOR TRANSITION)

THIS AMENDMENT NO. 2 TO CREDIT AGREEMENT (LIBOR TRANSITION) (this "Agreement") is made and entered into as of December 10, 2021 by and among **QUAKER CHEMICAL CORPORATION**, a Pennsylvania corporation (the "Company") and **BANK OF AMERICA, N.A.**, as Administrative Agent (in such capacity, the "Administrative Agent").

RECITALS

WHEREAS, the Company, certain Subsidiaries of the Company party thereto, each guarantor party thereto, each lender party thereto (collectively, the "Lenders" and individually, a "Lender"), and Bank of America, N.A., as Administrative Agent, have entered into that certain Credit Agreement dated as of August 1, 2019 (as amended, modified, extended, restated, replaced, or supplemented from time to time, the "Credit Agreement");

WHEREAS, certain loans and/or other extensions of credit (the "Loans") under the Credit Agreement denominated in Sterling, Yen, and Euros (collectively, the "Impacted Currencies") incur or are permitted to incur interest, fees, commissions or other amounts based on the London Interbank Offered Rate as administered by the ICE Benchmark Administration ("LIBOR") in accordance with the terms of the Credit Agreement; and

WHEREAS, applicable parties under the Credit Agreement have determined in accordance with the Credit Agreement that LIBOR for the Impacted Currencies should be replaced with a successor rate in accordance with the Credit Agreement and, in connection therewith, the Administrative Agent has determined that certain conforming changes are necessary or advisable.

NOW, THEREFORE, in consideration of the premises and the mutual covenants contained herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. Defined Terms. Capitalized terms used herein but not otherwise defined herein (including on any Appendix attached hereto) shall have the meanings provided to such terms in the Credit Agreement, as amended by this Agreement.

2. Agreement. Notwithstanding any provision of the Credit Agreement or any other document related thereto (the "Loan Documents") to the contrary, the parties hereto hereby agree that the terms set forth on Appendix A shall apply to the Impacted Currencies. For the avoidance of doubt, (a) to the extent provisions in the Credit Agreement apply to the Impacted Currencies and such provisions are not specifically addressed by Appendix A, the provisions in the Credit Agreement shall continue to apply to the Impacted Currencies and (b) to the extent provisions in the Credit Agreement apply to Dollar- denominated extensions of credit, the provisions in the Credit Agreement shall continue to apply to such Dollar-denominated extensions of credit and shall not be impacted by this Agreement.

3. Conflict with Loan Documents. In the event of any conflict between the terms of this Agreement and the terms of the Credit Agreement or the other Loan Documents, the terms hereof shall control.

4. Representations and Warranties. The Company represents and warrants to the Administrative Agent and the Lenders, as of the date hereof, as follows:

(a) the execution, delivery and performance by the Company of this Agreement have been duly authorized by all necessary corporate or other organizational action and do not and will not (i) require any consent or approval or other action by, or notice to, or filing with, any Governmental Authority or any other Person in connection with the execution, delivery or performance by, or enforcement against, the Company of this Agreement except as may have been obtained, or (ii) contravene the terms of the Company's Organization Documents; (b) conflict with or result in any breach or contravention of, or the creation of any Lien under, or require any payment to be made under (i) any Contractual Obligation to which the Company is a party or affecting the Company or the properties of the Company or (ii) any order, injunction, writ or decree of any Governmental Authority or any arbitral award to which the Company or its property is subject; or (c) violate any Law;

(b) this Agreement has been duly executed and delivered by the Company, and this Agreement, the Credit Agreement and each other Loan Document (in each case, as amended hereby) constitutes a legal, valid and binding obligation of the Company, enforceable against the Company in accordance with its terms, except to the extent that such enforceability may be limited by bankruptcy, receivership, moratorium, conservationship, or other laws of general application affecting the rights of creditors generally or by general principles of equity;

(c) the representations and warranties of the Company contained in Article V of the Credit Agreement and in each other Loan Document are true and correct in all material respects (or, with respect to representations and warranties modified by materiality standards or Material Adverse Effect, in all respects) on and as of the date hereof, except to the extent that such representations and warranties specifically refer to an earlier date, in which case they shall be true and correct in all material respects (or, with respect to representations and warranties modified by materiality standards or Material Adverse Effect, in all respects) as of such earlier date, and the representations and warranties contained in Sections 5.05(a) and (b) shall be deemed to refer to the most recent statements furnished pursuant to Sections 6.01(a) and (b), respectively;

(d) immediately before and after the effectiveness of this Agreement on the Effective Date, no Default or Event of Default has occurred and is continuing.

5. Conditions Precedent. This Agreement shall become effective upon receipt by the Administrative Agent of counterparts of this Agreement, properly executed by the Company and the Administrative Agent.

6. Payment of Expenses. The Company agrees to pay, in accordance with and subject to the limitations in Section 10.04 of the Credit Agreement, all reasonable and documented out-of-pocket expenses incurred by the Administrative Agent and its Affiliates in connection with the preparation, execution, delivery, administration of this Agreement and the other instruments and documents to be delivered hereunder.

7. Miscellaneous.

(a) The Loan Documents, and the obligations of the Company under the Loan Documents, are hereby ratified and confirmed and shall remain in full force and effect according to their terms. This Agreement is a Loan Document.

(b) The Company (i) acknowledges and consents to all of the terms and conditions of this Agreement, (ii) affirms all of its obligations under the Loan Documents, (iii) agrees that this Agreement and all documents executed in connection herewith do not operate to reduce or discharge its obligations under the Loan Documents, (iv) agrees that the Collateral Documents continue to be in full force and effect and are not impaired or adversely affected in any manner whatsoever, (v) confirms its grant of security interests pursuant to the Collateral Documents to which it is a party as Collateral for the Obligations, and (vi) acknowledges that all Liens granted (or purported to be granted) pursuant to the Collateral Documents remain and continue in full force and effect in respect of, and to secure, the Obligations.

(c) This Agreement may be in the form of an electronic record (in ".pdf" form or otherwise) and may be executed using electronic signatures, which shall be considered as originals and shall have the same legal effect, validity and enforceability as a paper record. This Agreement may be executed in as many counterparts as necessary or convenient, including both paper and electronic counterparts, but all such counterparts shall be one and the same Agreement. For the avoidance of doubt, the authorization under this paragraph may include, without limitation, use or acceptance by the Administrative Agent of a manually signed Agreement which has been converted into electronic form (such as scanned into ".pdf" format), or an electronically signed Agreement converted into another format, for transmission, delivery and/or retention.

(d) Any provision of this Agreement held to be illegal, invalid or unenforceable in any jurisdiction, shall, as to such jurisdiction, be ineffective to the extent of such illegality, invalidity or unenforceability without affecting the legality, validity or enforceability of the remaining provisions hereof and the illegality, invalidity or unenforceability of a particular provision in a particular jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

(e) The terms of the Credit Agreement with respect to governing law, submission to jurisdiction, waiver of venue and waiver of jury trial are incorporated herein by reference, *mutatis mutandis*, and the parties hereto agree to such terms.

[remainder of page intentionally left blank]

Each of the parties hereto has caused a counterpart of this Agreement to be duly executed and delivered as of the date first above written.

BORROWER:	QUAKER CHEMICAL CORPORATION, a Pennsylvania corporation By: /s/ LINGLING STEWART Name: LingLing Stewart Title: Global Treasurer

ADMINISTRATIVE AGENT:

BANK OF AMERICA, N.A.,
as Administrative Agent

By: /s/ ELIZABETH URIBE

Name: Elizabeth Uribe
Title: Assistant Vice President

Appendix A

TERMS APPLICABLE TO AFFECTED ALTERNATIVE CURRENCY LOANS

1. Defined Terms. The following terms shall have the meanings set forth below:

"Administrative Agent's Office" means, with respect to any currency, the Administrative Agent's address and, as appropriate, account specified in the Credit Agreement with respect to such currency, or such other address or account with respect to such currency as the Administrative Agent may from time to time notify the Company and the Lenders.

"Affected Alternative Currency" means each of the following currencies: Sterling, Yen, and Euros.

"Affected Alternative Currency Daily Rate" means, for any day, with respect to any extension of credit under the Credit Agreement denominated in Sterling, the rate per annum equal to SONIA determined pursuant to the definition thereof plus the SONIA Adjustment;

provided, that, if any Affected Alternative Currency Daily Rate shall be less than zero, such rate shall be deemed zero for purposes of this Agreement. Any change in an Affected Alternative Currency Daily Rate shall be effective from and including the date of such change without further notice.

"Affected Alternative Currency Daily Rate Loan" means a Loan that bears interest at a rate based on the definition of "Affected Alternative Currency Daily Rate." All Affected Alternative Currency Daily Rate Loans must be denominated in an Affected Alternative Currency.

"Affected Alternative Currency Loan" means an Affected Alternative Currency Daily Rate Loan or an Affected Alternative Currency Term Rate Loan, as applicable.

"Affected Alternative Currency Term Rate" means, for any Interest Period, with respect to any extension of credit under the Credit Agreement:

(a) denominated in Euros, the rate per annum equal to the Euro Interbank Offered Rate ("EURIBOR"), as published on the applicable Reuters screen page (or such other commercially available source providing such quotations as may be designated by the Administrative Agent from time to time) on the day that is two TARGET Days preceding the first day of such Interest Period with a term equivalent to such Interest Period; and

(b) denominated in Yen, the rate per annum equal to the Tokyo Interbank Offer Rate ("TIBOR"), as published on the applicable Reuters screen page (or such other commercially available source providing such quotations as may be designated by the Administrative Agent from time to time) on the day that is two Business Days preceding the first day of such Interest Period (or such other day as is generally treated as the rate fixing day by market practice in such interbank market, as determined by the Administrative Agent; provided that, to the extent such market practice is not administratively feasible for the Administrative Agent, then such date shall be such other day as otherwise reasonably determined by the Administrative Agent) with a term equivalent to such Interest Period;

provided, that, if any Affected Alternative Currency Term Rate shall be less than zero, such rate shall be deemed zero for purposes of this Agreement.

"Affected Alternative Currency Term Rate Loan" means a Loan that bears interest at a rate based on the definition of "Affected Alternative Currency Term Rate." All Affected Alternative Currency Term Rate Loans must be denominated in an Affected Alternative Currency.

"Applicable Rate" means the Applicable Rate, Applicable Margin or any similar or analogous definition in the Credit Agreement.

"Base Rate" means the Base Rate, Alternative Base Rate, ABR or any similar or analogous definition in the Credit Agreement.

"Base Rate Loans" means a Loan that bears interest at a rate based on the Base Rate.

"Basic ESTR" means, in relation to any day, ESTR for that day, and if that rate is less than zero, Basic ESTR shall be deemed to be zero.

"Borrowing" means a Committed Borrowing, Borrowing, or any similar or analogous definition in the Credit Agreement.

"Business Day" means any day other than a Saturday, Sunday or other day on which commercial banks are authorized to close under the laws of, or are in fact closed in, the state where the Administrative Agent's Office is located; provided that

(a) if such day relates to any interest rate settings as to an Affected Alternative Currency Loan denominated in Euro, any fundings, disbursements, settlements and payments in Euro in respect of any such Affected Alternative Currency Loan, or any other dealings in Euro to be carried out pursuant to this Agreement in respect of any such Affected Alternative Currency Loan, means a Business Day that is also a TARGET Day;

(b) if such day relates to any interest rate settings as to an Affected Alternative Currency Loan denominated in (i) Sterling, means a day other than a day banks are closed for general business in London because such day is a Saturday, Sunday or a legal holiday under the laws of the United Kingdom; and (ii) Yen, means a day other than when banks are closed for general business in Japan; and

(c) if such day relates to any fundings, disbursements, settlements and payments in a currency other than Euro in respect of an Affected Alternative Currency Loan denominated in a currency other than Euro, or any other dealings in any currency other than Euro to be carried out pursuant to this Agreement in respect of any such Affected Alternative Currency Loan (other than any interest rate settings), means any such day on which banks are open for foreign exchange business in the principal financial center of the country of such currency.

"Committed Loan Notice" means a Committed Loan Notice, Loan Notice, Borrowing Notice, Continuation/Conversion Notice, or any similar or analogous definition in the Credit Agreement, and such term shall be deemed to include the Committed Loan Notice attached hereto as Exhibit A.

"Conforming Changes" means, with respect to the use, administration of or any conventions associated with SONIA, EURIBOR, TIBOR or any proposed Successor Rate for any currency, any conforming changes to the definitions of "SONIA", "EURIBOR", "TIBOR", "Interest Period", timing and frequency of determining rates and making payments of interest and other technical, administrative or operational matters (including, for the avoidance of doubt, the definition of "Business Day", timing of borrowing requests or prepayment, conversion or continuation notices and length of lookback periods) as may be appropriate, in the discretion of the Administrative Agent and in consultation with the Company, to reflect the adoption and implementation of such applicable rate(s) and to permit the administration thereof by the Administrative Agent in a manner substantially consistent with market practice for such currency (or, if the Administrative Agent determines that adoption of any portion of such market practice is not administratively feasible or that no market practice for the administration of such rate for such currency exists, in such other manner of administration as the Administrative Agent determines in consultation with the Company is reasonably necessary in connection with the administration of this Agreement and any other Loan Document).

"Dollar" and "$" mean lawful money of the United States.

"Dollar Equivalent" means the Dollar Equivalent or any similar or analogous definition in the Credit Agreement.

"Eurocurrency Rate" means Eurocurrency Rate, LIBOR, Adjusted LIBOR Rate, LIBOR Rate or any similar or analogous definition in the Credit Agreement.

"Eurocurrency Rate Loans" means a Loan that bears interest at a rate based on the Eurocurrency Rate.

"Euro Swing Line Rate" means Basic ESTR

"ESTR" means, in relation to any day:

(a) the Euro short-term rate administered by the European Central Bank (or any other person which takes over the administration of that rate) displayed (before any correction, recalculation or republication by the administrator) on page "EUROSTR=" of the Thomson Reuters screen (or any replacement Thomson Reuters page which displays that rate); or

(b) if the rate otherwise to be determined by clause (a) is not available for ESTR for any day the applicable ESTR shall the equal the rate notified to the Administrative Agent by the Swing Line Lender as soon as practicable, and in any event before interest is due to be paid in respect of that Swing Line Loan, to be that which expresses as a percentage rate per annum the cost to the relevant Swing Line Lender of funding its participation in that Swing Line Loan for that day from whatever source it may reasonably select;

provided that if any day during an Interest Period for a Euro Swing Line Rate Loan is not a TARGET Day, ESTR on that day will be ESTR applicable on the immediately preceding TARGET Day.

"Interest Payment Date" means, (a) as to any Affected Alternative Currency Daily Rate Loan, the last Business Day of each calendar month and the applicable maturity date set forth in

the Credit Agreement and (b) as to any Affected Alternative Currency Term Rate Loan, the last day of each Interest Period applicable to such Loan; provided, however, that if any Interest Period for an Affected Alternative Currency Term Rate Loan exceeds three months, the respective dates that fall every three months after the beginning of such Interest Period shall be Interest Payment Dates.

"Interest Period" means as to each Affected Alternative Currency Term Rate Loan, the period commencing on the date such Affected Alternative Currency Term Rate Loan is disbursed or converted to or continued as an Affected Alternative Currency Term Rate Loan and ending on the date one, three or six months thereafter (in each case, subject to availability for the interest rate applicable to the relevant currency), as selected by the Company in its Committed Loan Notice, or such other period that is twelve months or less requested by the Company and consented to by all the Lenders; provided that:

(a) any Interest Period that would otherwise end on a day that is not a Business Day shall be extended to the next succeeding Business Day unless, in the case of an Affected Alternative Currency Term Rate Loan, such Business Day falls in another calendar month, in which case such Interest Period shall end on the next preceding Business Day;

(b) any Interest Period pertaining to an Affected Alternative Currency Term Rate Loan that begins on the last Business Day of a calendar month (or on a day for which there is no numerically corresponding day in the calendar month at the end of such Interest Period) shall end on the last Business Day of the calendar month at the end of such Interest Period; and

(c) no Interest Period shall extend beyond the applicable maturity date set forth in the Credit Agreement.

"Required Lenders" means the Required Lenders, Requisite Lenders, Majority Lenders or any similar or analogous definition in the Credit Agreement.

"Revaluation Date" means, with respect to any Loan, each of the following: (a) each date of a Borrowing of an Affected Alternative Currency Loan, (b) with respect to an Affected Alternative Currency Daily Rate Loan, each Interest Payment Date, (c) each date of a continuation of an Affected Alternative Currency Term Rate Loan pursuant to the terms of the Credit Agreement, and (d) such additional dates as the Administrative Agent shall determine or the Required Lenders shall require.

"SONIA" means, with respect to any applicable determination date, the Sterling Overnight Index Average Reference Rate published on the fifth Business Day preceding such date on the applicable Reuters screen page (or such other commercially available source providing such quotations as may be designated by the Administrative Agent from time to time); provided however that if such determination date is not a Business Day, SONIA means such rate that applied on the first Business Day immediately prior thereto.

"SONIA Adjustment" means, with respect to SONIA, 0.0326% per annum.

"Successor Rate" means the Successor Rate, LIBOR Successor Rate or any similar or analogous definition in the Credit Agreement.

"TARGET2" means the Trans-European Automated Real-time Gross Settlement Express Transfer payment system which utilizes a single shared platform and which was launched on November 19, 2007.

"TARGET Day" means any day on which TARGET2 (or, if such payment system ceases to be operative, such other payment system, if any, determined by the Administrative Agent to be a suitable replacement) is open for the settlement of payments in Euro.

"Type" means, with respect to a Loan, its character as a Base Rate Loan, a Eurocurrency Rate Loan, an Affected Alternative Currency Daily Rate Loan or an Affected Alternative Currency Term Rate Loan.

2. Terms Applicable to Affected Alternative Currency Loans. From and after the Amendment Effective Date, the parties hereto agree as follows:

(a) Alternative Currencies. (i) No Affected Alternative Currency shall be considered a currency for which there is a published LIBOR rate, and (ii) any request for a new Loan denominated in an Affected Alternative Currency, or to continue an existing Loan denominated in an Affected Alternative Currency, shall be deemed to be a request for a new Loan bearing interest at the Affected Alternative Currency Daily Rate or Affected Alternative Currency Term Rate, as applicable; provided, that, to the extent any Loan bearing interest at the Eurocurrency Rate is outstanding on the Amendment Effective Date, such Loan shall continue to bear interest at the Eurocurrency Rate until the end of the current Interest Period or payment period applicable to such Loan unless, in the case of a Loan that bears interest at a daily floating rate, such daily floating rate is no longer representative or being made available, in which case such Loan shall bear interest at the applicable Affected Alternative Currency Rate immediately upon the effectiveness of this Agreement.

(b) References to Eurocurrency Rate and Eurocurrency Rate Loans in the Credit Agreement and Loan Documents.

(i) References to the Eurocurrency Rate and Eurocurrency Rate Loans in provisions of the Credit Agreement and the other Loan Documents that are not specifically addressed herein (other than the definitions of Eurocurrency Rate and Eurocurrency Rate Loan) shall be deemed to include Affected Alternative Currency Daily Rates, Affected Alternative Currency Term Rates, and Affected Alternative Currency Loans, as applicable.

(ii) For purposes of any requirement for the Company to compensate Lenders for losses in the Credit Agreement resulting from any continuation, conversion, payment or prepayment of any Affected Alternative Currency Loan on a day other than the last day of any Interest Period (as defined in the Credit Agreement), references to the Interest Period (as defined in the Credit Agreement) shall be deemed to include any relevant interest payment date or payment period for an Affected Alternative Currency Loan.

(c) Interest Rates. The Administrative Agent does not warrant, nor accept responsibility, nor shall the Administrative Agent have any liability with respect to the administration, submission or any other matter related to the rates in the definition of "Affected Alternative Currency Daily Rate", "Affected Alternative Currency Term Rate", "ESTR", "Basic ESTR" or with respect to any rate (including, for the avoidance of doubt, the selection of such

rate and any related spread or other adjustment) that is an alternative or replacement for or successor to any such rate or the effect of any of the foregoing, or of any Conforming Changes.

(d) Revaluation Dates. The Administrative Agent shall determine the Dollar Equivalent amounts of Borrowings and Loans denominated in Alternative Currencies. Such Dollar Equivalent shall become effective as of such Revaluation Date and shall be the Dollar Equivalent of such amounts until the next Revaluation Date to occur.

(e) Borrowings and Continuations of Affected Alternative Currency Loans. In addition to any other borrowing requirements set forth in the Credit Agreement:

(i) Affected Alternative Currency Loans. Each Borrowing of Affected Alternative Currency Loans, and each continuation of an Affected Alternative Currency Term Rate Loan shall be made upon the Company's irrevocable notice to the Administrative Agent, which may be given by (A) telephone or (B) a Committed Loan Notice; provided that any telephonic notice must be confirmed immediately by delivery to the Administrative Agent of a Committed Loan Notice. Each such Committed Loan Notice must be received by the Administrative Agent not later than 11:00 a.m. (Eastern time) three Business Days (or five Business Days in the case of a Special Notice Currency) prior to the requested date of any Borrowing or, in the case of Affected Alternative Currency Term Rate Loans, any continuation; provided, however, that if the Company wishes to request Affected Alternative Currency Term Rate Loans having an Interest Period other than one, three or six months in duration as provided in the definition of "Interest Period," the applicable notice must be received by the Administrative Agent not later than 11:00 a.m. (Eastern time) five Business Days (or six Business Days in the case of a Special Notice Currency) prior to the requested date of such Borrowing or continuation of Affected Alternative Currency Term Rate Loans, whereupon the Administrative Agent shall give prompt notice to the Lenders of such request and determine whether the requested Interest Period is acceptable to all of them. Not later than 11:00 a.m. (Eastern time), four Business Days (or five Business Days in the case of a Special Notice Currency) prior to the requested date of such Borrowing or continuation of Affected Alternative Currency Term Rate Loans, the Administrative Agent shall notify the Company (which notice may be by telephone) whether or not the requested Interest Period has been consented to by all the Lenders. Each Borrowing of or continuation of Affected Alternative Currency Loans shall be in a principal amount of the Dollar Equivalent of $5,000,000 or a whole multiple of the Dollar Equivalent of $1,000,000 in excess thereof. Each Committed Loan Notice shall specify (i) whether the Company is requesting a Borrowing or a continuation of Affected Alternative Currency Term Rate Loans, (ii) the requested date of the Borrowing or continuation, as the case may be (which shall be a Business Day), (iii) the currency and principal amount of Loans to be borrowed or continued, (iv) the Type of Loans to be borrowed, (v) if applicable, the duration of the Interest Period with respect thereto. If the Company fails to specify a currency in a Loan Notice requesting a Borrowing, then the Loans so requested shall be made in Dollars. If the Company fails to specify a Type of Loan in a Committed Loan Notice or if such Company fails to give a timely notice requesting a continuation, then the applicable Loans shall be made as Base Rate Loans denominated in Dollars; provided, however, that in the case of a failure to timely request a continuation of Affected Alternative Currency Term Rate Loans, such Loans shall be continued as Affected Alternative Currency Term Rate Loans in their original currency with an Interest Period of one (1) month. If the Company requests a Borrowing of or continuation of Affected Alternative Currency Term Rate Loans in any such Committed

Loan Notice, but fails to specify an Interest Period, it will be deemed to have specified an Interest Period of one month. Except as otherwise specified in the Credit Agreement, no Affected Alternative Currency Loan may be converted into or continued as a Loan denominated in a different currency, but instead must be repaid in the original currency of such Affected Alternative Currency Loan and reborrowed in the other currency.

(ii) Conforming Changes. With respect to any Affected Alternative Currency Rate the Administrative Agent will have the right to make Conforming Changes from time to time and, notwithstanding anything to the contrary herein, in the Credit Agreement or in any other Loan Document, any amendments implementing such Conforming Changes will become effective without any further action or consent of any other party to this Agreement, the Credit Agreement or any other Loan Document; provided, that, with respect to any such amendment effected, the Administrative Agent shall post each such amendment implementing such Conforming Changes to the Company and the Lenders reasonably promptly after such amendment becomes effective.

(iii) Committed Loan Notice. For purposes of a Borrowing of Affected Alternative Currency Loans, or a continuation of any Affected Alternative Currency Term Rate Loan, the Company shall use the Committed Loan Notice attached hereto as Exhibit A.

(f) Interest.

(i) Subject to the provisions of the Credit Agreement with respect to default interest, (x) each Affected Alternative Currency Daily Rate Loan shall bear interest on the outstanding principal amount thereof from the applicable borrowing date at a rate per annum equal to the Affected Alternative Currency Daily Rate plus the Applicable Rate;
(y) each Affected Alternative Currency Term Rate Loan shall bear interest on the outstanding principal amount thereof for each Interest Period at a rate per annum equal to the Affected Alternative Currency Term Rate for such Interest Period plus the Applicable Rate; and (z) each Swing Line Loan denominated in Euros shall bear interest on the outstanding principal amount thereof from the applicable borrowing date at a rate per annum equal to the Euro Swing Line Rate plus the Applicable Rate.

(ii) Interest on each Affected Alternative Currency Loan and each Swing Line Loan denominated in Euros shall be due and payable in arrears on each Interest Payment Date applicable thereto and at such other times as may be specified the Credit Agreement. Interest hereunder shall be due and payable in accordance with the terms hereof before and after judgment, and before and after the commencement of any proceeding under any debtor relief law.

(g) Computations. All computations of interest for Affected Alternative Currency Loans shall be made on the basis of a year of 365 or 366 days, as the case may be, and actual days elapsed, or, in the case of interest in respect of Affected Alternative Currency Loans as to which market practice differs from the foregoing, in accordance with such market practice. Interest shall accrue on each Affected Alternative Currency Loans for the day on which the Affected Alternative Currency Loans is made, and shall not accrue on an Affected Alternative Currency Loans, or any portion thereof, for the day on which the Affected Alternative Currency Loans or such portion is paid, provided that any Affected Alternative Currency Loan that is repaid on the same day on which it is made shall, subject to the terms of the Credit Agreement, bear interest for

one day. Each determination by the Administrative Agent of an interest rate or fee hereunder shall be conclusive and binding for all purposes, absent manifest error.

(h) Successor Rates. The provisions in the Credit Agreement addressing the replacement of a current Successor Rate for a currency shall be deemed to apply to Affected Alternative Currency Loans and SONIA, TIBOR and EURIBOR, as applicable, and the related defined terms shall be deemed to include Sterling, Japanese Yen and Euros and SONIA, TIBOR and EURIBOR, as applicable.

Exhibit A

FORM OF COMMITTED LOAN NOTICE
(Affected Alternative Currency Loans)

Date:____________,_____[1]

To: Bank of America, N.A., as Administrative Agent Ladies and

Gentlemen:

Reference is made to that certain Credit Agreement, dated as of August 1, 2019 (as amended, restated, extended, supplemented or otherwise modified in writing from time to time, the "Credit Agreement;" the terms defined therein being used herein as therein defined), among Quaker Chemical Corporation, a Pennsylvania corporation (the "Company"), certain Subsidiaries of the Company party thereto as Designated Borrowers, each guarantor party thereto, each lender party thereto, and Bank of America, N.A., as Administrative Agent.

The undersigned hereby requests (select one)[2]:

[Revolving Credit Facility]

Indicate: Borrowing, Conversion or Continuation	**Indicate: Borrower Name**	**Indicate: Requested Amount**	**Indicate: Currency**	**Indicate: Affected Alternative Currency Daily Rate Loan or Affected Alternative Currency Term Rate Loan**	**For Affected Alternative Currency Term Rate Loans Indicate:** **Interest Period (e.g., 1, 3 or 6 month interest period)**

[Euro Term Facility]

[1] Note to Borrower. All requests submitted under a single Committed Loan Notice must be effective on the same date. If multiple effective dates are needed, multiple Committed Loan Notices will need to be prepared and signed. [2] Note to Borrower. For multiple borrowings, conversions and/or continuations for a particular facility, fill out a new row for each borrowing/conversion and/or continuation.

Indicate: Borrowing, Conversion or Continuation	**Indicate**: Borrower Name	**Indicate**: Requested Amount	**Indicate**: Currency	**Indicate**: Affected Alternative Currency Daily Rate Loan or Affected Alternative Currency Term Rate Loan	**For Affected Alternative Currency Term Rate Loans Indicate:** Interest Period (e.g., 1, 3 or 6 month interest period)

The Borrowing, if any, requested herein complies with the requirements set forth in the Credit Agreement.

QUAKER CHEMICAL CORPORATION

By:_______________________________________ Name:
[Type Signatory Name]
Title: [Type Signatory Title]