

**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, 2022
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)

Pennsylvania
(State or other jurisdiction of incorporation or organization)

23-0993790

(I.R.S. Employer Identification No.)

901 E. Hector Street,
Conshohocken, Pennsylvania
(Address of principal executive offices)

19428-2380
(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	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant 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

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. Yes No

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). 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, 2022): \$2,054,080,043

Indicate the number of shares outstanding of each of the registrant's classes of common stock, as of the latest practicable date 17,949,837 shares of Common Stock, \$1.00 Par Value, as of January 31, 2023.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant's definitive Proxy Statement relating to the 2023 Annual Meeting of Shareholders are incorporated by reference into Part III.

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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 “Combination” refers to the Quaker combination with Houghton International, Inc. (“Houghton”).

Item 1. Business.

General Description

The Company was organized in 1918 and incorporated as a Pennsylvania business corporation in 1930. 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, container, 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 quenchant, 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:

	2022	2021	2020
Metal removal fluids	22.9 %	23.4 %	23.9 %
Rolling lubricants	20.8 %	22.2 %	21.8 %
Hydraulic fluids	14.1 %	13.6 %	13.3 %

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 2022, Quaker Houghton’s five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) accounted for approximately 11% 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 2022, 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 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, 2022, 2021 and 2020 were \$46.0 million, \$44.9 million and \$40.0 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 2022 acquisitions consist of:

- In October 2022, the Company acquired a business that provides pickling and rinsing products and services, which is part of the EMEA reportable segment, for approximately \$3.5 million. This acquisition, along with the Company's January 2022 acquisition in the Americas reportable segment (described below), which had similar specializations and product offerings in pickling inhibitor technologies, strengthens Quaker Houghton's position in pickling inhibitors and additives, enabling the Company to better support and optimize production processes for customers across the Metals industry.
- In January 2022, the Company acquired a business that provides pickling inhibitor technologies, drawing lubricants and stamping oil, and various other lubrication, rust preventative, and cleaner applications, which is part of the 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 reportable segment.
- 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, which is part of the Global Specialty Businesses reportable segment for approximately \$1.4 million. This business broadens the Company's product offerings and service capabilities within its existing impregnation business.

Impact of COVID-19

During 2022, COVID-19 continued to negatively impact the Company's business operations, as well as those of its customers and suppliers, including increased costs and decreased availability of labor and raw materials. The Company's top priority, especially during this pandemic, has been to protect the health and safety of its employees and customers, while working to ensure business continuity to meet its customers' needs. In response, the Company implemented additional operational, health, and safety protocols, including enabling remote work where needed and practicable, employing social distancing standards, implementing travel restrictions where necessary, enhancing onsite hygiene practices, and instituting visitation restrictions at the Company's facilities, where necessary these operational changes remain in place. Although restrictions imposed by governments around the world have largely been eliminated or loosened, management continues to monitor and respond to the impacts related to COVID-19 on the Company, the overall specialty chemical industry, and the economies and markets in which the Company operates.

Management continues to evaluate how COVID-19-related circumstances, such as remote work arrangements, illness or staffing shortages and travel restrictions, may impact financial reporting processes and systems, internal control over financial reporting, and disclosure controls and procedures. 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.

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 \$2.2 million, \$4.2 million and \$3.7 million during the years ended December 31, 2022, 2021 and 2020, 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 reportable segments presented in this Annual Report reflect the business structure the Company operated with during the periods presented, which was four reportable segments: (i) Americas; (ii) EMEA; (iii) Asia/Pacific; and (iv) Global Specialty Businesses.

In January 2023, the Company reorganized certain of its executive management team to align with a new business structure. This change was made subsequent to December 31, 2022; therefore, the reportable segments presented in this Annual Report on Form 10-K reflect the business structure the Company operated with during the periods presented. Effective beginning in the first quarter of 2023, the Company's new structure will include three reportable segments: (i) Americas; (ii) Europe, Middle East and Africa ("EMEA"); and (iii) Asia/Pacific. 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, 2022, Quaker Houghton had approximately 4,600 full-time employees globally of whom approximately 1,100 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, 2022.

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.

Aligned to our core values, in 2022 we evolved our enterprise-wide approach to volunteerism. Moving forward, all employees will be provided with access to two paid days off per year that can be leveraged to volunteer for local charity organizations, or local chapters of national charity organizations, that seek to improve the conditions and lives of the people living in the communities in which our employees live and work.

Sustainability Governance and 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 Sustainability 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. In addition, the Company established 15 long-term environmental and social 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-term and medium-term milestones that may help support the achievement of our 2030 targets.

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 2021 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 which 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.

Talent and Culture

We strive to make Quaker Houghton a great place to work for all employees. We are committed to creating a workplace where employees feel valued, respected and challenged, while fostering an environment that attracts and engages a talented workforce that contributes to the Company’s growth and sustained success. Our Compensation and Human Resources Committee is responsible for overseeing our policies and strategies related to culture and human capital, including diversity, equity and inclusion.

Our Quaker Houghton University is available to all employees and provides a library of tools and resources for career development and growth. Through ongoing dialogue with leaders, employees are encouraged to plan for their development and leverage the tools available to create meaningful and actionable development plans that drive personal and company growth.

We endeavor to ensure that our leaders of tomorrow are members of the Company today. Leadership capability is critical in supporting our culture of inclusion and collaboration. As such, leaders have access to various structured development and learning experiences. This includes our global management program (“MAP”) which provides guidance on applying sound and consistent management approaches to leading and developing teams. In addition, we provide custom development programs germane to the needs of our leaders today. Recent topics including Financial Acumen for Leaders, Building Resilient Teams and Leading Change.

We continue to invest in processes to help the organization assess and develop talent, including a formalized annual performance evaluation program, an annual critical skills and potential analysis, and succession planning for the organization’s most critical and senior roles.

Additionally, we regularly evaluate our Total Rewards offerings 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 approach while ensuring that we remain competitive in the markets we serve and follow local statutory wage and benefits laws. We pay particular attention to wellness and the well-being of our employees with specific investments on a variety of health related topics including forums for learning, dialogue, and enterprise collaboration. We strive to create a culture where recognition is ingrained within it, and do so by utilization of an enterprise reward and recognition program celebrating and incentivizing the results and behaviors of our employees and their impacts on our teams and company.

Diversity, Equity, and Inclusion (“DEI”)

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 condition, 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. We seek to create an environment where every employee can feel their best allowing them to be their best.

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.

In 2022, we focused on and dedicated investment in our talent acquisition, talent development, and succession planning efforts as a means to diversify our workforce. We have continually provided minority and female leaders the opportunity to attend targeted world-class external development programs that speak to the unique experiences these employees can face in the workplace while investing in their continued growth both personally and professionally. In addition, our core principles of a culture of inclusion are reflected in required employee training programs, which we offer on our policies against harassment and discrimination of any kind.

In 2022 we began a multi-year investment in the Future of STEM Scholars Initiative ("FOSSI"). This program seeks to create pathways for under-represented groups to enter and succeed in the chemical industry. As part of this program, Quaker Houghton has committed to providing meaningful paid summer internships that build knowledge in the student's chosen areas of study along with mentoring conversations with current Quaker Houghton leaders and opportunities for learning more about the industry and business.

We recognize that we are on a journey and, as such, we are working to formalize our DEI strategy as part of our broader investment in culture and engagement. Through partnerships with thought leaders in diversity, equity and inclusion, we intend to continue the journey we have started by expanding our employee resource groups, building processes to support the attraction and development of historically underrepresented talent early in their careers, hosting inclusion training events for all employees, providing forums for feedback and engagement on inclusion and continuing to build on our talent processes that enable change. For example, 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 have launched several "Live Safe" initiatives to create an environment of openness and awareness in which all employees are actively engaged in meeting safety targets. We are keen in reporting near misses, hazard identifications and educating our employees on their "Stop Work Authority", which are seen as leading indicators, helping us to get to zero incidents. Our leading indicators are proactive and preventive measures that can shed light about the effectiveness of safety and health activities and reveal potential problems in a safety and health program. 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 us 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, the Russia and Ukraine conflict, inflation and global supply chain constraints on the Company's business, results of operations, and financial condition, our expectation that we will maintain sufficient liquidity, remain in compliance with the terms of the Company's credit facility, expectations about future demand and raw material costs, 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 impacts on our business as a result of the COVID-19 pandemic;
- the timing and extent of the projected impacts on our business as a result of the Ukrainian and Russian conflict and actions taken by various governments and governmental organizations in response;
- inflationary pressures, cost increases, and the impacts of constraints and disruptions in the global supply chain;
- the potential benefits of acquisitions;
- the potential for a variety of macroeconomic events, including the possibility of global or regional recessions, inflation generally, cost increases in prices of raw materials such as oil and increasing interest rates, to impact the value of our assets or result in asset impairments;
- 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 2022 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 disruptions.

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 inflationary pressures, including the potential for continued significant increases in raw material costs, supply chain disruptions, customer financial instability, rising interest rates and the possibility of economic recession, worldwide economic and political disruptions including the impacts of the military conflict between Russia and Ukraine, the economic and other sanctions imposed by other nations on Russia, suspensions of activities in Russia by many multinational companies and the potential expansion of military activity, 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. Other factors could also adversely affect us, including those related to 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 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. 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 2022, the Company's top five largest customers (each composed of multiple subsidiaries or divisions with semi-autonomous purchasing authority) together accounted for approximately 11% 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 require 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 or technology 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 successfully manage the maturation or obsolescence of our existing products and the introduction of new products successfully.

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. 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 capitalize on 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.

Gulf and its wholly-owned subsidiary, QH Hungary Holdings Limited (together, the "Gulf Affiliates"), remain 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.

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 continue to 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. 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 credit 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.

Our variable rate indebtedness subjects us to interest rate risk, which could cause our debt service obligations to increase significantly or result in an inability to obtain sufficient financing on favorable terms. Additionally, rising interest rates could have a material adverse effect on our business, financial condition, results of operations, or cash flows.

We carry, and will continue to carry for the foreseeable future, a substantial amount of debt and other fixed obligations. Our ability to satisfy these obligations, finance acquisitions and pay dividends rely on our access to capital, which depends in large part on cash flow generated by our business and the availability of debt financing. The Company's principal credit facility permits interest on certain borrowings to be calculated based on the Term Secured Overnight Financing Rate ("Term SOFR"), which exposes us to interest rate risk. See Note 20 of Notes to Consolidated Financial Statements included in Item 8 of this Report.

If interest rates increase, our debt service obligations on the variable rate indebtedness would increase even though the amount borrowed remains the same, which would require us to use more of our available cash to service our indebtedness. In the past, we have entered into certain hedging transactions, such as interest rate swap agreements, to mitigate our exposure to adverse fluctuations in interest rates, and we may do so again in the future. However, we do not currently utilize any such hedging arrangements with respect to interest rates and may not be able to enter into swap agreements or other hedging arrangements in the future.

Rising interest rates, such as those we have recently been experiencing, not only increase our cost of capital but could also have a dampening effect on overall economic activity and the financial condition of the Company's customers, either or both of which could negatively affect customer demand for the Company's products and customers' ability to repay their obligations. Rising interest rates could also cause credit market dislocations, which could have an impact on the Company and its customers' cost of capital.

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 affecting 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"). Although the U.K. and the EU entered into a trade and cooperation agreement, uncertainty remains regarding its implications and implementation, and whether and how any new trade agreements with other countries or territories will be agreed and implemented and how they may impact our business. Brexit could adversely affect political, regulatory, economic or market conditions and contribute to instability in global political institutions, regulatory agencies, and financial markets. Any of these risks might have a materially adverse impact on our business operations and our financial position or results of operations. Similar future trade disruptions or disputes could have a negative impact on our operations within the U.K., EU, and globally.

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 have experienced significant price volatility in 2021 and 2022.

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, 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, 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 COVID-19 pandemic 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, and to a lesser degree in 2022, 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 long 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 comprehensive environmental, health and safety programs, 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, which can be burdensome. 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 regulatory 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. and across our other markets, 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 and regulations 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 and 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, as we determined to be the case in the fourth quarter of 2022, when we recognized a \$93.0 million impairment charge related to our EMEA reportable segment, 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.

If we identify a material weakness in internal control over financial reporting, or if we fail to maintain an effective system of internal controls, we may not be able to accurately determine our financial results or prevent fraud, either of which could have a material effect on us.

Effective internal controls are necessary for us to provide reliable financial reports and effectively prevent fraud. Section 404 of the Sarbanes-Oxley Act of 2002 requires us to evaluate and report on our internal control over financial reporting. We cannot be certain that we will be successful in maintaining adequate internal control over our financial reporting and financial processes in the future. We may in the future discover areas of our internal controls that need improvement. Furthermore, to the extent our business grows or significantly changes, our internal controls may become more complex, and we could require significantly more resources to ensure our internal controls remain effective. In the past, we have identified certain material weaknesses in our internal control over financial reporting, all of which have been previously remediated as of December 31, 2021. If we identify material weaknesses in the future, it could negatively impact our operations or the market value of our common stock. Additionally, the existence of any material weakness may require management to devote significant time and incur significant expense to remediate any such material weaknesses and management may not be able to remediate any such material weaknesses in a timely manner.

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.

In addition, some U.S. state governments have enacted or are considering enacting more stringent laws and regulations protecting personal information and data. For instance, California passed the California Consumer Privacy Act of 2018, (“CCPA”), which went into effect in January 2020. The CCPA gives California residents expanded rights to access and delete their personal information, opt out of certain personal information sharing, and receive detailed information about how their personal information is used. The CCPA provides for civil penalties for violations, as well as for private rights of action for certain data breaches that result in the loss of personal information. In addition, the California Consumer Rights Act (“CPRA”) was recently enacted to strengthen elements of the CCPA and becomes effective January 1, 2023. A number of other states have considered similar privacy proposals, with states like Virginia and Colorado enacting their own privacy laws. These privacy laws and the evolving regulatory environment related to personal data may impact our business activities.

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 leadership, commercial, technical, and other key personnel. Competition for such talent 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 total rewards 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 parties 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 recognized third-party frameworks, 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 armed conflicts or war, including cyber-attacks, natural disasters, widespread public health crises, including the COVID-19 pandemic, or other uncommon global events such as the current war 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 global events such as earthquakes, hurricanes, fires and tsunamis cannot be predicted.

Terrorist attacks, other acts of armed conflicts or war, including cyber-attacks, 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 armed conflicts or war, including cyber-attacks, 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.

Epidemic diseases, similar to COVID-19, 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 COVID-19, which impacted all locations in which the Company does business as well as the Company's customers and suppliers. 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 full extent of the outbreak and business impact of COVID-19 continue to remain uncertain, and 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.

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, Netherlands; Dortmund, Germany; Barbera, Spain; Bera, Spain; Santa Perpetua de Mogoda, 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; Dahej, India; Rayong, Thailand; and Moorabbin, Australia. The Company's Global Specialty Businesses segment operates out of its principal facilities in Aurora, Illinois; Cleveland, Ohio; Santa Fe Springs, California; Batavia, New York; Waukegan, Illinois; Zion, Illinois; Madison Heights, Michigan; Lewisburg, Tennessee; Coventry, U.K; Broms Grove, U.K.; Monheim am Rhein, Germany; Chongqing, China; Shanghai, China; and Perth, Australia. With the exception of the Conshohocken, Santa Fe Springs, Madison Heights, Lewisburg, Aurora, Karlshamn, Rayong, and Coventry sites, which are leased, the remaining principal facilities are owned by the Company and, as of December 31, 2022, 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 300 to 65,000 gallons, and processing or manufacturing vessels ranging from 1 to 54 at each location with capacities ranging from 2 to 45,000 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, Melissa Leneis, and Dhruwa Rai) 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, 56 Chief Executive Officer and President	Mr. Tometich, who has been employed by the Company since October 2021, has served as Chief Executive Officer and President since December 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 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, 51 Chief Commercial Officer	Mr. Berquist, who has been employed by the Company since 1997, has served as Chief Commercial Officer since January 1, 2023. Prior to that role, he served as Executive Vice President, Chief Strategy Officer, and Managing Director, Global Specialty Businesses from September 2021 until December 2022. Additionally, he served as Interim Managing Director of EMEA from August 2022 through December 2022. Before that, he served as Senior Vice President, Global Specialty Businesses and Chief Strategy Officer from August 2019 to September 2021. Mr. Berquist served as Vice President and Managing Director – North America from April 2010 until July 2019.
Jeewat Bijlani, 46 Chief Strategy Officer	Mr. Bijlani, who has been employed by the Company since August 2019, has served as Chief Strategy Officer since January 1, 2023. Prior to that role, he served as Senior Vice President, Managing Director - Americas from August 2019 until December 2022. 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, 41 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 2021. Prior to that role, he served as Vice President, Finance and Chief Accounting Officer from August 2019 until April 2021. He served as Global Controller and Principal Accounting Officer from September 2014 until July 2019.

Name, Age, and Present Position with the Company	Business Experience During the Past Five Years and Period Served as an Officer
Melissa Leneis, 40 Senior Vice President, Chief Human Resources Officer	Ms. Leneis has served as Senior Vice President, Chief Human Resources Officer since she joined the Company in July 2022. Prior to joining the Company, Ms. Leneis served as Executive Vice President and Chief Human Resources Officer at InterDigital, Inc. from October 2019 through June 2022. Prior to that role, she served in various Human Resources leadership roles at InterDigital. Prior to joining InterDigital, Ms. Leneis was responsible for leading global teams of Human Resources business partners at Johnson Controls (formerly Tyco International), from October 2012 through September 2018. Her previous experience also includes Human Resources leadership positions with MEI, Inc. (formerly Mars) and Lockheed Martin Corporation.
Wilbert Platzer, 61 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.
Dhruwa Rai, 53 Senior Vice President, Chief Information Digital Officer	Mr. Rai has served as Senior Vice President, Chief Information Digital Officer since he joined the Company in July 2022. Prior to joining the Company, Mr. Rai served as Chief Digital Technology Officer for the American Cancer Society from August 2021 to June 2022 and Goodwill Industries International from April 2020 to August 2021. Prior to these roles, Mr. Rai served as Chief Digital Officer and Global Chief Information Officer for Ball Aerospace & Packaging Corporation from May 2016 to January 2020.
Dr. David Slinkman, 58 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.
Robert T. Traub, 58 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, 38 Vice President, Chief Accounting Officer	Mr. Will, who has been employed by the Company since 2014, has served as Vice President, Chief Accounting Officer since April 2022. Prior to that role, Mr. Will served as the Vice President, Global Controller and Principal Accounting Officer from April 2021 until March 2022. Previously, he served as Corporate Controller from August 2019 until April 2021 and 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 \$1.70 per share of outstanding common stock or \$30.5 million during the year ended December 31, 2022 and \$1.62 per share of outstanding common stock or \$29.0 million during the year ended December 31, 2021. In February and May 2022, our Board declared quarterly cash dividends of \$0.415 per share of outstanding common stock, payable to shareholders of record in April 2022 and July 2022, respectively. Subsequently, our Board declared quarterly dividends of \$0.435 per share of outstanding common stock in August and November 2022, respectively, payable to shareholders of record in October 2022 and January 2023, respectively. We currently expect to continue paying 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 \$75.0 million annually and 25% of consolidated EBITDA and there must be 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, 2023, 17,950,625 shares of Quaker common stock were issued and outstanding and were held by 621 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.

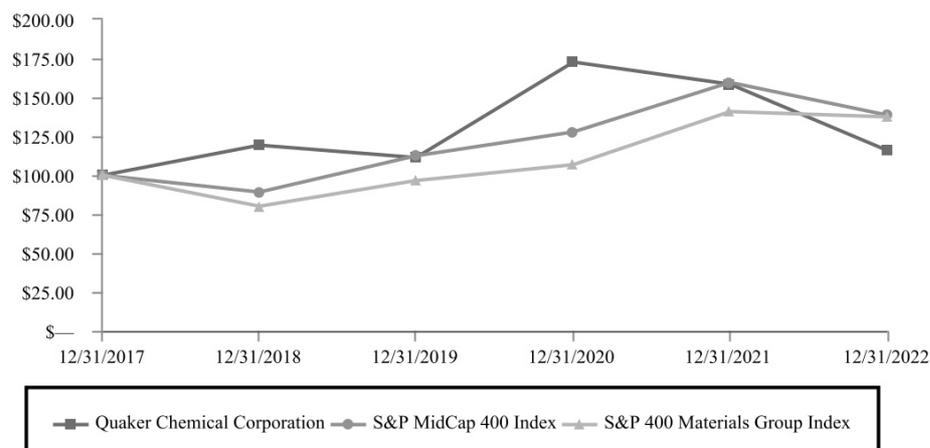
The following table sets forth information concerning shares of the Company’s common stock acquired by the Company during the fourth quarter of 2022 for the period covered by this report:

Period	<u>Issuer Purchases of Equity Securities</u>			
	(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, 2022	1,269	\$ 138.89	—	\$ 86,865,026
November 1 - November 30, 2022	—	\$ —	—	\$ 86,865,026
December 1 - December 31, 2022	253	\$ 166.90	—	\$ 86,865,026
Total	1,522	\$ 143.55	—	\$ 86,865,026

- (1) All of these shares were acquired from employees 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 awards or units.
- (2) The price 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, 2022.

Stock Performance Graph: The following graph compares the cumulative total return (assuming reinvestment of dividends) from December 31, 2017 to December 31, 2022 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, 2017 in each of Quaker’s common stock, the stocks comprising the MidCap Index and the Materials Group Index, respectively.

Comparison of Cumulative Five Year Total Return



	12/31/2017	12/31/2018	12/31/2019	12/31/2020	12/31/2021	12/31/2022
Quaker Chemical Corp.	\$ 100.00	\$ 118.90	\$ 110.99	\$ 172.48	\$ 158.13	\$ 115.58
S&P MidCap 400 Index	100.00	88.92	112.21	127.54	159.12	138.34
S&P 400 Materials Group Index	100.00	79.63	96.25	106.50	140.82	136.97

Item 6. 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 "Combination" refers to the Quaker combination with Houghton International, Inc. ("Houghton").

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, container, 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, 2022 was a successful year as the Company navigated through a challenging financial, economic and geopolitical backdrop, which included the direct and indirect impacts of the ongoing war in Ukraine, Zero-COVID policies in China, significant raw material cost escalation, inflationary pressures on manufacturing and generally, all other global costs, supply chain and logistics challenges, and significant foreign currency volatility. Net sales of \$1,943.6 million in 2022 increased 10% compared to \$1,761.2 million in 2021, primarily due to increases from selling price and product mix of approximately 22% and additional net sales from acquisitions of 1%, partially offset by a 7% decline in organic sales volumes and an unfavorable impact from foreign currency translation of 6%. The increase in selling price and product mix was primarily the result of strategic price increases implemented to offset the ongoing inflationary pressures that began at the onset of 2021 and continued throughout 2022. The decline in organic sales volumes compared to 2021 was primarily a result of softer end market conditions, particularly in Europe and Asia/Pacific, the wind-down of the tolling agreement for products previously divested related to the Combination and the direct and indirect impacts of the ongoing war in Ukraine, partially offset by higher volumes due to net new business wins.

The Company had a net loss of \$15.9 million or \$0.89 per diluted share in 2022, compared to net income of \$121.4 million or \$6.77 per diluted share in 2021. The Company's reported net loss in 2022 primarily reflects a non-cash goodwill impairment charge of \$93.0 million in the fourth quarter related to the EMEA reportable segment. Excluding this and other non-recurring or non-core items in each period, the Company's current year non-GAAP net income and non-GAAP earnings per diluted share were \$105.3 million and \$5.87, respectively, compared to \$122.8 million and \$6.85, respectively, in 2021. The Company generated adjusted EBITDA of \$257.2 million compared to \$274.1 million in 2021. The lower year-over-year adjusted EBITDA was primarily a result of higher net sales which were offset by lower gross margins driven by higher raw material costs, higher manufacturing and other input costs, the impacts of disruptions in the global supply chain experienced in 2022, and 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 lower year-over-year non-GAAP net income and non-GAAP earnings per diluted share were also impacted by higher interest expense and tax expense in 2022. See the Non-GAAP Measures section of this Item below.

The Company's 2022 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 as each of the Company's reportable segments net sales benefited from double-digit year-over-year increases in selling price and product mix, while those increases in net sales were partially offset by the significant and unfavorable impact of foreign currency translation in the EMEA, Asia/Pacific and Global Specialties Businesses. All geographic segments had lower organic sales volumes; however, organic sales volumes for the Global Specialty Businesses increased in 2022 compared to the prior year due to improved demand. Operating earnings for the Global Specialty Businesses and Americas increased due to higher net sales and an improvement in margins. Operating earnings declined slightly in Asia/Pacific due to slightly lower margins and a strong comparison in the first half of 2021. EMEA operating earnings declined compared to the prior year due to the persistent and significant inflationary pressures on raw materials and other costs and the negative impact of foreign currency translation, partially offset by price realization. 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 \$41.8 million in 2022 compared to \$48.9 million in 2021. The decrease in net operating cash flow year-over-year was primarily driven by a lower operating performance in 2022 compared to 2021 coupled with significant working capital investments in each year. 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 delivered solid results in 2022, primarily due to strong price realization, as a result of the Company's ongoing value-based pricing initiatives, and positive net new business wins, in the face of extreme economic headwinds. Looking ahead to 2023, we believe the business is well positioned to continue to outpace market growth rates by delivering value-added solutions and services to its customers. The Company is committed to improving its margins as we progress through 2023, through both price and cost actions, while balancing customer relationships with the value we provide and the overall raw material environment and customer relationships. Additionally, the Company expects to continue to invest in its long-term growth including advancing its customer intimate strategy, progressing with its sustainability program and positioning the Company to deliver earnings growth in 2023 and beyond.

On-going impact of COVID-19

During 2022, the direct and indirect effects of COVID-19 continued to negatively impact the Company's business operations, as well as those of its customers and suppliers, including increased costs and decreased availability of labor and raw materials. The Company's top priority, especially during this pandemic, has been to protect the health and safety of its employees and customers, while working to ensure business continuity and meet its customers' needs. In response, the Company implemented additional operational, health, and safety protocols, including enabling remote work where needed and practicable, employing social distancing standards, implementing travel restrictions where necessary, enhancing onsite hygiene practices, and instituting visitation restrictions at the Company's facilities; where necessary, these operational changes remain in place. 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. Although restrictions imposed by governments around the world have largely been eliminated or loosened, management continues to monitor and respond to the impacts related to COVID-19 on the Company, the overall specialty chemical industry, and the economies and markets in which the Company and its customers and suppliers operate.

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. 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.

Impact of Political Conflicts

A significant portion of the Company's revenues and earnings are generated by non-U.S. operations. This subjects the Company to political and economic risks that could adversely affect the Company's business, liquidity, financial position and results of operations. The existence of military conflicts, for example the ongoing war between Russia and Ukraine, bring inherent risks such as the potential for supply chain disruptions, increased costs of resources including oil, decreased trade activity and other consequences related to economic or other sanctions. The U.S. government and other nations have imposed significant restrictions on most companies' ability to do business in Russia as a result of the war between Russia and Ukraine. It is not possible to predict the broader or longer-term consequences of this conflict, which could include further sanctions, embargoes, regional instability, geopolitical shifts and adverse effects on macroeconomic conditions, security conditions, currency exchange rates and financial markets. The war between Russia and Ukraine has had a negative impact on the Company's ability to sell to, ship products to, collect payments from, and support customers in certain regions based on trade restrictions, embargoes and export control law restrictions, and logistics restrictions including closures of air space. If this conflict continues or expands, it could increase the costs, risks and adverse impacts from these new challenges. The Company and its customers and suppliers may also be the subject of increased cyber-attacks.

During the second quarter of 2022, the Company decided to cease its operations in Russia. The Company's operations in the conflict areas including Russia, Ukraine, and Belarus historically represented less than 2% of the Company's consolidated net sales and less than 1% of the Company's consolidated total assets. The Company's primary exposure in the conflict areas related to outstanding customer accounts receivable. The Company is actively monitoring its outstanding Russian receivables for collections and has recorded incremental allowances for credit losses where warranted.

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, credit losses, 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: The Company establishes allowances for credit losses 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 credit losses was \$13.5 million and \$12.3 million as of December 31, 2022 and 2021, respectively. The Company recorded expense to increase its provision for credit losses by \$4.3 million, \$0.7 million and \$3.6 million for the years ended December 31, 2022, 2021 and 2020, 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 \$0.4 million, \$0.1 million and \$0.4 million for the years ended December 31, 2022, 2021 and 2020, respectively. See Note 13 of Notes to Consolidated Financial Statements in Item 8 of this Report.

Tax exposures, uncertain tax positions and valuation allowances: The Company records expenses and liabilities for taxes based on estimates of amounts that will be determined as deductible or taxable 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, such as taxable income 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.

The Company 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, 2022, \$6.9 million in installments have been paid with the remaining \$8.6 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 certain undistributed earnings are ultimately remitted to the U.S. As of December 31, 2022, the Company has a deferred tax liability of \$6.8 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, 2022 was approximately \$424.7 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, the weighted average cost of capital ("WACC"), 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 December 31, 2022 and 2021 was \$515.0 million and \$631.2 million, respectively. The Company has four indefinite-lived intangible assets totaling \$189.1 million as of December 31, 2022, including \$188.0 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 \$196.9 million as of December 31, 2021.

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 as of October 1, 2022 and concluded no impairment charge was warranted. The Company continually evaluates financial performance, economic conditions and other recent developments in assessing if a triggering event indicates that the carrying values of goodwill, indefinite-lived, or long-lived assets are impaired.

During the fourth quarter of 2022, subsequent to the Company completing its annual impairment test as of October 1, 2022, the Company concluded that the continued negative impacts of the aforementioned events, most notably the continued rise in interest rates which led to an increase in the Company's cost of capital, as well as lower than expected financial performance driven by the ongoing lag in margin recovery represented an additional triggering event for the Company's EMEA reporting unit and the associated goodwill, as well as the related asset group. As a result of this conclusion, the Company completed an interim impairment assessment as of December 31, 2022 for its EMEA reporting unit and the related asset group. The Company concluded that the undiscounted cash flows exceeded the carrying value of the long-lived assets, and it was not more likely than not that an impairment exists. In completing a quantitative goodwill impairment test, the Company compares the reporting unit's fair value, primarily based on future discounted cash flows, to its carrying value in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable judgment and are based upon certain significant assumptions including the WACC as well as projected EBITDA, which includes assumptions related to revenue growth rates, gross margin levels and operating expenses. As a result of the impact of financial, economic, and geopolitical conditions driving a decrease in EMEA earnings in the current year, the impact of the current year decline on projected future earnings, as well as an increase in the WACC assumption utilized in this fourth quarter interim quantitative impairment assessment, the Company concluded that the estimated fair value of the EMEA reporting unit was less than its carrying value. As a result, a non-cash impairment charge of \$93.0 million to write down the carrying value of the EMEA reporting unit Goodwill to its estimated fair values was recorded in the fourth quarter of 2022. After this impairment charge, as of December 31, 2022, goodwill for the EMEA reporting unit was \$34.6 million.

In completing the interim quantitative impairment assessment, the Company used a WACC assumption of approximately 12.0% and holding all other assumptions constant, the WACC would have to increase by approximately 0.8 percentage points before the Company's EMEA reporting unit's remaining goodwill would be fully impaired. In addition, holding EBITDA margins and all other assumptions constant, the Company's compound annual revenue growth rate during the entire projection period would need to decline by approximately 1.6 percentage points before the Company's EMEA reporting unit's remaining goodwill would be fully impaired. Similarly, holding revenue growth rates and all other assumptions constant, the Company's average EBITDA margins throughout the discreet projection period would need to decline by approximately 2.3 percentage points before the Company's EMEA reporting unit's remaining goodwill would be fully impaired.

Notwithstanding the results of the Company's annual and trigger based interim impairment assessments during 2022 and the goodwill impairment charge taken in the fourth quarter of 2022, if the Company is unable to successfully implement actions aimed at more than offsetting raw material costs and ongoing inflationary pressures and the financial performance of the EMEA reporting unit declines further, or interest rates continue to rise and this leads to an increase in the cost of capital, then it is possible these financial, economic and geopolitical conditions could result in another triggering event for the EMEA reporting unit in the future and could potentially lead to an additional impairment of the EMEA reporting unit's remaining goodwill or other indefinite-lived or long-lived assets. See Note 16 of Notes to Consolidated Financial Statements in Item 8 of this Report.

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

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, 2022, the Company had cash, cash equivalents and restricted cash of \$181.0 million. Total cash, cash equivalents and restricted cash was \$165.2 million at December 31, 2021. The \$15.8 million increase in cash and cash equivalents was the net result of \$41.8 million of cash provided by operating activities and \$24.7 million of cash provided by financing activities partially offset by \$40.2 million of cash used in investing activities and approximately \$10.5 million of negative impacts due to the effect of foreign currency translation on cash.

Net cash flows provided by operating activities were \$41.8 million in 2022 compared to \$48.9 million in 2021. The Company's slightly lower current year net operating cash flow was primarily driven by lower earnings in 2022 as compared to 2021, partially offset by a lower working capital investment year-over-year. While the Company experienced ongoing working capital investment in 2022, the amount decelerated as compared to 2021. The year-over-year increase in net sales was larger in 2021 than in 2022, resulting in a smaller increase in accounts receivable in the current year. In addition, during 2022, the Company utilized certain non-income tax credits which were recognized during 2021, resulting in a decrease in working capital during the current year. Lastly, during 2021 there was a larger increase in inventory as a result of higher costs and, to a lesser extent, a build in certain inventory in response to global supply chain and logistics challenges, however, this larger prior year increase in inventory was partially offset by higher levels of accounts payable in the prior year as well, due to timing of purchases.

Net cash flows used in investing activities were \$40.2 million in 2022 compared to \$49.1 million in 2021. This \$8.9 million decrease in cash outflows used in investing activities was due to lower cash payments related to acquisitions as a result of the level of acquisition activity in each year, partially offset by lower cash proceeds from the disposition of assets which includes the sale of certain held-for-sale real property assets related to the Combination, and higher capital expenditures in the current year largely related to certain infrastructure and sustainability-related spending.

Net cash flows provided by financing activities were \$24.7 million in 2022 compared to net cash flows used in financing activities of \$13.5 million in 2021. The \$38.1 million increase in net cash inflows from financing activities was primarily driven by an increase in borrowings in the current year under the Company's primary credit facility (described below), including the impact of new borrowings, net of repayments of old borrowings and current year debt issuance costs, related to the June 2022 credit facility amendment. In addition, the Company paid \$30.1 million of cash dividends during 2022, a \$1.5 million or 5.3% increase in cash dividends compared to the prior year due to cash dividend per share increases.

The Company, its wholly owned subsidiary, Quaker Chemical B.V., as borrowers, Bank of America, N.A., as administrative agent, U.S. Dollar swing line lender and letter of credit issuer, and the other lenders party thereto, entered into a credit agreement on August 1, 2019, as amended (the "Original Credit Facility"). The Original Credit Facility was comprised of a \$400.0 million multicurrency revolver (the "Original Revolver"), a \$600.0 million term loan (the "Original 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 "Original EURO Term Loan"), with Quaker Chemical B.V., a Dutch subsidiary of the Company as borrower, each with a five-year term, maturing in August 2024.

During June 2022, the Company, and its wholly owned subsidiary, Quaker Houghton B.V., as borrowers, Bank of America, N.A., as administrative agent, U.S. Dollar swing line lender and letter of credit issuer, Bank of America Europe Designated Active Company, as Euro Swing Line Lender, certain guarantors and other lenders entered into an amendment to the Original Credit Facility (the "Amended Credit Facility"). The Amended Credit Facility established (A) a new \$150.0 million Euro equivalent senior secured term loan (the "Amended Euro Term Loan"), (B) a new \$600.0 million senior secured term loan (the "Amended U.S. Term Loan"), and (C) a new \$500.0 million senior secured revolving credit facility (the "Amended Revolver"). The Company has the right to increase the amount of the Amended Credit Facility by an aggregate amount not to exceed the greater of \$300.0 million or 100% of Consolidated EBITDA, subject to certain conditions. In addition, the Amended Credit Facility also:

- (i) eliminated the requirement that material foreign subsidiaries must guaranty the Original Euro Term Loan;
- (ii) replaced the U.S. Dollar borrowings reference rate from LIBOR to Term SOFR;
- (iii) extended the maturity date of the Original Credit Facility from August 2024 to June 2027; and

(iv) effected certain other changes to the Original Credit Facility as set forth in the Amended Credit Facility.

The Company used the proceeds of the Amended Credit Facility to repay all outstanding loans under the Original Credit Facility, unpaid accrued interest and fees on the closing date under the Original Credit Facility and certain expenses and fees. U.S. Dollar-denominated borrowings under the Amended Credit Facility bear interest, at the Company's election, at the base rate or term SOFR plus an applicable rate ranging from 1.00% to 1.75% for Term SOFR loans and from 0.00% to 0.75% for base rate loans, depending upon the Company's consolidated net leverage ratio. Loans based on term SOFR also include a spread adjustment equal to 0.10% per annum. Borrowings under the Amended Credit Facility denominated in currencies other than U.S. Dollars bear interest at the alternative currency term rate plus the applicable rate ranging from 1.00% to 1.75%

The Amended Credit Facility contains affirmative and negative covenants, financial covenants and events of default, including without limitation 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 share purchases; and (d) dispositions of assets. Dividends and share repurchases are permitted in annual amounts not exceeding the greater of \$75 million annually and 25% of consolidated EBITDA if there is no default. If the consolidated net leverage ratio is less than 2.50 to 1.00, then the Company is no longer subject to restricted payments.

Financial covenants contained in the Amended Credit Facility include a consolidated interest coverage ratio test and a consolidated net leverage ratio test. The consolidated net leverage ratio at the end of a quarter may not be greater than 4.00 to 1.00, subject to a permitted increase during a four-quarter period after certain acquisitions. The Company has the option of replacing the consolidated net leverage ratio test with a consolidated senior net leverage ratio test if the Company issues certain types of unsecured notes, subject to certain limitations. Events of default in the Amended Credit Facility include without limitation defaults for non-payment, breach of representations and warranties, non-performance of covenants, cross-defaults, insolvency, and a change of control in certain circumstances. The occurrence of an event of default under the Amended Credit Facility could result in all loans and other obligations becoming immediately due and payable and the Amended Credit Facility being terminated. As of December 31, 2022 and December 31, 2021, the Company was in compliance with all of the Amended and Original Credit Facility covenants.

The weighted average variable interest rate incurred on the outstanding borrowings under the Original Credit Facility and the Amended Credit Facility during the twelve months ended December 31, 2022 was approximately 3.0%. As of December 31, 2022, the interest rate on the outstanding borrowings under the Amended Credit Facility was approximately 4.9%. In addition to paying interest on outstanding principal under the Original Credit Facility, the Company was required to pay a commitment fee ranging from 0.2% to 0.3% depending on the Company's consolidated net leverage ratio under the Original Revolver in respect of the unutilized commitments thereunder. As part of the Amended Credit Facility, the Company is required to pay a commitment fee ranging from 0.150% to 0.275% related to unutilized commitments under the Amended Revolver, depending on the Company's consolidated net leverage ratio.

The Company previously capitalized \$23.7 million of certain third-party debt issuance costs in connection with executing the Original Credit Facility. Approximately \$15.5 million of the capitalized costs were attributed to the Original 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 Original 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 Original Credit Facility. Prior to executing the Amended Credit Facility, as of December 31, 2021, the Company had \$8.0 million of debt issuance costs recorded as a reduction of Long-term debt attributable to the Original Credit Facility and \$4.3 million of debt issuance costs recorded within Other assets attributable to the Original Credit Facility.

In connection with executing the Amended Credit Facility, the Company recorded a loss on extinguishment of debt of approximately \$6.8 million which includes the write-off of certain previously unamortized deferred financing costs as well as a portion of the third-party and creditor debt issuance costs incurred to execute the Amended Credit Facility. Also, in connection with executing the Amended Credit Facility, during the second quarter of 2022, the Company capitalized \$2.2 million of certain third-party and creditor debt issuance costs. Approximately \$0.7 million of the capitalized costs were attributed to the Amended Euro Term Loan and Amended U.S. Term Loan. These costs were recorded as a direct reduction of Long-term debt on the Consolidated Balance Sheet. Approximately \$1.5 million of the capitalized costs were attributed to the Amended Revolver and recorded within Other assets on the Consolidated Balance Sheet. These capitalized costs, as well as the previously capitalized costs that were not written off will collectively be amortized into Interest expense over the five year term of the Amended Credit Facility. As of December 31, 2022, the Company had \$2.0 million of debt issuance costs recorded as a reduction of Long-term debt on the Consolidated Balance Sheet and \$4.3 million of debt issuance costs recorded within Other assets on the Consolidated Balance Sheet.

The Original 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 Original 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 Original Credit Facility, based on the Company's consolidated net leverage ratio. In October 2022, the Company's interest rate swap contracts expired. Upon expiration, the Company received a cash payment from the counterparties of \$0.2 million. See Note 25 of Notes to Consolidated Financial Statements.

As of December 31, 2022, the Company had Amended Credit Facility borrowings outstanding of \$943.5 million. The Company had unused capacity under the Amended Revolver of approximately \$301 million, which is net of bank letters of credit of approximately \$3 million, as of December 31, 2022. The Company's other debt obligations are primarily industrial development bonds, bank lines of credit and municipality-related loans, which totaled \$11.3 million as of December 31, 2022. Total unused capacity under these arrangements as of December 31, 2022 was approximately \$35 million. The Company's total net debt as of December 31, 2022 was \$773.8 million.

The Company incurred \$11.0 million of total Combination, integration and other acquisition-related expenses in 2022, which includes \$2.4 million of other expense related to an indemnification asset and is net of a \$0.2 million gain on the sale of certain held-for-sale real property assets, described in the Non-GAAP Measures section of this Item below. The Company had aggregate net cash outflows of approximately \$13.3 million related to Combination, integration and other acquisition-related expenses during 2022. Comparatively, in 2021, the Company incurred \$18.6 million of total Combination, integration and other acquisition-related expenses, including \$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, as well as a \$0.6 million of other income related to an indemnification asset. Net cash outflows related to these costs were approximately \$20.6 million during 2021.

During 2022, the Company incurred \$14.4 million of strategic planning expenses. The Company expects that these additional operating costs and associated cash flows, as well as higher capital expenditures related to strategic planning, process optimization and the next phase of the Company's long-term integration to further optimize its footprint, processes and other functions will continue in 2023 and extend into the next several years.

Quaker Houghton's management approved, and the Company initiated, a global restructuring plan (the "QH Program") in 2019 as part of its planned cost synergies associated with the Combination. The QH Program included 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. As of December 31, 2022, the Company has substantially completed all of the initiatives under the QH Program with only an immaterial amount of remaining severance still to be paid, which is expected to be completed during 2023.

In response to current macroeconomic headwinds and softer operating conditions in 2022, the Company's Management initiated a global cost and optimization program to improve its cost structure and drive a more profitable and productive organization. This program has and will include certain restructuring activities as part of the plan to further optimize and strengthen the Company's footprint, optimize the go-to-market strategy, simplify the portfolio and organization, and enable the Company to deliver on its strategic plan. During the fourth quarter of 2022, initial actions under this program included restructuring and associated severance costs to reduce headcount by approximately 40 positions globally. These headcount reductions began in the fourth quarter of 2022 and are expected to be completed in 2023. The Company is continuing to evaluate and expects to implement further actions under this program, and as a result, additional headcount reductions and restructuring costs may be incurred in the future. Under the Company's restructuring programs, employee separation benefits varied depending on local regulations within certain foreign countries and included severance and other benefits. The exact timing to complete all actions and final costs associated will depend on a number of factors and are subject to change.

The Company recognized \$3.2 million, \$1.4 million and \$5.5 million of restructuring and related charges for the years ended December 31, 2022, 2021 and 2020, respectively, as a result of these programs. The Company made cash payments related to the settlement of restructuring liabilities for these programs of \$1.5 million and \$5.3 million during the years ended December 31, 2022 and 2021, respectively.

As of December 31, 2022, the Company's gross liability for uncertain tax positions, including interest and penalties, was \$20.3 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 \$6.1 million as a result of offsetting benefits in other tax jurisdictions. During 2021, the Company recorded \$13.1 million of non-income tax credits for certain of its Brazilian subsidiaries. The Company utilized these credits to offset certain Brazilian federal tax payments during 2022. See Note 26 of Notes to Consolidated Financial Statements in Item 8 of this Report.

During 2021, two of the Company's locations suffered property damage as a result of flooding and electrical fire, respectively. The Company maintains property insurance for all of its locations globally. The Company, its insurance adjuster, and insurance carrier are actively managing the remediation and restoration activities associated with each of these events. Based on all available information and discussions with its insurance adjuster and insurance carrier, that the losses incurred during 2021 are expected to be covered under the Company's property insurance coverage, net of an aggregate deductible of \$2.0 million. To date, the Company has received payments from its insurers of \$4.6 million and has recorded an insurance receivable associated with these events of \$0.2 million as of December 31, 2022. The Company and its insurance carrier continue to review 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, 2022. 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, payments for restructuring activities including further strategic and optimization initiatives, 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 and other events 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, 2022, and the effect such obligations are expected to have on its liquidity and cash flows in future periods. Pension and postretirement plan contributions beyond 2022 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, 2022.

<i>(dollars in thousand)</i>	Payments due by period						
	Total	2023	2024	2025	2026	2027	2028 and Beyond
Long-term debt (See Note 20 of Notes to Consolidated Financial Statements)	\$ 954,240	\$ 19,063	\$ 23,740	\$ 37,745	\$ 37,705	\$ 825,964	\$ 10,02
Interest obligations (See Note 20 of Notes to Consolidated Financial Statements)	196,374	45,771	44,745	43,263	41,438	20,982	17
Capital lease obligations (See Note 6 of Notes to Consolidated Financial Statements)	813	210	25	186	196	16	18
Operating leases (See Note 6 of Notes to Consolidated Financial Statements)	45,002	13,551	11,149	7,266	5,280	2,457	5,29
Purchase obligations	5,756	5,687	69	—	—	—	—
Non-current income taxes payable (See Note 10 and Note 22 of Notes to Consolidated Financial Statements)	8,883	—	—	—	—	—	8,88
Pension and other postretirement plan contributions (See Note 21 of Notes to Consolidated Financial Statements)	13,187	13,187	—	—	—	—	—
Other long-term liabilities (See Note 22 of Notes to Consolidated Financial Statements)	9,148	—	—	—	—	—	9,14
Total contractual cash obligations	\$ 1,233,403	\$ 97,469	\$ 79,728	\$ 88,460	\$ 84,619	\$ 849,419	\$ 33,70

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.

Certain of the prior period non-GAAP financial measures presented in the following tables have been adjusted to conform with current period presentation. 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,		
	2022	2021	2020
Operating income	\$ 52,304	\$ 150,466	\$ 59,360
Combination, restructuring and other acquisition-related expenses (a)	11,975	26,845	36,213
Strategic planning expenses (b)	14,446	—	—
Executive transition costs (c)	2,813	2,986	—
Russia-Ukraine conflict related expenses (k)	2,487	—	—
Facility remediation (recovery) costs, net (d)	—	1,509	—
Impairment charges (e)	93,000	—	38,000
Other charges (j)	866	819	463
Non-GAAP operating income	\$ 177,891	\$ 182,625	\$ 134,036
Non-GAAP operating margin (%) (p)	9.2 %	10.4 %	9.5 %

**EBITDA, Adjusted EBITDA, Adjusted EBITDA Margin and Non-GAAP
Net Income Reconciliations**

	For the years ended December 31,		
	2022	2021	2020
Net (loss) income attributable to Quaker Chemical Corporation	\$ (15,931)	\$ 121,369	\$ 39,658
Depreciation and amortization (a)(n)	81,514	87,728	84,494
Interest expense, net	32,579	22,326	26,603
Taxes on income (loss) before equity in net income of associated companies (o)	24,925	34,939	(5,296)
EBITDA	123,087	266,362	145,459
Equity income in a captive insurance company (f)	1,427	(4,993)	(1,151)
Combination, restructuring and other acquisition-related expenses (a)	14,153	20,151	35,305
Strategic planning expenses (b)	14,446	—	—
Executive transition costs (c)	2,813	2,986	—
Facility remediation (recovery) costs, net (d)	(1,804)	2,066	—
Impairment charges (e)	93,000	—	38,000
Pension and postretirement benefit (income) costs, non-service components (g)	(1,704)	(759)	21,592
Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery (h)	—	—	(18,144)
Brazilian non-income tax credits (i)	—	(13,087)	—
Russia-Ukraine conflict related expenses (k)	2,487	—	—
Loss on extinguishment of debt (l)	6,763	—	—
Other charges (j)	2,482	1,383	913
Adjusted EBITDA	<u>\$ 257,150</u>	<u>\$ 274,109</u>	<u>\$ 221,974</u>
Adjusted EBITDA margin (%) (p)	13.2 %	15.6 %	15.7 %
Adjusted EBITDA	\$ 257,150	\$ 274,109	\$ 221,974
Less: Depreciation and amortization - adjusted (a)	81,514	87,002	83,732
Less: Interest expense, net	32,579	22,326	26,603
Less: Taxes on income (loss) before equity in net income of associated companies - adjusted (m)(o)	37,737	41,976	26,488
Non-GAAP net income	<u><u>\$ 105,320</u></u>	<u><u>\$ 122,805</u></u>	<u><u>\$ 85,151</u></u>

Non-GAAP Earnings per Diluted Share Reconciliations

	For the years ending December 31,		
	2022	2021	2020
GAAP earnings per diluted share attributable to Quaker Chemical Corporation common shareholders	\$ (0.89)	\$ 6.77	\$ 2.22
Equity income in a captive insurance company per diluted share (f)	0.08	(0.28)	(0.07)
Combination, restructuring and other acquisition-related expenses per diluted share (a)	0.62	0.89	1.55
Strategic planning expenses per diluted share (b)	0.63	—	—
Executive transition costs per diluted share (c)	0.12	0.13	—
Facility remediation (recovery) costs, net per diluted share (d)	(0.08)	0.09	—
Impairment charges per diluted share (e)	5.19	—	1.65
Pension and postretirement benefit costs, non-service components per diluted share (g)	(0.08)	(0.04)	0.79
Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery per diluted share (h)	—	—	(0.78)
Brazilian non-income tax credits per diluted share (i)	—	(0.46)	—
Russia-Ukraine conflict related expenses per diluted share (k)	0.12	—	—
Loss on extinguishment of debt per diluted share (l)	0.29	—	—
Other charges per diluted share (i)	0.13	0.07	0.04
Impact of certain discrete tax items per diluted share (m)	(0.26)	(0.32)	(0.62)
Non-GAAP earnings per diluted share (q)	\$ 5.87	\$ 6.85	\$ 4.78

- (a) Combination, restructuring and other acquisition-related expenses include certain legal, financial, and other advisory and consultant costs incurred in connection with the Combination integration activities including internal control readiness and remediation. These amounts also include expense associated with the Company's other recent acquisitions, including certain legal, financial, and other advisory and consultant costs incurred in connection with due diligence as well as costs associated with selling inventory from acquired businesses which was adjusted to fair value as part of purchase accounting. These costs are not indicative of the future operating performance of the Company. Approximately \$0.2 million, \$0.6 million and \$1.5 million for the years ended December 31, 2022, 2021 and 2020, 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 and 2020, the Company recorded \$0.7 million and \$0.8 million, respectively, of accelerated depreciation related to certain of the Company's facilities, which is included in the caption "Combination, restructuring 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 2022, 2021 and 2020, the Company recorded \$2.4 million of other expense and, \$0.6 million and \$0.8 million, respectively, of other income related to an indemnification asset. During 2022, 2021 and 2020, the Company recorded restructuring and related charges of \$3.2 million, \$1.4 million and \$5.5 million, respectively. During 2021 and 2020, the Company recorded \$0.8 million and \$0.2 million, respectively, related to the sale of inventory from acquired businesses which was adjusted to fair value. During 2022, 2021 and 2020, the Company recorded a gain of \$0.2 million, 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 "Combination, restructuring and other acquisition-related 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 Notes 2, 7, 9 and 10 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.
- (b) Strategic planning expenses include certain consultant and advisory expenses for the Company's long-term strategic planning, as well as process optimization and the next phase of the Company's long-term integration to further optimize its footprint, processes and other functions. These costs are not indicative of the future operating performance of the Company.
- (c) 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 occurred in 2021 as well as the, hiring and transition for other officers during 2022. These expenses are one-time in nature and are not indicative of the future operating performance of the Company.

- (d) Facility remediation (recovery) 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.
- (e) Impairment charges represents the non-cash charges taken to write down the value of goodwill and indefinite-lived intangible assets. These charges are 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.
- (f) 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. See Note 17 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.
- (g) 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 a noncontributory U.S. pension plan. See Note 21 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.
- (h) 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.
- (i) 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.
- (j) Other charges include charges incurred by an inactive subsidiary of the Company as a result of the termination of restrictions on insurance settlement reserves, the foreign currency remeasurement impacts associated with the Company's affiliates whose local economies are designated as hyper-inflationary under U.S. GAAP and costs associated with specific reserves for trade accounts receivable related to a customer who filed for bankruptcy during 2020. These expenses are not indicative of the future operating performance of the Company. See Notes 1 and 13 of Notes to Consolidated Financial Statements, which appear in Item 8 of this Report.
- (k) Russia-Ukraine conflict related expenses represent the direct costs associated with the Company's exit of operations in Russia during 2022, primarily employee separation benefits, as well as costs associated with establishing specific reserves or changes to existing reserves for trade accounts receivable within the Company's EMEA reportable segment due to the economic instability associated with certain customer accounts receivables which have been directly impacted by the current economic conflict between Russia and Ukraine or the Company's decision to end operations in Russia. These expenses are not indicative of the future operating performance of the Company. See Note 13 of Notes to Consolidated Financial Statements, which appear in Item 8 of this Report.
- (l) In connection with executing the Amended Credit Facility, the Company recorded a loss on extinguishment of debt of approximately \$6.8 million which includes the write-off of certain previously unamortized deferred financing costs as well as a portion of the third-party and creditor debt issuance costs incurred to execute the Amended Credit Facility. These expenses are not indicative of the future operating performance of the Company. See Note 20 of Notes to Consolidated Financial Statements, which appear in Item 8 of this Report.
- (m) The impacts of certain discrete tax items includes the impact of changes in 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, deferred tax benefits 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 related to similar intercompany intangible asset transfers. See Note 10 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report.
- (n) Depreciation and amortization for the years ended December 31, 2022, 2021 and 2020 includes \$1.0 million, \$1.2 million and \$1.2 million, respectively, of amortization expense recorded within equity in net income of associated companies in the Company's Consolidated Statements of Operations, 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.

- (o) 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. Combination, restructuring and other acquisition-related expenses described in (a) resulted in incremental taxes of \$2.8 million for 2022, \$4.7 million for 2021, and \$8.3 million for 2020. Strategic planning expenses described in (b) resulted in incremental taxes of \$3.3 million for 2022. Executive transition costs described in (c) resulted in incremental taxes of \$0.6 million and \$0.7 million for the years 2022 and 2021, respectively. Facility remediation costs, net described in (d) results in a tax benefit of \$0.4 million for 2022 and incremental taxes of \$0.5 million for 2021. Impairment charges described in (e) resulted in incremental taxes of \$8.7 million for 2020. Pension and postretirement benefit (income) costs, non-service components described in (g) resulted in a reduction of taxes of \$0.3 million and \$0.1 million for 2022 and 2021, respectively, and incremental taxes of \$7.5 million for 2020. Gain on changes in insurance settlement restrictions of an inactive subsidiary and related insurance insolvency recovery described in (h) resulted in a reduction of taxes of \$4.2 million in 2020. Brazilian non-income tax credits described in (i) resulted in a reduction of taxes of \$4.8 million for 2021. Other charges described in (j) resulted in incremental taxes of \$0.2 million, \$0.2 million and \$0.1 million during 2022, 2021 and 2020, respectively. Russia-Ukraine conflict related expenses described in (k) resulted in incremental taxes of \$0.5 million for 2022. Loss on extinguishment of debt described in (l) resulted in incremental taxes of \$1.6 million for 2022. The impact of certain discrete tax items described in (m) resulted in incremental taxes of \$4.4 million for 2022, a tax benefit of \$5.8 million for 2021, and incremental taxes of \$11.2 million for 2020.
- (p) 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.
- (q) 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, 2022. The Company’s only off-balance sheet commitments or obligations outstanding as of December 31, 2022 represented approximately \$5 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 2022 with 2021

Net sales were a record \$1,943.6 million in 2022 compared to \$1,761.2 million in 2021. The increase in net sales of approximately \$182.4 million or 10% year-over-year was primarily due to an increase in selling price and product mix of approximately 22% and additional net sales from acquisitions of 1%, partially offset by a decline in organic sales volumes of approximately 7% and the unfavorable impact from foreign currency translation of approximately 6%. The increase in selling price and product mix was primarily driven by price increases implemented to offset the significant increases in raw material and other input costs that began during 2021 and continued throughout 2022. The decline in organic sales volumes was primarily attributable to softer end market demand, particularly in the EMEA and Asia/Pacific segments, the wind-down of the tolling agreement for products previously divested related to the Combination and the impact of the ongoing war in Ukraine, partially offset by net new business wins, including the impact of the Company’s ongoing value-based pricing initiatives. The impact from foreign currency translation is primarily the result of the year-over-year strengthening of the U.S. Dollar compared to major world currencies including the Euro and the Chinese renminbi.

COGS were \$1,330.9 million in 2022 compared to \$1,166.5 million in 2021. The increase in COGS of 14% was driven by the continued increases in the Company’s global raw material, manufacturing and supply chain and logistics costs compared to the prior year.

Gross profit in 2022 of \$612.7 million increased \$18.0 million or approximately 3% from 2021. The Company’s reported gross margin in 2022 was 31.5% compared to 33.8% in 2021. The Company’s current year gross margin reflects a significant increase in raw material and other input costs and the impacts of constraints on the global supply chain, partially offset by the Company’s ongoing value-based pricing initiatives.

SG&A in 2022 increased \$36.6 million compared to 2021 due primarily to the impact of sales increases on direct selling costs, higher operating costs due to inflationary pressures, costs associated with strategic planning initiatives (see the Non-GAAP Measures section of this Item, above), and additional SG&A from recent acquisitions, partially offset by lower SG&A due to foreign currency translation compared to the prior year. In addition, SG&A was lower in the prior year period as a result of continued temporary cost saving measures the Company implemented in response to the onset of COVID-19.

During 2022 and 2021, the Company incurred \$8.8 million and \$23.9 million, respectively, of Combination, integration and other acquisition-related expenses. See the Non-GAAP Measures section of this Item, above.

The Company incurred restructuring expenses of \$3.2 million and \$1.4 million during 2022 and 2021, respectively, related to the Company's restructuring programs. See the Non-GAAP Measures section of this Item, above.

In 2022, the Company recorded a \$93.0 million non-cash impairment charge to write down the value of goodwill associated with the Company's EMEA reportable segment. This non-cash impairment charge is the result of the Company's trigger based fourth quarter of 2022 impairment assessment. There were no similar impairment charges in 2022 and no charges in 2021. See the Critical Accounting Policies and Estimates section as well as the Non-GAAP Measures section, of this Item, above.

Operating income in 2022 was \$52.3 million compared to \$150.5 million in 2021. Excluding the non-cash impairment charge, as well as other non-core items that are not indicative of future operating performance, the Company's current year non-GAAP operating income was \$177.9 million compared to \$182.6 million in the prior year. The decline in non-GAAP operating income was primarily due to the higher SG&A, as described above.

Other expense in 2022 includes \$6.8 million of loss on extinguishment of debt related to the Company's refinancing the Original Credit Facility, partially offset by \$1.8 million of facility remediation insurance recoveries and \$2.4 million of other income related to an indemnification asset. Other income in 2021 includes \$13.1 million of non-income tax credits recorded by the Company's Brazilian subsidiaries as well as a \$4.8 million gain on the sale of certain held-for-sale real property assets. See the Non-GAAP Measures section of this Item, above. In addition, foreign exchange losses, net, were higher in 2022 as compared to 2021.

Interest expense, net, increased \$10.3 million compared to 2021, primarily driven by increases in the average borrowings outstanding coupled with an increase in interest rates year-over-year as the weighted average interest rate incurred on borrowings under the Company's primary credit facility was approximately 3.0% during 2022 compared to approximately 1.6% during 2021. This was partially offset by lower amortization of debt issuance costs in 2022 as compared to 2021 due to the June 2022 credit facility amendment and write off of certain previously capitalized debt issuance costs.

The Company's effective tax rates for 2022 and 2021 were an expense of 350.2% and an expense of 23.8%, respectively. The Company's current year effective tax rate was largely driven by the non-cash impairment charge described above and to a lesser extent a decline in profits, earnings mix, foreign tax inclusions and withholding taxes, partially offset by a reduction in reserves for uncertain tax positions and changes in the valuation allowance for foreign tax credits. The Company's 2021 effective tax rate was driven by a higher level of pre-tax earnings and mix of earnings, as well as a 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. 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 the 2022 and 2021 effective tax rates would have been approximately 27% and 26%, respectively. The higher estimated current year tax rate was primarily driven by a lower level of pre-tax earnings and the impact of changes in mix of earnings. 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 decreased \$7.4 million in 2022 compared to 2021, primarily due to lower current year income from the Company's interest in a captive insurance company (see the Non-GAAP Measures section of this Item, above) due to lower market performance on equity investments and from the Company's 50% interest in a joint venture in Korea due to overall market challenges.

Net income attributable to noncontrolling interest was less than \$0.1 million for both 2022 and 2021.

Foreign exchange negatively impacted the Company's yearly results by approximately 8% driven by the negative impact from foreign currency translation on earnings as well as higher foreign exchange transaction losses in the current year as compared to the prior year.

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 are 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 ongoing 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 (expense) 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 a noncontributory 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 a noncontributory 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.

Reportable Segments Review - Comparison of 2022 with 2021

As of December 31, 2022, and 2021, 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 sales of products and services. 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 36% of the Company's consolidated net sales in 2022. The segment's net sales were \$696.1 million, an increase of \$123.5 million or 22% compared to 2021. The increase in net sales was due to higher selling price and product mix of 28% and additional net sales from acquisition of 1%, partially offset by a decrease in organic sales volumes of approximately 7%. The increase in selling price and product mix is primarily driven by price increases implemented to offset the significant increases in raw material, manufacturing and other input costs that began during 2021 and continued through 2022. The current year decline in organic sales volumes was primarily driven by softer end market conditions, primarily in the automotive industry, due to the semiconductor supply constraints and to a lesser extent the primary metals markets, the wind-down of the tolling agreement for products previously divested related to the Combination, the Company's ongoing value-based pricing initiatives, partially offset by net new business wins. This segment's operating earnings were \$148.2 million, an increase of \$23.3 million or 19% compared to 2021 primarily driven by higher margins as the Company's ongoing value-based pricing initiatives offset the ongoing inflationary pressures on the business.

EMEA

EMEA represented approximately 24% of the Company's consolidated net sales in 2022. The segment's net sales were \$474.6 million, a decrease of \$5.5 million or 1% compared to 2021. The decrease in net sales was a result of a 20% increase in selling price and product mix and additional net sales from acquisition of 2% which was more than offset by an unfavorable impact of foreign currency translation of 14% and a decrease in sales volumes of 9%. The increase in selling price and product mix was primarily driven by price increases implemented to offset the significant increases in raw material, manufacturing and other input costs that began during 2021 and continued through 2022. The decline in sales volumes was primarily driven by current geopolitical and macroeconomic pressures including the direct and indirect impacts of the ongoing war in Ukraine and the impact of the economic and other sanctions by other nations on Russia in response to the war, as well as the wind-down of the tolling agreement for products previously divested related to the Combination and softer economic conditions in the region. The significant and unfavorable foreign currency translation impact was primarily due to the strengthening of the U.S. dollar against the euro as this exchange rate averaged 1.05 in 2022 compared to 1.18 in 2021. This segment's operating earnings were \$50.7 million, a decrease of \$34.5 million or 40% compared to 2021. The decrease in segment operating earnings was primarily a result of lower net sales, lower gross margins, and inflationary pressures on other costs, including SG&A.

Asia/Pacific

Asia/Pacific represented approximately 20% of the Company's consolidated net sales in 2022. The segment's net sales were \$386.5 million, a decrease of less than 1% or approximately \$1.7 million compared to 2021. The decrease in net sales was a result of a 16% increase in selling price and product mix offset by lower sales volumes of 11% and an unfavorable impact from foreign currency translation of 5%. The increase in selling price and product mix was primarily driven by price increases implemented to offset the significant increases in raw material, manufacturing and other input costs that began during 2021 and continued through 2022. The decline in organic sales volumes was primarily driven by softer market conditions, primarily in China, in part as a result of the government imposed COVID-19 quarantine and related production disruptions implemented at the end of March 2022 and continued throughout 2022, partially offset by net new business wins. The unfavorable foreign exchange impact was primarily due to the strengthening of the U.S. dollar against the Chinese renminbi as this exchange rate averaged 6.71 Chinese renminbi per USD in 2022 compared to 6.45 Chinese renminbi per USD in 2021. This segment's operating earnings were \$93.0 million, a decrease of \$3.3 million or 3% compared to 2021 as a result of lower net sales, lower gross margins, and inflationary pressures on other costs, including SG&A.

Global Specialty Businesses

Global Specialty Businesses represented approximately 20% of the Company's consolidated net sales in 2022. The segment's net sales were \$386.4 million, an increase of \$66.2 million or 21% compared to 2021. The increase in net sales was driven by higher selling price and product mix of 17%, an increase in organic sales volumes of 5% and additional net sales from acquisitions of 3%, partially offset by an unfavorable impact from foreign currency translation of 4%. The increase in selling price and product mix was primarily driven by price increases implemented to help offset the significant increases in raw material, manufacturing and other input costs that began during 2021 and continued through 2022. The increase in organic sales volumes was primarily attributable to a continued favorable demand environment for this segment's products. The unfavorable foreign exchange impact was primarily due to the strengthening of the U.S. dollar against the euro as described in the EMEA section above. This segment's operating earnings were \$113.9 million, an increase of \$23.3 million or 26% compared to 2021. The increase in segment operating earnings reflects the higher net sales and gross margins in the current year as the Company's value-based pricing initiatives offset higher raw materials, manufacturing and other costs resulting from continued inflationary pressures.

Reportable Segments Review – Comparison of 2021 with 2020

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.

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, 2022, 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, 2022, 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, program management, and soil vapor testing.

The Company is also 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, 2022, 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 26 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, 2022, for which \$5.3 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2022. Comparatively, as of December 31, 2021, the Company had \$5.6 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, 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 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 \$0.3 million and \$0.4 million were accrued as of December 31, 2022 and 2021, 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. Except as otherwise disclosed below, the market risks discussed below did not change materially from December 31, 2021.

Interest Rate Risk. During June 2022, the Company entered into an amendment to its primary credit facility (the "Original Credit Facility", or as amended, the "Amended Credit Facility"). See Note 20 of Notes to Consolidated Financial Statements, which appears in Item 8 of this Report. As of December 31, 2022, borrowings under the Amended Credit Facility bear interest at either term SOFR or a base rate, in each case, plus an applicable margin based upon the Company's consolidated net leverage ratio, and, in the case of term SOFR, a spread adjustment equal to 0.10% per annum. As a result of the variable interest rates applicable under the Amended Credit Facility, if interest rates rise significantly, the cost of debt to the Company will increase. This may 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, 2022, the Company had outstanding borrowings under the Amended Credit Facility of approximately \$943.5 million. The weighted average interest rate applicable on outstanding borrowings under the Amended Credit Facility was approximately 4.9% as of December 31, 2022. The weighted average interest rate applicable on outstanding borrowings under the Original Credit Facility and the Amended Credit Facility during the year ended December 31, 2022 was approximately 3.0%. An interest rate change of 100 basis points would result in an approximate \$9.4 million increase or decrease to interest expense for the year ended December 31, 2022.

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 2022 revenues would have correspondingly decreased or increased by approximately \$103.0 million. Similarly, pre-tax earnings would increase or decrease by approximately \$11.1 million.

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 \$19.4 million.

Credit Risk. Quaker Houghton establishes allowances for credit losses 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 credit losses by \$4.3 million, \$0.7 million and \$3.6 million for the years ended December 31, 2022, 2021 and 2020, 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 \$0.4 million, \$0.1 million and \$0.4 million for the years ended December 31, 2022, 2021 and 2020, 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, 2022 and 2021, and the related consolidated 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, 2022, 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, 2022, 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, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022 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, 2022, 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 the accompanying Management's Annual 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.

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.

Goodwill Impairment Assessments for the EMEA Reporting Unit

As described in Note 16 to the consolidated financial statements, the Company's consolidated goodwill balance was \$515 million as of December 31, 2022, of which \$35 million relates to the EMEA reporting unit. Management completes its annual goodwill impairment test during the fourth quarter of each year, or more frequently if triggering events indicate a possible impairment in one or more of its reporting units. Management monitors various financial, economic and geopolitical conditions impacting the Company and concluded that during the third and fourth quarters of 2022 these events adversely impacted the EMEA reporting unit and represented triggering events. In completing a quantitative goodwill impairment test, management compares the reporting unit's fair value, primarily based on future discounted cash flows, to its carrying value in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable management judgment and are based upon certain significant assumptions including the weighted average cost of capital (WACC) as well as projected EBITDA, which includes assumptions related to revenue growth rates, gross margin levels and operating expenses. Management completed its interim impairment assessment in the third quarter and its annual assessment as of October 1, 2022 and concluded no impairment charge was warranted. As a result of the interim impairment assessment performed in the fourth quarter, an impairment charge of \$93 million was recorded to write down the carrying value of the EMEA reporting unit.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessments for the EMEA reporting unit is a critical audit matter are (i) the significant judgment by management when developing the fair value estimates of the EMEA reporting unit; (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to weighted average cost of capital, revenue growth rates, gross margin levels, and operating expenses; 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 goodwill impairment assessments, including controls over the valuation of the Company's EMEA reporting unit. These procedures also included, among others, (i) testing management's process for developing the fair value estimates of the EMEA reporting unit; (ii) evaluating the appropriateness of the discounted cash flow model; (iii) testing the completeness and accuracy of underlying data used in the discounted cash flow model; and (iv) evaluating the reasonableness of management's significant assumptions related to weighted average cost of capital, revenue growth rates, gross margin levels, and operating expenses. Evaluating management's assumptions related to revenue growth rates, gross margin levels, and operating expenses involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the EMEA reporting unit; (ii) the consistency with external market and industry data; and (iii) whether the assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in evaluating (i) the appropriateness of the Company's discounted cash flow model and (ii) the reasonableness of the weighted average cost of capital assumption.

/s/PricewaterhouseCoopers, LLP
Philadelphia, Pennsylvania
February 23, 2023

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 OPERATIONS
(Dollars in thousands, except per share data)

	Year Ended December 31,		
	2022	2021	2020
Net sales	\$ 1,943,585	\$ 1,761,158	\$ 1,417,677
Cost of goods sold (excluding amortization expense - See Note 16)	1,330,931	1,166,518	904,234
Gross profit	612,654	594,640	513,443
Selling, general and administrative expenses	455,408	418,856	380,752
Impairment charges	93,000	—	38,000
Restructuring and related charges	3,163	1,433	5,541
Combination, integration and other acquisition-related expenses	8,779	23,885	29,790
Operating income	52,304	150,466	59,360
Other (expense) income, net	(12,607)	18,851	(5,618)
Interest expense, net	(32,579)	(22,326)	(26,603)
Income before taxes and equity in net income of associated companies	7,118	146,991	27,139
Taxes on income (loss) before equity in net income of associated companies	24,925	34,939	(5,296)
(Loss) income before equity in net income of associated companies	(17,807)	112,052	32,435
Equity in net income of associated companies	1,965	9,379	7,352
Net (loss) income	(15,842)	121,431	39,787
Less: Net income attributable to noncontrolling interest	89	62	129
Net (loss) income attributable to Quaker Chemical Corporation	\$ (15,931)	\$ 121,369	\$ 39,658
Per share data:			
Net (loss) income attributable to Quaker Chemical Corporation common shareholders – basic	\$ (0.89)	\$ 6.79	\$ 2.23
Net (loss) income attributable to Quaker Chemical Corporation common shareholders – diluted	\$ (0.89)	\$ 6.77	\$ 2.22

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

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

	Year Ended December 31,		
	2022	2021	2020
Net (loss) income	\$ (15,842)	\$ 121,431	\$ 39,787
Other comprehensive (loss) income, net of tax			
Currency translation adjustments	(82,368)	(46,952)	41,601
Defined benefit retirement plans			
Net gain (loss) arising during the period, other	8,177	9,210	8,827
Amortization of actuarial loss	628	1,078	2,308
Amortization of prior service (gain) cost	(228)	7	(69)
Current period change in fair value of derivatives	1,372	2,226	(3,278)
Unrealized (loss) gain on available-for-sale securities	(1,881)	(2,945)	2,091
Other comprehensive (loss) income	(74,300)	(37,376)	51,480
Comprehensive (loss) income	(90,142)	84,055	91,267
Less: Comprehensive income attributable to noncontrolling interest	(39)	(78)	(37)
Comprehensive (loss) income attributable to Quaker Chemical Corporation	\$ (90,181)	\$ 83,977	\$ 91,230

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,	
	2022	2021
ASSETS		
Current assets		
Cash and cash equivalents	\$ 180,963	\$ 165,176
Accounts receivable, net	472,888	430,676
Inventories, net	284,848	264,531
Prepaid expenses and other current assets	55,438	59,871
Total current assets	994,137	920,254
Property, plant and equipment, net	198,595	197,520
Right of use lease assets	43,766	36,635
Goodwill	515,008	631,194
Other intangible assets, net	942,925	1,027,782
Investments in associated companies	88,234	95,278
Deferred tax assets	11,218	16,138
Other non-current assets	27,739	30,959
Total assets	\$ 2,821,622	\$ 2,955,760
LIABILITIES AND EQUITY		
Current liabilities		
Short-term borrowings and current portion of long-term debt	\$ 19,245	\$ 56,935
Accounts payable	193,983	226,656
Dividends payable	7,808	7,427
Accrued compensation	39,834	38,197
Accrued restructuring	5,483	4,087
Accrued pension and postretirement benefits	1,560	1,548
Other accrued liabilities	86,873	95,617
Total current liabilities	354,786	430,467
Long-term debt	933,561	836,412
Long-term lease liabilities	26,967	26,335
Deferred tax liabilities	160,294	179,025
Non-current accrued pension and postretirement benefits	28,765	45,984
Other non-current liabilities	38,664	49,615
Total liabilities	1,543,037	1,567,838
Commitments and contingencies (Note 26)		
Equity		
Common stock, \$1 par value; authorized 30,000,000 shares; issued and outstanding 2022 – 17,950,264 shares; 2021 – 17,897,033 shares	17,950	17,897
Capital in excess of par value	928,288	917,053
Retained earnings	469,920	516,334
Accumulated other comprehensive loss	(138,240)	(63,990)
Total Quaker shareholders' equity	1,277,918	1,387,294
Noncontrolling interest	667	628
Total equity	1,278,585	1,387,922
Total liabilities and equity	\$ 2,821,622	\$ 2,955,760

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,		
	2022	2021	2020
Cash flows from operating activities			
Net (loss) income	\$ (15,842)	\$ 121,431	\$ 39,787
Adjustments to reconcile net income to net cash provided by operating activities:			
Amortization of debt issuance costs	2,942	4,749	4,749
Depreciation and amortization	80,467	86,550	83,246
Equity in undistributed earnings of associated companies, net of dividends	1,005	(8,971)	4,862
Acquisition-related fair value adjustments related to inventory	—	801	229
Deferred income taxes	(10,552)	(12,506)	(38,281)
Uncertain tax positions (non-deferred portion)	(6,398)	(922)	1,075
Deferred compensation and other, net	2,613	(5,325)	(471)
Share-based compensation	11,666	11,038	10,996
Loss on extinguishment of debt	5,246	—	—
(Gain) loss on disposal of property, plant, equipment and other assets	(168)	(4,695)	871
Insurance settlement realized	—	—	(1,035)
Impairment charges	93,000	—	38,000
Gain on inactive subsidiary litigation and settlement reserve	—	—	(18,144)
Combination and other acquisition-related expenses, net of payments	(4,460)	(1,974)	860
Restructuring and related charges	3,163	1,433	5,541
Pension and other postretirement benefits	(7,964)	(6,330)	16,535
(Decrease) increase in cash from changes in current assets and current liabilities, net of acquisitions:			
Accounts receivable	(59,112)	(67,473)	17,170
Inventories	(29,858)	(84,428)	(3,854)
Prepaid expenses and other current assets	3,705	(21,174)	927
Change in restructuring liabilities	(1,532)	(5,266)	(15,745)
Accounts payable and accrued liabilities	(23,439)	37,998	22,308
Estimated taxes on (loss) income	(2,688)	3,997	8,763
Net cash provided by operating activities	41,794	48,933	178,389
Cash flows from investing activities			
Investments in property, plant and equipment	(28,539)	(21,457)	(17,901)
Payments related to acquisitions, net of cash acquired	(13,115)	(42,417)	(56,230)
Proceeds from disposition of assets	1,463	14,744	2,702
Insurance settlement interest earned	—	—	44
Net cash used in investing activities	(40,191)	(49,130)	(71,385)
Cash flows from financing activities			
Payments of long-term debt	(673,203)	(38,011)	(37,615)
Proceeds from long-term debt	750,000	—	—
(Repayments) borrowings on revolving credit facilities, net	(16,281)	53,031	(11,485)
Repayments on other debt, net	(1,629)	(776)	(661)
Financing-related debt issuance costs	(3,734)	—	—
Dividends paid	(30,103)	(28,599)	(27,563)
Stock options exercised, other	(378)	890	3,867
Purchase of noncontrolling interest in affiliates	—	—	(1,047)
Distributions to noncontrolling affiliate shareholders	—	—	(751)
Net cash provided by (used in) financing activities	24,672	(13,465)	(75,255)
Effect of foreign exchange rate changes on cash	(10,488)	(3,057)	6,591
Net increase (decrease) in cash, cash equivalents and restricted cash	15,787	(16,719)	38,340
Cash, cash equivalents and restricted cash at the beginning of the period	165,176	181,895	143,555
Cash, cash equivalents and restricted cash at the end of the period	\$ 180,963	\$ 165,176	\$ 181,895
Supplemental cash flow disclosures:			
Cash paid during the year for:			
Income taxes, net of refunds	\$ 35,327	\$ 34,775	\$ 20,253
Interest	29,074	19,298	23,653
Non-cash activities:			
Change in accrued purchases of property, plant and equipment, net	\$ 278	\$ 2,132	\$ (1,376)

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

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

	Common stock	Capital in excess of par value	Retained earnings	Accumulated other comprehensive loss	Noncontrolling interest	Total
Balance as of December 31, 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
Net (loss) income	—	—	(15,931)	—	89	(15,842)
Amounts reported in other comprehensive (loss) income	—	—	—	(74,250)	(50)	(74,300)
Dividends declared (\$1.70 per share)	—	—	(30,483)	—	—	(30,483)
Shares issued upon exercise of stock options and other	1	(355)	—	—	—	(354)
Share-based compensation plans	52	11,590	—	—	—	11,642
Balance as of December 31, 2022	<u>\$ 17,950</u>	<u>\$ 928,288</u>	<u>\$ 469,920</u>	<u>\$ (138,240)</u>	<u>\$ 667</u>	<u>\$1,278,585</u>

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

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Dollars in thousands, except per share amounts, unless otherwise stated)

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. The “Combination” refers to the Quaker combination with Houghton International, Inc. (“Houghton”).

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 Operations. 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 credit losses: 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 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. Operating lease expense is recognized on a straight-line basis over the 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 includes finance leases in Property, plant and equipment (“PP&E”), current portion of long-term debt and long-term debt on the Consolidated Balance Sheet.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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 33 years, or the remaining term of the lease; and machinery and equipment, 4 to 10 years, or the remaining term of the lease. 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 Operations. 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 \$3.5 million and \$3.6 million of net costs were capitalized in PP&E on the Company's Consolidated Balance Sheets at December 31, 2022 and 2021, 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 recognizes 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 a five-step model, 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 five-step model, 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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 fulfillment 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 Operations, 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 \$46.0 million, \$44.9 million and \$40.0 million for the years ended December 31, 2022, 2021 and 2020, 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. 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 assesses whether it has legal or conditional obligations associated with the retirement of tangible long-lived assets that result from the acquisition, construction, or development and/or the normal operation of a long-lived asset, including any legal obligations that require disposal of a replaced part that is a component of a tangible long-lived asset. As of December 31, 2022 and 2021, the Company had no significant exposure or liabilities recorded 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. The plans of the remaining non-U.S. subsidiaries are, for the most part, either fully insured or integrated with the local governments' plans. The Company recognizes on a prospective basis the funded status of the defined benefit pension and other postretirement plans on its Consolidated Balance Sheets 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 Company recognizes a settlement charge in its Consolidated Statements of Operations 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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 (loss) income in its Statements of Comprehensive (Loss) Income. The Company discloses 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 Company accounts for uncertainty in income taxes by applying 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 Company determines 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, 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 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
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Derivatives: The Company is exposed to the impact of changes in interest rates, foreign currency fluctuations, changes in commodity prices and credit risk. Historically, the Company has utilized 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. In October 2022, the Company's interest rate swap contracts expired. As of December 31, 2022, the Company has not entered into any similar interest rate swap contracts. The Company previously recorded these instruments on a net basis within the Consolidated Balance Sheets. The effective portion of the change in fair value of the agreement was recorded in AOCI and was recognized in the Consolidated Statements of Operations when cash was paid from the counterparties. See Note 25 of Notes to Consolidated Financial Statements.

Fair value measurements: The Company 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 recognizes 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 Company is permitted 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 generally 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 predetermined 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 calculates earnings per share for nonvested stock awards with rights to non-forfeitable dividends, which 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. 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 Operations.

Argentina's and Türkiye's economies were considered hyper-inflationary effective July 1, 2018 and April 1, 2022, respectively. As of, and for the year ended December 31, 2022, the Company's Argentine and Turkish subsidiaries represented a combined 1% and 2% of the Company's consolidated total assets and net sales, respectively. For the years ended December 31, 2022, 2021 and 2020, the Company recorded \$1.6 million, \$0.6 million, and \$0.4 million, respectively, of remeasurement losses associated with the applicable currency conversions related to Argentina and Türkiye. These losses were recorded within foreign exchange losses, net, which is a component of Other (expense) income, net, in the Company's Consolidated Statements of Operations.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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 recognizes a liability for a cost associated with an exit or disposal activity, 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 in the United States (“U.S. GAAP”) 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

2022 Acquisitions

In October 2022, the Company acquired a business that provides pickling and rinsing products and services, which is part of the EMEA reportable segment, for approximately 3.5 million EUR or approximately \$3.5 million. This acquisition, along with the Company’s January 2022 acquisition in the Americas reportable segment (described below), which had similar specializations and product offerings, strengthens Quaker Houghton’s position in pickling inhibitors and additives, enabling the Company to better support and optimize production processes for customers across the Metals industry. The Company allocated \$2.8 million of the purchase price to intangible assets, comprised of \$2.3 million of customer relationships to be amortized over 10 years; \$0.2 million of existing product technologies to be amortized over 10 years; and \$0.3 million of licensed trademarks to be amortized over 10 years. In addition, the Company recorded \$0.8 million of goodwill related to expected value not allocated to other acquired assets.

In January 2022, the Company acquired a business that provides pickling inhibitor technologies, drawing lubricants and stamping oil, and various other lubrication, rust preventative, and cleaner applications, which is part of the 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 reportable segment. The Company allocated \$5.6 million of the purchase price to intangible assets, comprised of \$5.1 million of customer relationships to be amortized over 14 years; and \$0.5 million of existing product technologies to be amortized over 14 years. In addition, the Company recorded \$1.8 million of goodwill related to expected value not allocated to other acquired assets, all of which is expected to be tax deductible in various jurisdictions in which the Company operates. During the third quarter of 2022 the Company finalized post-closing adjustments that resulted in the Company paying less than \$0.1 million of additional purchase consideration. 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.

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, which is part of the Global Specialty Businesses reportable segment for approximately 1.2 million EUR or approximately \$1.4 million. This business broadens its product offerings and service capabilities within its existing impregnation business.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Other Previous 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 that are payable at various times from 2022 through 2025. The earn-out provisions could total a maximum of \$4.5 million. In September 2022, the Company paid \$2.5 million related to certain of these earnout provisions. The Company recorded an incremental earn-out expense of \$0.1 million during the year ended December 31, 2022 related to these earnout provisions, recorded within the financial statement caption “Combination, integration and other acquisition-related expenses” on the Company’s Condensed Consolidated Statements of Operations. As of December 31, 2022, the Company has remaining earnout liabilities recorded on its Condensed Consolidated Balance Sheet of \$1.6 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. 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. During the third quarter of 2022 the Company finalized post-closing adjustments that resulted in the Company receiving less than \$0.1 million.

In November 2021, the Company acquired a business that provides hydraulic fluids, coolants, cleaners, and rust preventative oils in Türkiye 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 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.

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 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. Subsequent to the acquisition, the Company and the sellers of Coral (the “Sellers”) have worked to finalize certain post-closing adjustments. During the second quarter of 2022, after failing to reach resolution, the Sellers filed suit asserting certain amounts owed related to tax attributes of the acquisition. Since the second quarter of 2022, there have been no material changes to the facts and circumstances of the claim asserted by the Sellers, and the Company continues to believe the potential range of exposure for this claim is \$0 to \$1.5 million.

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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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.

During the first quarter of 2020, the Company finalized its post-closing adjustments for the Norman Hay plc (“Norman Hay”) acquisition and paid approximately 2.5 million GBP to settle post-closing adjustments.

As of December 31, 2022, the allocation of the purchase price of each of the 2022 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. As of December 31, 2022, the allocation of the purchase price for all other previous acquisitions was finalized and the one year measurement period ended.

The results of operations of each acquisition subsequent to the respective acquisition dates are included in the Consolidated Statements of Operations. Applicable transaction expenses associated with these acquisitions are included in Combination, integration and other acquisition-related expenses in the Company’s Consolidated Statements of Operations. 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.

Note 3 – Recently Issued Accounting Standards

Recently Issued Accounting Standards Adopted

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, and ASU 2022-06, *Reference Rate Reform (Topic 848): Deferral of the Sunset Date of Topic 848*, which defers the sunset date of Topic 848 from December 31, 2022 to December 31, 2024. Neither ASU materially changed 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, 2024. On June 17, 2022, the Company entered into an amendment to its primary credit facility, which, among other things, provided for the use of a USD currency LIBOR successor rate (the Term Secured Overnight Financing Rate (“Term SOFR”)). 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 (expense) income, net.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

The following tables present information about the performance of the Company's reportable segments for the years ended December 31, 2022, 2021 and 2020.

	2022	2021	2020
Net sales			
Americas	\$ 696,102	\$ 572,643	\$ 450,161
EMEA	474,604	480,126	383,187
Asia/Pacific	386,450	388,160	315,299
Global Specialty Businesses	386,429	320,229	269,030
Total net sales	<u>\$ 1,943,585</u>	<u>\$ 1,761,158</u>	<u>\$ 1,417,677</u>
	2022	2021	2020
Segment operating earnings			
Americas	\$ 148,181	\$ 124,863	\$ 96,379
EMEA	50,708	85,209	69,163
Asia/Pacific	92,995	96,318	88,356
Global Specialty Businesses	113,940	90,632	79,690
Total segment operating earnings	405,824	397,022	333,588
Combination, integration and other acquisition-related expenses	(8,779)	(23,885)	(29,790)
Restructuring and related charges	(3,163)	(1,433)	(5,541)
Fair value step up of acquired inventory sold	—	(801)	(226)
Impairment charges	(93,000)	—	(38,000)
Non-operating and administrative expenses	(187,830)	(157,864)	(143,202)
Depreciation of corporate assets and amortization	(60,748)	(62,573)	(57,469)
Operating income	52,304	150,466	59,360
Other (expense) income, net	(12,607)	18,851	(5,618)
Interest expense, net	(32,579)	(22,326)	(26,603)
Income before taxes and equity in net income of associated companies	<u>\$ 7,118</u>	<u>\$ 146,991</u>	<u>\$ 27,139</u>

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, 2022, 2021 and 2020:

	2022	2021	2020
Segment assets			
Americas	\$ 1,014,115	\$ 983,521	\$ 969,551
EMEA	602,289	714,659	697,821
Asia/Pacific	685,607	750,970	713,004
Global Specialty Businesses	519,611	506,610	511,458
Total segment assets	<u>\$ 2,821,622</u>	<u>\$ 2,955,760</u>	<u>\$ 2,891,834</u>
	2022	2021	2020
Segment long-lived assets			
Americas	\$ 118,525	\$ 129,321	\$ 122,302
EMEA	66,151	69,990	69,344
Asia/Pacific	113,476	123,130	119,233
Global Specialty Businesses	60,182	37,951	59,091
Total segment long-lived assets	<u>\$ 358,334</u>	<u>\$ 360,392</u>	<u>\$ 369,970</u>

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

The following tables present information regarding the Company's reportable segments' capital expenditures and depreciation for identifiable assets for the years ended December 31, 2022, 2021 and 2020:

	2022	2021	2020
Capital expenditures			
Americas	\$ 18,188	\$ 9,678	\$ 6,451
EMEA	5,628	6,767	3,844
Asia/Pacific	3,245	2,264	5,688
Global Specialty Businesses	1,478	2,748	1,918
Total segment capital expenditures	<u>\$ 28,539</u>	<u>\$ 21,457</u>	<u>\$ 17,901</u>
	2022	2021	2020
Depreciation			
Americas	\$ 8,858	\$ 12,074	\$ 12,322
EMEA	4,897	6,936	6,813
Asia/Pacific	4,060	4,596	4,672
Global Specialty Businesses	5,109	3,043	3,544
Total segment depreciation	<u>\$ 22,924</u>	<u>\$ 26,649</u>	<u>\$ 27,351</u>

During the years ended December 31, 2022, 2021 and 2020, the Company had approximately \$1,246.7 million, \$1,198.4 million and \$963.2 million of net sales, respectively, attributable to non-U.S. operations. As of December 31, 2022, 2021 and 2020, the Company had approximately \$156.4 million, \$155.2 million and \$176.6 million of long-lived assets, respectively, attributable to non-U.S. operations.

Inter-segment revenue for the years ended December 31, 2022, 2021 and 2020 was \$11.9 million, \$12.2 million and \$9.1 million for Americas, \$32.4 million, \$29.0 million and \$22.0 million for EMEA, \$0.9 million, \$1.6 million and \$0.6 million for Asia/Pacific and \$8.5 million, \$7.4 million and \$4.7 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.

In January 2023, the Company reorganized certain of its executive management team to align with its new business structure, which reflects the method by which the Company will assess its performance and allocate its resources going forward. This change was made subsequent to December 31, 2022 and therefore, the reportable segments presented in the preceding tables represented the business structure the Company operated during the periods presented. Effective beginning in the first quarter of 2023, the Company's new structure will include three reportable segments: (i) Americas; (ii) Europe, Middle East and Africa ("EMEA"); and (iii) Asia/Pacific. The three geographic segments are composed of the net sales and operations in each respective region, including net sales and operations formerly included in the Global Specialty Businesses segment.

Note 5 – Net Sales and Revenue Recognition

Arrangements Resulting in Net Reporting

As part of the Company's Fluidcare™ 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 \$83.8 million, \$71.7 million and \$42.5 million for the years ended December 31, 2022, 2021 and 2020, 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, 2022, the Company's five largest customers (each composed of multiple subsidiaries or divisions with semiautonomous purchasing authority) accounted for approximately 11% 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, 2022 and 2021.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
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The Company had approximately \$5.7 million and \$7.0 million of deferred revenue as of December 31, 2022 and 2021, respectively. During the years ended December 31, 2022 and 2021, respectively, the Company satisfied all of the associated performance obligations and recognized into revenue the advance payments received and recorded as of December 31, 2021 and 2020, 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, 2022, 2021 and 2020, 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, 2022, 2021 and 2020.

	2022	2021	2020
Metal removal fluids	22.9 %	23.4 %	23.9 %
Rolling lubricants	20.8 %	22.2 %	21.8 %
Hydraulic fluids	14.1 %	13.6 %	13.3 %

Net sales for the year ending December 31, 2022

	Americas	EMEA	Asia/Pacific	Consolidated Total
Customer Industries				
Metals	\$ 252,513	\$ 137,767	\$ 214,377	\$ 604,657
Metalworking and other	443,589	336,837	172,073	952,499
	696,102	474,604	386,450	1,557,156
Global Specialty Businesses	247,646	83,738	55,045	386,429
	\$ 943,748	\$ 558,342	\$ 441,495	\$ 1,943,585

Timing of Revenue Recognized

Product sales at a point in time	\$ 903,610	\$ 526,977	\$ 430,857	\$ 1,861,444
Services transferred over time	40,138	31,365	10,638	82,141
	\$ 943,748	\$ 558,342	\$ 441,495	\$ 1,943,585

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

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

	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
	<u>\$ 604,957</u>	<u>\$ 451,351</u>	<u>\$ 361,369</u>	<u>\$ 1,417,677</u>
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
	<u>\$ 604,957</u>	<u>\$ 451,351</u>	<u>\$ 361,369</u>	<u>\$ 1,417,677</u>

Note 6 – Leases

The Company has operating leases for certain facilities, vehicles and machinery and equipment with remaining lease terms up to 9 years. In addition, the Company has certain land use leases with remaining lease terms up to 93 years.

The Company's finance leases are included in PP&E on the Consolidated Balance Sheet. See Note 15 of Notes to Consolidated Financial Statements. The Company has no material variable lease costs or sublease income for the years ended December 31, 2022, 2021 and 2020. The following table sets forth the components of the Company's lease cost for the years ended December 31, 2022, 2021 and 2020:

	December 31, 2022	December 31, 2021	December 31, 2020
Operating lease expense	\$ 15,171	\$ 14,061	\$ 14,247
Short-term lease expense	816	861	1,308

Supplemental cash flow information related to the Company's leases is as follows:

	December 31, 2022	December 31, 2021	December 31, 2020
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows from operating leases	\$ 19,215	\$ 13,859	\$ 14,101
Non-cash lease liabilities activity:			
Leased assets obtained in exchange for new operating lease liabilities	23,356	11,142	6,949

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

	December 31, 2022	December 31, 2021
Right of use lease assets	\$ 43,766	\$ 36,635
Other accrued liabilities	12,024	9,976
Long-term lease liabilities	26,967	26,335
Total operating lease liabilities	<u>\$ 38,991</u>	<u>\$ 36,311</u>
Weighted average remaining lease term (years)	5.1	5.6
Weighted average discount rate	4.36 %	4.22 %

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Maturities of operating lease liabilities as of December 31, 2022 were as follows:

	December 31, 2022
For the year ended December 31, 2023	\$ 13,551
For the year ended December 31, 2024	11,149
For the year ended December 31, 2025	7,266
For the year ended December 31, 2026	5,280
For the year ended December 31, 2027	2,457
For the year ended December 31, 2028 and beyond	5,299
Total lease payments	45,002
Less: imputed interest	(6,011)
Present value of lease liabilities	\$ 38,991

Note 7 – Restructuring and Related Activities

The Company's Management approved a global restructuring plan (the "QH Program") as part of its initial plan to realize certain cost synergies associated with the Combination in the third quarter of 2019. The QH Program included 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. As of December 31, 2022, the Company has substantially completed all of the initiatives under the QH Program with only an immaterial amount of remaining severance still to be paid, which is expected to be completed during 2023.

In response to current macroeconomic headwinds and softer operating conditions, in 2022, the Company's Management initiated a global cost and optimization program to improve its cost structure and drive a more profitable and productive organization. This program has and will include certain restructuring activities as part of the plan to further optimize and strengthen the Company's footprint, optimize the go-to-market strategy, simplify the portfolio and organization, and enable the Company to deliver on its strategic plan. During the fourth quarter of 2022, initial actions under this program included restructuring and associated severance costs to reduce headcount by approximately 40 positions globally. These headcount reductions began in the fourth quarter of 2022 and are expected to be completed in 2023.

Under the Company's restructuring programs, employee separation benefits varied depending on local regulations within certain foreign countries and included severance and other benefits. The exact timing to complete all actions and final costs associated will depend on a number of factors and are subject to change. Restructuring costs incurred during the years ended December 31, 2022, 2021 and 2020 include 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 Operations.

In connection with the plans for closure of certain manufacturing and non-manufacturing facilities, the Company has made available for sale certain facilities and property. During the years ended December 31, 2022, 2021 and 2020, certain of these facilities were sold and the Company recognized a gain of \$0.2 million in 2022 and \$5.4 million in 2021 and a loss of approximately \$0.6 million in 2020, which is included within Other (expense) income, net on the Consolidated Statements of Operations. Additionally, certain land with an aggregate book value of approximately \$0.6 million continues to be held-for-sale as of December 31, 2022 and is recorded in Prepaid expenses and other current assets on the Company's Consolidated Balance Sheets. The Company expects to complete the sale of this land in 2023. The Company will continue to evaluate actions to strengthen and optimize its existing facilities and footprint and this may include making certain other facilities or property available for sale in the future. 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Activity in the Company's accrual for restructuring for the years ended December 31, 2022 and 2021 are as follows:

	Restructuring Programs
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
Restructuring and related charges	3,163
Cash payments	(1,532)
Currency translation adjustments	(235)
Accrued restructuring as of December 31, 2022	<u>\$ 5,483</u>

Note 8 – Share-Based Compensation

The Company recognized the following share-based compensation expense in its Consolidated Statements of Operations for the years ended December 31, 2022, 2021 and 2020:

	2022	2021	2020
Stock options	\$ 1,774	\$ 1,235	\$ 1,491
Non-vested stock awards and restricted stock units	6,679	5,438	5,012
Non-elective and elective 401(k) matching contribution in stock	—	1,553	3,112
Director stock ownership plan	63	901	541
Performance stock units	3,150	1,911	840
Total share-based compensation expense	<u>\$ 11,666</u>	<u>\$ 11,038</u>	<u>\$ 10,996</u>

Share-based compensation expense is recorded in SG&A, except for \$0.2 million, \$0.9 million and \$1.5 million during the years ended December 31, 2022, 2021 and 2020, 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, 2022	109,684	\$ 165.47		
Options granted	31,914	222.82		
Options exercised	(11,801)	133.10		
Options forfeited	(10,315)	172.41		
Options outstanding as of December 31, 2022	<u>119,482</u>	\$ 183.39	4.7	\$ (373)
Options expected to vest after December 31, 2022	<u>54,245</u>	\$ 182.20	5.5	\$ (830)
Options exercisable as of December 31, 2022	<u>65,237</u>	\$ 159.93	3.9	\$ 455

The total intrinsic value of options exercised during the years ended December 31, 2022, 2021 and 2020 was approximately \$0.8 million, \$2.7 million and \$6.5 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
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A summary of the Company's outstanding stock options as of December 31, 2022 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)
\$	120.01	- \$	150.00	40,781	4.5	137.28	23,262	136.64
\$	150.01	- \$	180.00	56,834	4.6	164.63	33,833	155.35
\$	220.01	- \$	250.00	21,867	5.2	245.10	8,142	245.49
				119,482	4.7	183.39	65,237	159.93

As of December 31, 2022, unrecognized compensation expense related to options granted during the years ended December 31, 2022, 2021 and 2020 was \$0.8 million, \$0.5 million and \$0.1 million, respectively, to be recognized over a weighted average period of 1.3 years.

The Company granted stock options under its LTIP plan that are subject only to time vesting generally over a three year period during 2022, 2021, 2020 and 2019. 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:

	July 2022 Grant	March 2022 Grant	2021	2020	2019
Number of stock options granted	4,837	27,077	25,250	49,115	51,610
Dividend yield	0.79 %	0.80 %	0.85 %	0.99 %	1.12 %
Expected volatility	40.47 %	38.60 %	37.33 %	31.57 %	26.29 %
Risk-free interest rate	2.87 %	2.07 %	0.60 %	0.36 %	1.52 %
Expected term (years)	4.0	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, 2022, 2021 and 2020, respectively, is as follows:

	2022	2021	2020
2022 Stock option awards	\$ 783	\$ —	\$ —
2021 Stock option awards	521	429	—
2020 Stock option awards	443	516	385
2019 Stock option awards	27	234	698
2018 Stock option awards	—	56	357

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, 2021	68,693	\$ 179.26
Granted	54,433	166.07
Vested	(38,583)	175.80
Forfeited	(5,088)	184.64
Nonvested awards, December 31, 2022	79,455	\$ 171.61

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, 2022, unrecognized compensation expense related to these awards was \$7.4 million, to be recognized over a weighted average remaining period of 1.6 years.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
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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, 2021	10,977	\$ 170.82
Granted	10,703	169.29
Vested	(3,009)	158.09
Forfeited	(171)	190.37
Nonvested awards, December 31, 2022	18,500	\$ 171.83

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, 2022, unrecognized compensation expense related to these awards was \$1.7 million, to be recognized over a weighted average remaining period of 1.9 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:

	2022	CEO Grant 2021 (1)	2021	2020
Number of PSUs granted	18,462	3,775	12,103	18,485
Risk-free interest rate	2.11 %	0.65 %	0.29 %	0.28 %
Dividend yield	0.93 %	0.72 %	0.64 %	1.13 %
Expected term (years)	3.0	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, 2022, there was approximately \$4.0 million of total unrecognized compensation cost related to PSUs which the Company expects to recognize over a weighted-average period of 1.8 years.

Defined Contribution Plan

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. There were no matching contributions in stock for the year ended December 31, 2022. For the years ended December 31, 2021 and 2020, total contributions in stock were \$1.5 million and \$3.1 million, respectively.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

2013 Director Stock Ownership Plan

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

Note 9 – Other (Expense) Income, net

Other (expense) income, net, for the years ended December 31, 2022, 2021 and 2020 are as follows:

	2022	2021	2020
Income from third party license fees	\$ 1,268	\$ 1,367	\$ 999
Foreign exchange losses, net	(9,399)	(3,821)	(6,082)
Gain (loss) on disposals of property, plant, equipment and other assets, net	168	4,695	(871)
Non-income tax refunds and other related (expense) credits	(1,613)	15,155	3,345
Pension and postretirement benefit income (costs), non-service components	1,704	759	(21,592)
Loss on extinguishment of debt	(6,763)	—	—
Gain on insurance recoveries	1,804	—	18,144
Other non-operating income, net	224	696	439
Total other (expense) income, net	\$ (12,607)	\$ 18,851	\$ (5,618)

Foreign exchange losses, net, during the years ended December 31, 2022, 2021 and 2020, include foreign currency transaction losses of approximately \$1.6 million, \$0.6 million and \$0.4 million, respectively, related to hyper-inflationary accounting. See Note 1 of Notes to Consolidated Financial Statements.

Gain (loss) on disposals of property, plant, equipment and other assets, net, includes losses related to certain fixed asset 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. This caption also includes a gain in 2022 and 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 (expense) credits during the year ended December 31, 2022 includes adjustments to Combination-related indemnification assets associated with the settlement of certain income tax audits at certain of the Company’s Italian and German affiliates for tax periods prior to August 1, 2019, whereas during the year ended December 31, 2021 this 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 termination of a noncontributory U.S. pension plan, as described in Note 21 of Notes to Consolidated Financial Statements.

Loss on extinguishment of debt during the year ended December 31, 2022 includes the write-off of certain previously unamortized deferred financing costs as well as a portion of the third party and creditor debt issuance costs incurred to execute an amendment to the Company’s primary credit facility. See Note 20 of Notes to Consolidated Financial Statements.

Gain on insurance recoveries for the year ended December 31, 2022 reflects payments received from insurers related to the property damage incurred during 2021, noted above, whereas for the year ended December 31, 2020, this amount relates 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.

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Note 10 – Taxes on Income

On December 22, 2017, the U.S. government enacted comprehensive tax legislation which we refer 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 (“IRS”), 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, 2022, \$6.9 million in installments have been paid with the remaining \$8.6 million to be paid through installments in future years.

As of December 31, 2022, the Company has a deferred tax liability of \$6.8 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 as further explained below.

Taxes on income before equity in net income of associated companies for the years ended December 31, 2022, 2021 and 2020 are as follows:

	2022	2021	2020
Current:			
Federal	\$ (708)	\$ 955	\$ (1,359)
State	1,450	2,115	1,171
Foreign	34,735	44,375	33,173
	<u>35,477</u>	<u>47,445</u>	<u>32,985</u>
Deferred:			
Federal	(2,798)	(3,863)	(28,437)
State	(713)	(3,117)	(3,087)
Foreign	(7,041)	(5,526)	(6,757)
Total	<u>\$ 24,925</u>	<u>\$ 34,939</u>	<u>\$ (5,296)</u>

The components of earnings before income taxes for the years ended December 31, 2022, 2021 and 2020 are as follows:

	2022	2021	2020
U.S.	\$ (4,933)	\$ 7,263	\$ (66,585)
Foreign	12,051	139,728	93,724
Total	<u>\$ 7,118</u>	<u>\$ 146,991</u>	<u>\$ 27,139</u>

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Total deferred tax assets and liabilities are composed of the following as of December 31, 2022 and 2021:

	2022	2021
Retirement benefits	\$ 8,469	\$ 11,860
Allowance for credit losses	2,246	2,155
Insurance and litigation reserves	716	675
Performance incentives	3,327	2,881
Equity-based compensation	2,723	1,920
Prepaid expense	486	460
Operating loss carryforward	20,519	18,544
Foreign tax credit and other credits	5,506	16,285
Interest	9,928	9,940
Restructuring reserves	791	631
Right of use lease assets	8,440	8,322
Inventory reserves	2,967	2,941
Research and development	11,936	8,832
Other	4,307	2,846
	<u>82,361</u>	<u>88,292</u>
Valuation allowance	(11,730)	(17,400)
Total deferred tax assets, net	<u>\$ 70,631</u>	<u>\$ 70,892</u>
Depreciation	11,935	11,580
Foreign pension and other	2,691	2,332
Intangibles	182,838	197,066
Lease liabilities	9,590	8,421
Outside basis in equity investment	5,886	5,999
Unremitted Earnings	6,766	8,381
Total deferred tax liabilities	<u>\$ 219,706</u>	<u>\$ 233,779</u>

The Company has \$7.4 million of deferred tax assets related to state net operating losses. Management analyzed the expected impact of the reversal of existing taxable temporary differences, considered expiration dates, analyzed current state tax laws, and determined that \$1.7 million of state net operating loss carryforwards is expected to be realized as a future benefit based on the reversal of deferred tax liabilities. Accordingly, a partial valuation allowance of \$5.7 million has been established. These state net operating losses are subject to various carryforward periods of 5 years to 20 years or an indefinite carryforward period. An additional \$0.9 million of valuation allowance was established for other net state deferred tax assets.

The Company has \$13.1 million of deferred tax assets related to foreign net operating loss carryforwards. A partial valuation allowance of \$2.3 million has been established against this amount resulting in a net \$10.8 million expected future benefit. 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 \$1.5 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 \$5.2 million and \$15.9 million as of December 31, 2022 and 2021, respectively, with a \$1.3 million and \$5.8 million valuation allowance as of December 31, 2022 and 2021, 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 2028. As of December 31, 2022, the Company had a net realizable disallowed interest carryforward of \$10.1 million on its balance sheet related to its US operations and \$0.6 million related to non-US operations.

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(Dollars in thousands, except per share amounts, unless otherwise stated)

As of December 31, 2022, the Company had deferred tax liabilities of \$169.4 million primarily related to the step-up in intangibles resulting from the Combination and Norman Hay acquisition.

As part of the Combination, the Company acquired a 50% interest in the Korea Houghton Corporation joint venture and has recorded a \$5.9 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, 2022, 2021 and 2020:

	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, 2022	\$ 17,400	\$ —	\$ 1,326	\$ (6,789)	\$ (207)	\$ 11,730
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

The Company's net deferred tax assets and liabilities are classified in the Consolidated Balance Sheets as of December 31, 2022 and 2021 as follows:

	2022	2021
Non-current deferred tax assets	\$ 11,218	\$ 16,138
Non-current deferred tax liabilities	160,294	179,025
Net deferred tax liability	<u>\$ (149,076)</u>	<u>\$ (162,887)</u>

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, 2022, 2021 and 2020. Certain immaterial reclassifications within the presentation of the reconciliation of income taxes have been made to the years ended December 31, 2021 and 2020:

	2022	2021	2020
Income tax provision at the Federal statutory tax rate	\$ 1,495	\$ 30,868	\$ 5,699
Unremitted earnings	(1,839)	1,841	(2,308)
Tax law changes / reform	823	1,955	(1,059)
U.S. tax on foreign operations	4,864	10,479	5,140
Pension settlement	—	—	(2,247)
Foreign derived intangible income	(917)	(8,698)	(7,339)
Non-deductible acquisition expenses	45	129	131
Withholding taxes	7,785	6,584	7,809
Foreign tax credits	(5,850)	(14,725)	(4,699)
Share-based compensation	1,234	600	335
Foreign tax rate differential	4,782	1,712	332
Research and development credit	(1,757)	(1,685)	(1,018)
Audit Settlements	2,697	1,378	807
Uncertain tax positions	(6,375)	519	1,990
State income tax provisions, net	432	(1,446)	(2,245)
Non-deductible meals and entertainment	146	426	290
Intercompany transfer of intangible assets	(1,932)	4,347	(4,384)
Goodwill Impairment	19,550	—	—
Miscellaneous items, net	(258)	655	(2,530)
Taxes on income before equity in net income of associated companies	<u>\$ 24,925</u>	<u>\$ 34,939</u>	<u>\$ (5,296)</u>

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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, 2022, the Company has a deferred tax liability \$6.8 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, 2022 was approximately \$424.7 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, 2022, the Company's cumulative liability for gross unrecognized tax benefits was \$16.3 million. The Company had accrued approximately \$1.3 million for cumulative penalties and \$2.7 million for cumulative interest as of December 31, 2022. 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.

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 Operations. The Company recognized a benefit of \$1.7 million for penalties and a benefit of \$0.3 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2022, 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, and an expense of less than \$0.1 million for penalties and an expense of \$0.6 million for interest (net of expirations and settlements) in its Consolidated Statement of Income for the year ended December 31, 2020.

The Company estimates that during the year ending December 31, 2022, it will reduce its cumulative liability for gross unrecognized tax benefits by approximately \$4.9 million due to the expiration of the statute of limitations with regard to certain tax positions. This estimated reduction in the cumulative liability for unrecognized tax benefits does not consider any increase in liability for unrecognized tax benefits with regard to existing tax positions or any increase in cumulative liability for unrecognized tax benefits with regard to new tax positions for the year ending December 31, 2022.

A reconciliation of the beginning and ending amounts of unrecognized tax benefits for the years ended December 31, 2022, 2021 and 2020, respectively, is as follows:

	2022	2021	2020
Unrecognized tax benefits as of January 1	\$ 22,464	\$ 22,152	\$ 19,097
(Decrease) increase in unrecognized tax benefits taken in prior periods	(1,174)	1,002	2,025
Increase in unrecognized tax benefits taken in current period	953	2,915	3,095
Decrease in unrecognized tax benefits due to lapse of statute of limitations	(2,378)	(1,527)	(2,024)
Decrease in unrecognized tax benefits due to audit settlements	(2,509)	(1,104)	(1,635)
Increase in unrecognized tax benefits due to acquisition	—	—	597
(Decrease) increase due to foreign exchange rates	(1,016)	(974)	997
Unrecognized tax benefits as of December 31	<u>\$ 16,340</u>	<u>\$ 22,464</u>	<u>\$ 22,152</u>

The amount of net unrecognized tax benefits above that, if recognized, would impact the Company's tax expense and effective tax rate is \$10.2 million, \$15.2 million and \$14.7 million for the years ended December 31, 2022, 2021 and 2020, 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 from 2016, Canada, China, Mexico, Germany, Spain and the U.S. from 2018, the United Kingdom from 2019, India from fiscal year beginning April 1, 2017 and ending March 31, 2018, and various U.S. state tax jurisdictions from 2011.

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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 the Netherlands reached agreement with respect to the MAP proceedings, which the Company has accepted. As of December 31, 2022, the Company has received \$1.6 million in refunds from the Netherlands and Spain. 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. As of December 31, 2022, the Company has paid the full settlement, of which approximately \$0.2 million was refunded.

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. 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. During the year ended December 31, 2022, the Company settled tax years 2016 through 2018 for a total of \$2.0 million. In total, the Company has now settled all years 2014 through 2018 for \$3.7 million. Accordingly, the Company has released all reserves relating to this audit for the settled tax years. As a result of the settlement and reserve release the Company recognized a net benefit to the tax provision of \$1.9 million during the year ended December 31, 2022. The Company has an indemnification receivable of \$3.6 million in connection with its claim against the former owners of Houghton for any pre-Combination tax liabilities arising from this matter, as well as other audit settlements and tax matters.

Houghton Deutschland GmbH was also under audit by the German tax authorities for tax years 2015 through 2017. In the second quarter of 2022, the Company settled the corporate tax audit for the tax years 2015-2017 with the German tax authorities for a total of \$0.3 million. The Company has an indemnification receivable of \$0.3 million in connection with its claim against the former owners of Houghton for any pre-Combination tax liabilities arising from this matter.

Note 11 – Earnings Per Share

The following table summarizes earnings per share calculations for the years ended December 31, 2022, 2021 and 2020:

	2022	2021	2020
Basic earnings per common share			
Net (loss) income attributable to Quaker Chemical Corporation	\$ (15,931)	\$ 121,369	\$ 39,658
Less: loss (income) allocated to participating securities	92	(480)	(148)
Net (loss) income available to common shareholders	\$ (15,839)	\$ 120,889	\$ 39,510
Basic weighted average common shares outstanding	17,841,487	17,805,034	17,719,792
Basic (loss) earnings per common share	\$ (0.89)	\$ 6.79	\$ 2.23
Diluted earnings per common share			
Net (loss) income attributable to Quaker Chemical Corporation	\$ (15,931)	\$ 121,369	\$ 39,658
Less: loss (income) allocated to participating securities	92	(479)	(148)
Net (loss) income available to common shareholders	\$ (15,839)	\$ 120,890	\$ 39,510
Basic weighted average common shares outstanding	17,841,487	17,805,034	17,719,792
Effect of dilutive securities	15,005	50,090	31,087
Diluted weighted average common shares outstanding	17,856,492	17,855,124	17,750,879
Diluted (loss) earnings per common share	\$ (0.89)	\$ 6.77	\$ 2.22

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 28,222 in 2022, 4,070 in 2021 and 945 in 2020.

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 than \$0.1 million for the year ended December 31, 2020, offset by \$1.0 million of net payments during 2020. 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.

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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 a \$35.0 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 was no restricted cash for the years ended December 31, 2021 and 2022, respectively. 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, 2022, 2021, 2020 and 2019:

	2022	2021	2020	2019
Cash and cash equivalents	\$ 180,963	\$ 165,176	\$ 181,833	\$ 123,524
Restricted cash included in other current assets	—	—	62	353
Restricted cash included in other assets	—	—	—	19,678
Cash, cash equivalents and restricted cash	<u>\$ 180,963</u>	<u>\$ 165,176</u>	<u>\$ 181,895</u>	<u>\$ 143,555</u>

Note 13 – Accounts Receivable and Allowance for Credit Losses

As of December 31, 2022 and 2021, the Company had gross trade accounts receivable totaling \$486.4 million and \$443.0 million, respectively.

The following are changes in the allowance for credit losses during the years ended December 31, 2022, 2021 and 2020:

	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 Credit Losses					
Year ended December 31, 2022	\$ 12,334	\$ 4,319	\$ (2,441)	\$ (685)	\$ 13,527
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

Note 14 – Inventories

Inventories, net, as of December 31, 2022 and 2021 were as follows:

	2022	2021
Raw materials and supplies	\$ 151,105	\$ 129,382
Work in process, finished goods and reserves	133,743	135,149
Total inventories, net	<u>\$ 284,848</u>	<u>\$ 264,531</u>

Note 15 – Property, Plant and Equipment

Property, plant and equipment as of December 31, 2022 and 2021 were as follows:

	2022	2021
Land	\$ 29,010	\$ 30,793
Building and improvements	138,759	134,313
Machinery and equipment	240,097	252,779
Construction in progress	20,324	16,459
Property, plant and equipment, at cost	428,190	434,344
Less: accumulated depreciation	(229,595)	(236,824)
Total property, plant and equipment, net	<u>\$ 198,595</u>	<u>\$ 197,520</u>

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As of December 31, 2022, PP&E includes \$0.6 million of finance lease assets and future minimum lease payments. Land with an aggregate book value of approximately \$0.6 million is held-for-sale as of December 31, 2022 and is recorded in Prepaid expenses and other current assets on the Company's Consolidated Balance Sheets.

Note 16 – Goodwill and Other Intangible Assets

Changes in the carrying amount of goodwill for the years ended December 31, 2022 and 2021 were as follows:

	Americas	EMEA	Asia/Pacific	Global Specialty Businesses	Total
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
Goodwill additions (reductions)	1,853	251	—	(59)	2,045
Goodwill impairments	—	(93,000)	—	—	(93,000)
Currency translation and other adjustments	23	(8,204)	(12,083)	(4,967)	(25,231)
Balance as of December 31, 2022	<u>\$ 215,899</u>	<u>\$ 34,567</u>	<u>\$ 150,375</u>	<u>\$ 114,167</u>	<u>\$ 515,008</u>

Gross carrying amounts and accumulated amortization for definite-lived intangible assets as of December 31, 2022 and 2021 were as follows:

	Gross Carrying Amount		Accumulated Amortization		Net Book Value	
	2022	2021	2022	2021	2022	2021
Customer lists and rights to sell	\$ 831,600	\$ 853,122	\$ 191,286	\$ 147,858	\$ 640,314	\$ 705,264
Trademarks, formulations and product technology	158,564	163,974	46,281	38,747	112,283	125,227
Other	7,576	6,309	6,390	5,900	1,186	4,409
Total definite-lived intangible assets	<u>\$ 997,740</u>	<u>\$ 1,023,405</u>	<u>\$ 243,957</u>	<u>\$ 192,505</u>	<u>\$ 753,783</u>	<u>\$ 830,900</u>

The Company recorded \$57.5 million, \$59.9 million and \$55.9 million of amortization expense during the years ended December 31, 2022, 2021 and 2020, respectively. Amortization is recorded within SG&A in the Company's Consolidated Statements of Operations. Estimated annual aggregate amortization expense for the subsequent five years is as follows:

For the year ended December 31, 2023	\$ 57,822
For the year ended December 31, 2024	57,218
For the year ended December 31, 2025	56,466
For the year ended December 31, 2026	56,194
For the year ended December 31, 2027	55,897

The Company has four indefinite-lived intangible assets totaling \$189.1 million as of December 31, 2022, including \$188.0 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 \$196.9 million as of December 31, 2021. 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 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.

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 as of October 1, 2022 and concluded no impairment charge was warranted. The Company continually evaluates financial performance, economic conditions and other recent developments in assessing if a triggering event indicates that the carrying values of goodwill, indefinite-lived, or long-lived assets are impaired.

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The Company continues to monitor various financial, economic and geopolitical conditions impacting the Company, including the ongoing Russia-Ukraine war and the Company's decision to cease operations in Russia, continued raw material cost escalation, supply chain constraints and disruptions, as well as rising interest rates and the Company's cost of capital, among other factors. During the third quarter of 2022, the Company concluded that the escalation of these events adversely impacted the Company's EMEA reporting unit's financial performance and represented a triggering event. As a result of this conclusion, the Company completed an interim impairment assessment for its EMEA reporting unit, as well as the related asset group, during the third quarter of 2022. The Company concluded that the undiscounted cash flows exceeded the carrying value of the long-lived assets, and it was not more likely than not that an impairment exists. In completing a quantitative goodwill impairment test, the Company compares the reporting unit's fair value, primarily based on future discounted cash flows, to its carrying value in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable judgment and are based upon certain significant assumptions including the weighted average cost of capital ("WACC") as well as projected EBITDA, which includes assumptions related to revenue growth rates, gross margin levels and operating expenses. The estimated fair value of the EMEA reporting unit as of this interim impairment assessment exceeded its carrying value and the Company concluded no impairment was warranted.

During the fourth quarter of 2022, subsequent to the Company completing its annual impairment test as of October 1, 2022, the Company concluded that the continued negative impacts of the aforementioned events, most notably the continued rise in interest rates which led to an increase in the Company's cost of capital, as well as lower than expected financial performance driven by the ongoing lag in margin recovery represented an additional triggering event for the Company's EMEA reporting unit and the associated goodwill, as well as the related asset group. As a result of this conclusion, the Company completed an interim impairment assessment as of December 31, 2022 for its EMEA reporting unit and the related asset group. The Company concluded that the undiscounted cash flows exceeded the carrying value of the long-lived assets, and it was not more likely than not that an impairment exists. In completing a quantitative goodwill impairment test, the Company compares the reporting unit's fair value, primarily based on future discounted cash flows, to its carrying value in order to determine if an impairment charge is warranted. The estimates of future discounted cash flows involve considerable judgment and are based upon certain significant assumptions including the WACC as well as projected EBITDA, which includes assumptions related to revenue growth rates, gross margin levels and operating expenses. As a result of the impact of financial, economic, and geopolitical conditions driving a decrease in EMEA earnings in the current year, the impact of the current year decline on projected future earnings, as well as an increase in the WACC assumption utilized in this fourth quarter interim quantitative impairment assessment, the Company concluded that the estimated fair value of the EMEA reporting unit was less than its carrying value. As a result, a non-cash impairment charge of \$93.0 million to write down the carrying value of the EMEA reporting unit Goodwill to its estimated fair values was recorded in the fourth quarter of 2022.

Notwithstanding the results of the Company's annual and trigger based interim impairment assessments during 2022 and the goodwill impairment charge taken in the fourth quarter of 2022, if the Company is unable to successfully implement actions aimed at more than offsetting raw material costs and ongoing inflationary pressures and the financial performance of the EMEA reporting unit declines further, or interest rates continue to rise and this leads to an increase in the cost of capital, then it is possible these financial, economic and geopolitical conditions could result in another triggering event for the EMEA reporting unit in the future and could potentially lead to an additional impairment of the EMEA reporting unit's remaining goodwill or other indefinite-lived or long-lived assets.

Note 17 – Investments in Associated Companies

As of December 31, 2022, 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, 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, 2022 was \$88.2 million, which includes investments of \$62.9 million in Houghton Korea; \$18.1 million in Primex; \$6.6 million in Nippon Japan; and \$0.6 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, 2022 and 2021, the Company had no remaining carrying value for its investment in Kelko Venezuela.

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The following table is a summary of equity income in associated companies by investment for the years ending December 31, 2022, 2021 and 2020:

	Year Ended December 31,		
	2022	2021	2020
Houghton Korea	\$ 2,644	\$ 3,808	\$ 5,241
Nippon Japan	323	461	853
Kelko Panama	425	154	107
Grindaix (1)	—	(37)	—
Primex	(1,427)	4,993	1,151
Total equity in net income of associated companies	<u>\$ 1,965</u>	<u>\$ 9,379</u>	<u>\$ 7,352</u>

(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.

Note 18 – Other Non-Current Assets

Other non-current assets as of December 31, 2022 and 2021 were as follows:

	2022	2021
Pension assets (See Note 21)	\$ 8,639	\$ 7,916
Uncertain tax positions (See Note 10)	5,803	6,931
Debt issuance costs (See Note 20)	4,305	4,267
Indemnification assets	3,909	6,630
Supplemental retirement income program (See Notes 21 and 24)	2,114	2,269
Other	2,969	2,946
Total other non -current assets	<u>\$ 27,739</u>	<u>\$ 30,959</u>

As of December 31, 2022 and 2021, 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. A portion of these indemnification assets have a corresponding uncertain tax position recorded in other non-current liabilities. As of December 31, 2022 and 2021, 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, 2022 and 2021 were as follows:

	2022	2021
Non-income taxes	\$ 25,525	\$ 23,725
Current income taxes payable (See Note 10)	12,966	16,642
Short-term lease liabilities (See Note 6)	12,024	9,976
Selling expenses and freight accruals	9,822	11,695
Customer advances and sales return reserves	6,585	7,965
Professional fees, legal, and acquisition-related accruals	5,415	12,264
Accrued interest (See Note 20)	2,749	2,129
Interest rate swap (See Note 25)	—	1,782
Other	11,787	9,439
Total other accrued liabilities	<u>\$ 86,873</u>	<u>\$ 95,617</u>

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Note 20 – Debt

Debt as of December 31, 2022 and 2021 includes the following:

	As of December 31, 2022		As of December 31, 2021	
	Interest Rate	Outstanding Balance	Interest Rate	Outstanding Balance
Credit Facilities:				
Original Revolver	—%	\$ —	1.62%	\$ 211,955
Original U.S. Term Loan	—%	—	1.65%	540,000
Original EURO Term Loan	—%	—	1.50%	137,616
Amended Revolver	5.17%	195,673	—%	—
Amended U.S. Term Loan	5.70%	596,250	—%	—
Amended EURO Term Loan	1.50%	151,572	—%	—
Industrial development bonds	5.26%	10,000	5.26%	10,000
Bank lines of credit and other debt obligations	Various	1,303	Various	1,777
Total debt		\$ 954,798		\$ 901,348
Less: debt issuance costs		(1,992)		(8,001)
Less: short-term and current portion of long-term debts		(19,245)		(56,935)
Total long-term debt		<u>\$ 933,561</u>		<u>\$ 836,412</u>

Credit facilities

The Company, its wholly owned subsidiary, Quaker Chemical B.V., as borrowers, Bank of America, N.A., as administrative agent, U.S. Dollar swing line lender and letter of credit issuer, and the other lenders party thereto, entered into a credit agreement on August 1, 2019, as amended (the “Original Credit Facility”). The Original Credit Facility was comprised of a \$400.0 million multicurrency revolver (the “Original Revolver”), a \$600.0 million term loan (the “Original 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 “Original EURO Term Loan”) with Quaker Chemical B.V., a Dutch subsidiary of the Company as borrower, each with a five year term, maturing in August 2024.

During June 2022, the Company, and its wholly owned subsidiary, Quaker Houghton B.V., as borrowers, Bank of America, N.A., as administrative agent, U.S. Dollar swing line lender and letter of credit issuer, Bank of America Europe Designated Active Company, as Euro Swing Line Lender, certain guarantors and other lenders entered into an amendment to the Original Credit Facility (the “Amended Credit Facility”). The Amended Credit Facility established (A) a new \$150.0 million Euro equivalent senior secured term loan (the “Amended Euro Term Loan”), (B) a new \$600.0 million senior secured term loan (the “Amended U.S. Term Loan”), and (C) a new \$500.0 million senior secured revolving credit facility (the “Amended Revolver”). The Company has the right to increase the amount of the Amended Credit Facility by an aggregate amount not to exceed the greater of \$300.0 million or 100% of Consolidated EBITDA, subject to certain conditions including the agreement to provide financing by any lender providing such increase. In addition, the Amended Credit Facility also:

- (i) eliminated the requirement that material foreign subsidiaries must guaranty the Original Euro Term Loan;
- (ii) replaced the U.S. Dollar borrowings reference rate from LIBOR to SOFR;
- (iii) extended the maturity date of the Original Credit Facility from August 2024 to June 2027; and
- (iv) effected certain other changes to the Original Credit Facility as set forth in the Amended Credit Facility.

The Company used the proceeds of the Amended Credit Facility to repay all outstanding loans under the Original Credit Facility, unpaid accrued interest and fees on the closing date under the Original Credit Facility and certain expenses and fees. U.S. Dollar-denominated borrowings under the Amended Credit Facility bear interest, at the Company’s election, at the base rate or term SOFR plus an applicable rate ranging from 1.00% to 1.75% for term SOFR loans and from 0.00% to 0.75% for base rate loans, depending upon the Company’s consolidated net leverage ratio. Loans based on term SOFR also include a spread adjustment equal to 0.10% per annum. Borrowings under the Amended Credit Facility denominated in currencies other than U.S. Dollars bear interest at the alternative currency term rate plus the applicable rate ranging from 1.00% to 1.75%

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The Amended Credit Facility contains affirmative and negative covenants, financial covenants and events of default, including without limitation 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. Dividends and share repurchases are permitted in annual amounts not exceeding the greater of \$75 million annually and 25% of consolidated EBITDA if there is no default. If the consolidated net leverage ratio is less than 2.50 to 1.00, then the Company is no longer subject to restricted payments.

Financial covenants contained in the Amended Credit Facility include a consolidated interest coverage ratio test and a consolidated net leverage ratio test. The consolidated net leverage ratio at the end of a quarter may not be greater than 4.00 to 1.00, subject to a permitted increase during a four-quarter period after certain acquisitions. The Company has the option of replacing the consolidated net leverage ratio test with a consolidated senior net leverage ratio test if the Company issues certain types of unsecured notes, subject to certain limitations. Events of default in the Amended Credit Facility include without limitation defaults for non-payment, breach of representations and warranties, non-performance of covenants, cross-defaults, insolvency, and a change of control in certain circumstances. The occurrence of an event of default under the Amended Credit Facility could result in all loans and other obligations becoming immediately due and payable and the Amended Credit Facility being terminated. As of December 31, 2022 and December 31, 2021, the Company was in compliance with all of the Amended and Original Credit Facility covenants.

The weighted average variable interest rate incurred on the outstanding borrowings under the Original Credit Facility and the Amended Credit Facility during the twelve months ended December 31, 2022 was approximately 3.0%. As of December 31, 2022, the interest rate on the outstanding borrowings under the Amended Credit Facility was approximately 4.9%. In addition to paying interest on outstanding principal under the Original Credit Facility, the Company was required to pay a commitment fee ranging from 0.2% to 0.3% depending on the Company's consolidated net leverage ratio under the Original Revolver in respect of the unutilized commitments thereunder. As part of the Amended Credit Facility, the Company is required to pay a commitment fee ranging from 0.150% to 0.275% related to unutilized commitments under the Amended Revolver, depending on the Company's consolidated net leverage ratio. The Company had unused capacity under the Amended Revolver of approximately \$301.1 million, which is net of bank letters of credit of approximately \$3 million, as of December 31, 2022.

The Company previously capitalized \$23.7 million of certain third-party debt issuance costs in connection with executing the Original Credit Facility. Approximately \$15.5 million of the capitalized costs were attributed to the Original 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 Original 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 Original Credit Facility. Prior to executing the Amended Credit Facility, as of December 31, 2021, the Company had \$8.0 million of debt issuance costs recorded as a reduction of Long-term debt attributable to the Original Credit Facility and \$4.3 million of debt issuance costs recorded within Other assets attributable to the Original Credit Facility.

In connection with executing the Amended Credit Facility, the Company recorded a loss on extinguishment of debt of approximately \$6.8 million which includes the write-off of certain previously unamortized deferred financing costs as well as a portion of the third-party and creditor debt issuance costs incurred to execute the Amended Credit Facility. Also in connection with executing the Amended Credit Facility, during the second quarter of 2022, the Company capitalized \$2.2 million of certain third-party and creditor debt issuance costs. Approximately \$0.7 million of the capitalized costs were attributed to the Amended Euro Term Loan and Amended U.S. Term Loan. These costs were recorded as a direct reduction of Long-term debt on the Consolidated Balance Sheet. Approximately \$1.5 million of the capitalized costs were attributed to the Amended Revolver and recorded within Other assets on the Consolidated Balance Sheet. These capitalized costs, as well as the previously capitalized costs that were not written off will collectively be amortized into Interest expense over the five year term of the Amended Credit Facility. As of December 31, 2022, the Company had \$2.0 million of debt issuance costs recorded as a reduction of Long-term debt on the Consolidated Balance Sheet and \$4.3 million of debt issuance costs recorded within Other assets on the Consolidated Balance Sheet.

The Original 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, the aggregate interest rate on the swaps, including the fixed base rate plus an applicable margin, was 3.1%. The Amended Credit Facility does not require the Company to fix variable interest rates on any portion of its borrowings. In October 2022, the Company's interest rate swap contracts expired. Upon expiration, the Company received a cash payment from the counterparties of \$0.2 million. See Note 25 of Notes to Consolidated Financial Statements.

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Industrial development bonds

As of December 31, 2022 and 2021, 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 Amended 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, 2022, was approximately \$35 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, 2022 were approximately \$5 million.

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

	Year Ended December 31,		
	2022	2021	2020
Interest expense	\$ 33,691	\$ 19,089	\$ 23,552
Amortization of debt issuance costs	2,942	4,749	4,749
Total	\$ 36,633	\$ 23,838	\$ 28,301

Based on the variable interest rates associated with the Amended Credit Facility and the Original Credit Facility, as of December 31, 2022 and 2021, the amounts at which the Company's total debt were recorded are not materially different from their fair market value.

At December 31, 2022, 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:

For the year ended December 31, 2023	\$ 19,063
For the year ended December 31, 2024	23,740
For the year ended December 31, 2025	37,745
For the year ended December 31, 2026	37,705
For the year ended December 31, 2027	825,964
Total maturities on debt in the next five fiscal years	944,217

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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, 2022 and 2021:

	Pension Benefits						Other Post-Retirement Benefits	
	2022			2021			2022	2021
	Foreign	U.S.	Total	Foreign	U.S.	Total	U.S.	U.S.
Change in benefit obligation								
Gross benefit obligation at beginning of year	\$ 228,752	\$ 103,420	\$ 332,172	\$ 247,675	\$ 109,969	\$ 357,644	\$ 2,010	\$ 3,234
Service cost	465	47	512	698	547	1,245	—	1
Interest cost	3,079	2,145	5,224	2,594	1,737	4,331	37	27
Employee contributions	20	—	20	71	—	71	—	—
Effect of plan amendments	303	—	303	—	—	—	(2)	(78)
Curtailement gain	207	—	207	—	—	—	—	—
Plan settlements	(1,726)	—	(1,726)	(541)	—	(541)	—	—
Benefits paid	(5,343)	(5,838)	(11,181)	(6,869)	(5,064)	(11,933)	(176)	(182)
Plan expenses and premiums paid	(66)	—	(66)	(74)	—	(74)	—	—
Transfer in of business acquisition	—	—	—	231	—	231	—	—
Actuarial (gain) loss	(77,244)	(20,688)	(97,932)	(4,160)	(3,769)	(7,929)	(263)	(992)
Translation differences and other	(17,893)	—	(17,893)	(10,873)	—	(10,873)	—	—
Gross benefit obligation at end of year	<u>\$ 130,554</u>	<u>\$ 79,086</u>	<u>\$ 209,640</u>	<u>\$ 228,752</u>	<u>\$ 103,420</u>	<u>\$ 332,172</u>	<u>\$ 1,606</u>	<u>\$ 2,010</u>

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

	Pension Benefits						Other Post-Retirement Benefits	
	2022			2021			2022	2021
	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	\$ 216,886	\$ 77,680	\$ 294,566	\$ 228,789	\$ 73,481	\$ 302,270	\$ —	\$ —
Actual return on plan assets	(65,396)	(14,871)	(80,267)	915	7,201	8,116	—	—
Employer contributions	3,241	2,620	5,861	4,289	2,063	6,352	176	182
Employee contributions	20	—	20	71	—	71	—	—
Plan settlements	(1,726)	—	(1,726)	(541)	—	(541)	—	—
Benefits paid	(5,343)	(5,838)	(11,181)	(6,869)	(5,065)	(11,934)	(176)	(182)
Plan expenses and premiums paid	(66)	—	(66)	(74)	—	(74)	—	—
Translation differences	(17,672)	—	(17,672)	(9,694)	—	(9,694)	—	—
Fair value of plan assets at end of year	\$ 129,944	\$ 59,591	\$ 189,535	\$ 216,886	\$ 77,680	\$ 294,566	\$ —	\$ —
Net benefit obligation recognized	\$ (610)	\$ (19,495)	\$ (20,105)	\$ (11,866)	\$ (25,740)	\$ (37,606)	\$ (1,606)	\$ (2,010)
Amounts recognized in the balance sheet consist of:								
Non-current assets	\$ 8,639	\$ —	\$ 8,639	\$ 7,916	\$ —	\$ 7,916	\$ —	\$ —
Current liabilities	(210)	(1,128)	(1,338)	(191)	(1,137)	(1,328)	(222)	(220)
Non-current liabilities	(9,039)	(18,367)	(27,406)	(19,591)	(24,603)	(44,194)	(1,384)	(1,790)
Net benefit obligation recognized	\$ (610)	\$ (19,495)	\$ (20,105)	\$ (11,866)	\$ (25,740)	\$ (37,606)	\$ (1,606)	\$ (2,010)
Amounts not yet reflected in net periodic benefit costs and included in accumulated other comprehensive loss:								
Prior service (cost) credit	(333)	(36)	(369)	(22)	43	21	16	46
Accumulated (loss) gain	(10,387)	2,532	(7,855)	(19,163)	(9,763)	(28,926)	1,218	1,034
AOI	(10,720)	2,496	(8,224)	(19,185)	(9,720)	(28,905)	1,234	1,080
Cumulative employer contributions in excess of or (below) net periodic benefit cost	10,110	(21,991)	(11,881)	7,319	(16,020)	(8,701)	(2,840)	(3,090)
Net benefit obligation recognized	\$ (610)	\$ (19,495)	\$ (20,105)	\$ (11,866)	\$ (25,740)	\$ (37,606)	\$ (1,606)	\$ (2,010)

The accumulated benefit obligation for all defined benefit pension plans was \$204.5 million (\$79.1 million U.S. and \$125.4 million Foreign) and \$321.5 million (\$103.4 million U.S. and approximately \$218.1 million Foreign) as of December 31, 2022 and 2021, respectively.

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

	2022			2021		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Accumulated benefit obligation	5,983	79,086	85,069	128,268	103,420	231,688
Fair value of plan assets	1,842	59,591	61,433	119,181	77,680	196,861

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

	2022			2021		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Projected benefit obligation	\$ 71,318	\$ 79,086	\$ 150,404	\$ 138,963	\$ 103,420	\$ 242,383
Fair value of plan assets	61,805	59,591	121,396	119,181	77,680	196,861

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Components of net periodic benefit costs – pension plans:

	2022			2021		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Service cost	\$ 465	\$ 47	\$ 512	\$ 698	\$ 547	\$ 1,245
Interest cost	3,079	2,145	5,224	2,594	1,737	4,331
Expected return on plan assets	(4,472)	(3,509)	(7,981)	(4,686)	(3,611)	(8,297)
Settlement loss (gain)	(71)	—	(71)	35	—	35
Curtailement charge	207	—	207	—	—	—
Actuarial loss amortization	658	323	981	996	2,252	3,248
Prior service cost (credit) amortization	3	7	10	3	7	10
Net periodic benefit (income) cost	\$ (131)	\$ (987)	\$ (1,118)	\$ (360)	\$ 932	\$ 572

	2020		
	Foreign	U.S.	Total
Service cost	\$ 4,340	\$ 491	\$ 4,831
Interest cost	3,416	2,923	6,339
Expected return on plan assets	(4,262)	(4,810)	(9,072)
Settlement (gain) loss	(88)	22,667	22,579
Curtailement charge	(1,155)	—	(1,155)
Actuarial loss amortization	886	2,110	2,996
Prior service credit amortization	(167)	—	(167)
Net periodic benefit cost	\$ 2,970	\$ 23,381	\$ 26,351

Other changes recognized in other comprehensive income – pension plans:

	2022			2021		
	Foreign	U.S.	Total	Foreign	U.S.	Total
Net (gain) loss arising during the period	\$ (7,008)	\$ (3,555)	\$ (10,563)	\$ (388)	\$ (448)	\$ (836)
Settlement loss	—	(323)	(323)	(83)	(2,252)	(2,335)
Prior service (cost) credit	303	(7)	296	—	(7)	(7)
Actuarial (loss) gain	(587)	1,247	660	(954)	(6,925)	(7,879)
Curtailement Recognition	(3)	—	(3)	(3)	—	(3)
Effect of exchange rates on amounts included in AOCI	(1,169)	—	(1,169)	(1,390)	—	(1,390)
Total recognized in other comprehensive (income) loss	(8,464)	(2,638)	(11,102)	(2,818)	(9,632)	(12,450)
Total recognized in net periodic benefit cost and other comprehensive (income) loss	\$ (8,595)	\$ (3,625)	\$ (12,220)	\$ (3,178)	\$ (8,700)	\$ (11,878)

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	2020		
	Foreign	U.S.	Total
Net (gain) loss arising during period	\$ (1,594)	\$ 1,536	\$ (58)
Recognition of amortization in net periodic benefit cost			
Settlement loss	(39)	(22,667)	(22,706)
Prior service credit	1,325	50	1,375
Actuarial (loss) gain	(758)	3,967	3,209
Curtailment Recognition	(3)	—	(3)
Effect of exchange rates on amounts included in AOCI	1,535	—	1,535
Total recognized in other comprehensive loss	466	(17,114)	(16,648)
Total recognized in net periodic benefit cost and other comprehensive loss	<u>\$ 3,436</u>	<u>\$ 6,267</u>	<u>\$ 9,703</u>

Components of net periodic benefit costs – other postretirement plan:

	2022	2021	2020
Service cost	\$ —	\$ 1	\$ 5
Interest cost	37	27	77
Actuarial loss amortization	(79)	(82)	(5)
Prior service credit amortization	(32)	(31)	—
Net periodic benefit costs	<u>\$ (74)</u>	<u>\$ (85)</u>	<u>\$ 77</u>

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

	2022	2021	2020
Net (gain) loss arising during period	\$ (263)	\$ (992)	\$ (864)
Recognition of amortizations in net periodic benefit cost	(2)	(78)	—
Prior service credit	32	31	—
Actuarial gain amortization	79	82	5
Total recognized in other comprehensive (income) loss	(154)	(957)	(859)
Total recognized in net periodic benefit cost and other comprehensive (income) loss	<u>\$ (228)</u>	<u>\$ (1,042)</u>	<u>\$ (782)</u>

Weighted-average assumptions used to determine benefit obligations as of December 31, 2022 and 2021:

	Pension Benefits		Other Postretirement Benefits	
	2022	2021	2022	2021
U.S. Plans:				
Discount rate	5.21%	2.58%	5.14%	2.45%
Rate of compensation increase	N/A	N/A	N/A	N/A
Foreign Plans:				
Discount rate	6.29%	1.71%	N/A	N/A
Rate of compensation increase	3.93%	2.21%	N/A	N/A

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Weighted-average assumptions used to determine net periodic benefit costs for the years ended December 31, 2022, 2021 and 2020:

	Pension Benefits			Other Postretirement Benefits		
	2022	2021	2020	2022	2021	2020
U.S. Plans:						
Discount rate	2.67 %	2.67 %	3.11 %	2.45 %	1.90 %	2.99 %
Expected long-term return on plan assets	5.75 %	5.75 %	6.50 %	N/A	N/A	N/A
Rate of compensation increase	N/A	6.00 %	6.00 %	N/A	N/A	N/A
Foreign Plans:						
Discount rate	3.97 %	1.38 %	2.30 %	N/A	N/A	N/A
Expected long-term return on plan assets	2.26 %	2.06 %	2.20 %	N/A	N/A	N/A
Rate of compensation increase	3.21 %	2.52 %	2.79 %	N/A	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, 2022, 2021 and 2020:

	2022	2021	2020
Health care cost trend rate for next year	5.60 %	5.65 %	5.70 %
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	4.00 %	4.00 %	4.50 %
Year that the rate reaches the ultimate trend rate	2047	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, 2022 and 2021 by asset category were as follows:

<i>Asset Category</i>	Target	2022	2021
U.S. Plans			
Equity securities	32 %	32 %	46 %
Debt securities	60 %	60 %	48 %
Other	8 %	8 %	6 %
Total	100 %	100 %	100 %
Foreign Plans			
Equity securities	15 %	8 %	36 %
Debt securities	79 %	79 %	43 %
Other	6 %	13 %	21 %
Total	100 %	100 %	100 %

As of December 31, 2022 and 2021, "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.

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Commingled Funds

Investments in the U.S. pooled separate accounts consist primarily of mutual funds, each of which follows a separate investment strategy, and are valued based on the reported unit value at year end. 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, 2022, the foreign pension plan commingled funds included approximately 34 percent of investments in equity securities, 50 percent of investments in fixed income securities, and 16 percent of other non-related investments, primarily real estate. 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, 2022, the U.S. pension plan pooled separate accounts included approximately 35 percent of investments in equity securities and 65 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. There were no such investments as of December 31, 2022.

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.

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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, 2022 and 2021, the U.S. and foreign plans' investments measured at fair value on a recurring basis were as follows:

U.S. Pension Assets	Total Fair Value	Fair Value Measurements at December 31, 2022		
		Using Fair Value Hierarchy		
		Level 1	Level 2	Level 3
Pooled separate accounts	\$ 54,596	\$ —	\$ 54,596	\$ —
Real estate	4,995	—	—	4,995
Subtotal U.S. pension plan assets in fair value hierarchy	\$ 59,591	\$ —	\$ 54,596	\$ 4,995
Total U.S. pension plan assets	\$ 59,591			
Foreign Pension Assets				
Cash and cash equivalents	\$ 4,923	\$ 4,923	\$ —	\$ —
Insurance contract	59,963	—	—	59,963
Diversified equity securities - registered investment companies	5,211	—	5,211	—
Fixed income – foreign registered investment companies	54,098	—	54,098	—
Real estate	3,907	—	—	3,907
Sub-total of foreign pension assets in fair value hierarchy	\$ 128,102	\$ 4,923	\$ 59,309	\$ 63,870
Commingled funds measured at NAV	1,842			
Total foreign pension assets	\$ 129,944			
Total pension assets in fair value hierarchy	\$ 187,693	\$ 4,923	\$ 113,905	\$ 68,865
Total pension assets measured at NAV	1,842			
Total pension assets	\$ 189,535			

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

U.S. Pension Assets	Total Fair Value	Fair Value Measurements at December 31, 2021		
		Using Fair Value Hierarchy		
		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			

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, 2022 and 2021 were as follows:

	Insurance Contract	Real Estate	Alternative Investments	Total
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
Purchases	(1,136)	(122)	(6,979)	(8,237)
Unrealized losses	(32,305)	(1,842)	—	(34,147)
Currency translation adjustment	(6,123)	(681)	—	(6,804)
Balance as of December 31, 2022	\$ 59,963	\$ 8,902	\$ —	\$ 68,865

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

In 2018, the Company began the process of terminating a noncontributory U.S. pension plan. During 2019, the Company received a favorable termination determination letter from the I.R.S. and completed the termination during 2020. In order to terminate the plan in accordance with I.R.S. and Pension Benefit Guaranty Corporation requirements, the Company was required to fully fund the plan on a termination basis and the amount necessary to do so was approximately \$1.8 million, subject to final true up adjustments. In 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.

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, 2025. As of January 1, 2021, the last valuation date available for the multiemployer plan, total plan liabilities were approximately \$583 million. As of December 31, 2021, the multiemployer pension plan had total plan assets of approximately \$427 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 \$0.1 million during the year ended December 31, 2022. The Employee Retirement Income Security Act of 1974, as amended by the Multi-Employer Pension Plan Amendments Act of 1980, imposes certain contingent liabilities upon an employer who is a contributor to a multiemployer pension plan if the employer withdraws from the plan or the plan is terminated or experiences a mass withdrawal. While the Company may also have additional liabilities imposed by law as a result of its participation in the multiemployer defined benefit pension plan, there is no liability as of December 31, 2022.

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 \$5.2 million to its pension plans (approximately \$2.6 million U.S. and \$2.6 million Foreign) and approximately \$0.2 million to its other postretirement benefit plan in 2023.

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 Benefits
	Foreign	U.S.	Total	
2023	\$ 6,097	\$ 6,868	\$ 12,965	\$ 222
2024	5,935	6,290	12,225	203
2025	6,423	6,271	12,694	190
2026	7,117	6,272	13,389	174
2027	6,844	6,254	13,098	151
2028 to 2032	41,304	29,868	71,172	597

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 \$0.7 million, \$3.0 million and \$2.5 million for the years ended December 31, 2022, 2021 and 2020, respectively, representing the annual accrued benefits under this plan.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Defined Contribution Plan

The Company sponsors various defined contribution plans in both its U.S. and non-U.S. subsidiaries, under which eligible participants may defer a portion of their compensation up to the allowable amount as determined by the plan. All contributions and Company matches are invested at the direction of the participant. The most significant plan is the Company's primary U.S. 401(k) plan with an employer match covering a majority of its U.S. employees. 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. See Note 8 of Notes to Consolidated Financial Statements. Total Company contributions under this U.S. 401(k) plan were \$7.2 million, \$4.8 million and \$5.7 million for the years ended December 31, 2022, 2021 and 2020, respectively. Annual cash contributions to all other of the Company's defined contribution plans is approximately \$1 million.

Note 22 – Other Non-Current Liabilities

Other non-current liabilities as of December 31, 2022 and 2021 were as follows:

	2022	2021
Uncertain tax positions (includes interest and penalties - See Note 10)	\$ 20,322	\$ 28,665
Non-current income taxes payable (See Note 10)	8,883	8,500
Environmental reserves (See Note 26)	4,342	4,424
Deferred and other long-term compensation	3,132	4,820
Acquisition-related earnout liability (See Note 2)	1,024	1,568
Inactive subsidiary litigation and settlement reserve (See Note 26)	311	410
Other	650	1,228
Total other non-current liabilities	<u>\$ 38,664</u>	<u>\$ 49,615</u>

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 17,950,264 and 17,897,033 shares issued and outstanding as of December 31, 2022 and 2021, respectively. The change in shares issued and outstanding during 2022 was primarily related to 52,653 shares issued for share-based compensation plans and 578 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, 2022, 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, 2022, 2021 and 2020. As of December 31, 2022, there was approximately \$86.9 million of common stock remaining to be purchased under this share repurchase program.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

The following table shows the reclassifications from and resulting balances of AOCI for the years ended December 31, 2022, 2021 and 2020:

	Currency Translation Adjustments	Defined Benefit Pension Plans	Unrealized Gain (Loss) in Available-for- Sale Securities	Derivative Instruments	Total
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)
Other comprehensive (loss) income before reclassifications	(82,318)	10,789	(3,276)	—	(74,805)
Amounts reclassified from AOCI	—	479	895	1,372	2,746
Related tax amounts	—	(2,691)	500	—	(2,191)
Balance as of December 31, 2022	\$ (132,161)	\$ (4,595)	\$ (1,484)	\$ —	\$ (138,240)

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 (loss) 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, 2022
Using Fair Value Hierarchy

Assets	Total Fair Value	Level 1	Level 2	Level 3
Company-owned life insurance	\$ 2,114	\$ —	\$ 2,114	\$ —
Total	\$ 2,114	\$ —	\$ 2,114	\$ —

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	\$ —

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, 2022 or 2021, respectively.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Items Measured at Fair Value on Nonrecurring Basis

In addition to assets and liabilities that are measured at fair value on a recurring basis, the Company is also required to measure certain items at fair value on a nonrecurring basis. The Company recorded non-cash impairment charges on goodwill and trademarks of \$93.0 million and \$38.0 million in the years ended December 31, 2022 and 2020, respectively. The determination of the estimated fair values requires Management's judgment and involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, the WACC, royalty rates, asset lives and market multiples, among other items. For non-observable market values, the Company determines fair value using acceptable valuation principles, including the excess earnings, relief from royalty, lost profit or cost methods. Significant unobservable inputs used to estimate the fair values of the EMEA reporting unit as of December 31, 2022 included a WACC of 12.0%. See Note 16 of Notes to Consolidated Financial Statements.

Note 25 – Hedging Activities

In order to satisfy certain requirements of the Original 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 were designated as cash flow hedges and, as such, the contracts were marked-to-market at each reporting date and any unrealized gains or losses were included in AOCI to the extent effective and reclassified to interest expense in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur.

In June 2022, the Company amended the Original Credit Facility. See Note 20 of Notes to the Consolidated Financial Statements. The Amended Credit Facility does not require the Company to fix variable interest rates on any portion of its borrowings. In October 2022, the Company's interest rate swap contracts expired. Upon expiration, the Company received a cash payment from the counterparties for approximately \$0.2 million. As of December 31, 2022, the Company has not entered into any similar interest rate swap contracts.

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

Derivatives designed as Cash flow hedges:	Consolidated Balance Sheet Location	Fair Value	
		December 31,	
		2022	2021
Interest rate swaps	Prepaid expenses and other current assets	\$ —	\$ —
	Other non-current liabilities	—	1,782
		<u>\$ —</u>	<u>\$ 1,782</u>

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

Derivatives designated as cash flow hedges:		December 31,	
		2022	2021
Interest rate swaps	AOCI	\$ —	\$ 1,372
		<u>\$ —</u>	<u>\$ 1,372</u>

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

Amount and location of expense reclassified from AOCI into expense (Effective Portion)	Interest expense, net	For the Years Ended December 31,		
		2022	2021	2020
		\$ —	\$ (2,649)	\$ (1,754)

Prior to expiration in October 2022, interest rate swaps were entered into with a limited number of counterparties, each of which allowed 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 were recorded on a net basis within the Consolidated Balance Sheets.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

Note 26 – Commitments and Contingencies

In the early 1990s, 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 2022 and will continue into 2023. As of December 31, 2022, 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, 2022, 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, program management, and soil vapor testing.

An inactive subsidiary of the Company that was acquired in the late 1970s 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 \$0.2 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, 2022, 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

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, 2022, 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 26 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, 2022, for which \$5.3 million is accrued within other accrued liabilities and other non-current liabilities on the Company's Consolidated Balance Sheet as of December 31, 2022. Comparatively, as of December 31, 2021, the Company had \$5.6 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 2020, 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 \$0.3 million and \$0.4 million were accrued as of December 31, 2022 and 2021, respectively, to provide for such anticipated future environmental assessments and remediation costs.

During 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 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 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 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 2021. These tax credits can be used to offset future Brazilian federal taxes. As of December 31, 2022, the Company has used the full amount of credits. Also during 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.

QUAKER CHEMICAL CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - Continued
(Dollars in thousands, except per share amounts, unless otherwise stated)

In connection with obtaining regulatory approvals for the Combination, certain steel and aluminum related product lines of Houghton were divested in August 2019. In 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 responded to the subject matters of the indemnification claim and during 2022, the matter was resolved consistent with the Company's expectations and position that there were no amounts owed by the Company.

During 2021, two of the Company's locations suffered property damages as a result of flooding and electrical 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 2021 will be covered under the Company's property insurance coverage, net of an aggregate deductible of \$2.0 million. Through December 31, 2022, the Company has received payments from its insurers of \$4.6 million associated with these events. During 2022, the Company recognized a gain on insurance recoveries of \$1.8 million. The Company has recorded an insurance receivable associated with these events of \$0.2 million as of December 31, 2022. The Company and its insurance carrier continue to review 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, 2022.

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, 2022, 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, 2022. 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, 2022, the Company’s internal control over financial reporting is effective based on those criteria.

The effectiveness of the Company’s internal control over financial reporting as of December 31, 2022 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.”

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, 2022, 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, 2022.

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 2023 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, 2022 (the “2023 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 2023 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 2023 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 2023 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 2023 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 Party Transactions.”

Equity Compensation Plans

The following table sets forth certain information relating to the Company’s equity compensation plans as of December 31, 2022. Each number of securities reflected in the table is a reference to shares of Quaker common stock.

Plan Category	Equity Compensation Plan Information		
	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders	119,482	\$ 183.39	514,070 (1)
Equity compensation plans not approved by security holders	—	—	—
Total	119,482	\$ 183.39	514,070 (1)

(1) As of December 31, 2022, 304,900 of these shares were available for issuance as restricted stock awards under the Company’s 2001 Global Annual Incentive Plan, 148,169 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 61,001 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 2023 Proxy Statement beginning with and including the caption “Certain Relationships and Related Party Transactions” to, but not including, the caption “Proposal 5 — Ratification of Appointment of Independent Registered Public Accounting Firm,” (ii) the information in the 2023 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 2023 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 2023 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, 2023.

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 — [Amended and Restated By-laws \(effective December 19, 2022\). Incorporated by reference to Exhibit 3.1 as filed by Registrant within its current report on Form 8-K on December 20, 2022.](#)
- 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 — [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. †](#)
- 10.5 — [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. †](#)

- 10.6 — [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. †](#)
- 10.7 — [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. †](#)
- 10.8 — [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. †](#)
- 10.9 — [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. †](#)
- 10.10 — [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. †](#)
- 10.11 — [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. †](#)
- 10.12 — [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. †](#)
- 10.13 — [Expatriate Agreement by and between the Registrant and Dieter Laininger, dated September 27, 2017, effective August 1, 2019. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†](#)
- 10.14 — [Expatriate Agreement by and between the Registrant and Adrian Steeples, dated October 12, 2017, effective August 1, 2019. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q, filed on November 12, 2019.†](#)
- 10.15 — [Form of Memorandum of Employment by and between the Registrant and certain executive officers \(including Robert Traub, Jeewat Bijlani, and David Slinkman\). Incorporated by reference to Exhibit 10.3 as filed by the Registrant with Form 10-Q, filed on November 12, 2019 .†](#)
- 10.16 — [Form of Change of Control Agreement by and between the Registrant and certain executive officers \(including Robert Traub, Jeewat Bijlani, and David Slinkman\). Incorporated by reference to Exhibit 10.4 as filed by the Registrant with Form 10-Q, filed on November 12, 2019 .†](#)
- 10.17 — [Memorandum of Employment by and between 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. †](#)
- 10.18 — [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. †](#)
- 10.19 — [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. †](#)
- 10.20 — [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.†](#)
- 10.21 — [Memorandum of Employment by and between the Registrant and Melissa Leneis dated May 24, 2022 and effective July 5, 2022. Incorporated by reference to Exhibit 10.2 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2022.†](#)
- 10.22 — [Form of Change of Control Agreement by and between the Registrant and certain executive officers \(including Melissa Leneis\). Incorporated by reference to Exhibit 10.3 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2022.†](#)

- 10.23 — [Memorandum of Employment by and between the Registrant and Dhuwa Rai dated June 23, 2022 and effective July 6, 2022. Incorporated by reference to Exhibit 10.4 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2022.](#) †
- 10.24 — [Form of Change of Control Agreement by and between the Registrant and certain executive officers \(including Dhuwa Rai\). Incorporated by reference to Exhibit 10.5 as filed by the Registrant with Form 10-Q for the quarter ended June 30, 2022.](#) †
- 10.25 — [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.](#) †
- 10.26 — [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.](#) †
- 10.27 — [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.](#) †
- 10.28 — [Retirement Savings Plan, as amended and restated effective January 22, 2021, approved November 1, 2021.](#) *†
- 10.29 — [Quaker Houghton Annual Incentive Plan \(as amended and restated effective November 17, 2021\).](#) *†
- 10.30 — [2011 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 31, 2011.](#) †
- 10.31 — [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.](#) †
- 10.32 — [2016 Long-Term Performance Incentive Plan. Incorporated by reference to Appendix C to the Registrant's definitive proxy statement filed on March 28, 2016.](#) †
- 10.33 — [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.](#) †
- 10.34 — [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.](#) †
- 10.35 — [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.](#) †
- 10.36 — [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.](#) †
- 10.37 — [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.](#) †
- 10.38 — [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.](#) †
- 10.39 — [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.](#) †
- 10.40 — [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.](#) †
- 10.41 — [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.](#) †

10.42 —	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. †
10.43 —	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.
10.44 —	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.
10.45 —	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.
10.46 —	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. ***
10.47 —	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.
10.48 —	Amendment No. 2, dated as of December 10, 2021, to the Credit Agreement, dated as of August 1, 2019.*
10.49 —	Amendment No. 3, dated as of June 17, 2022, to the Credit Agreement, dated as of August 1, 2019, as amended. Incorporated by reference to Exhibit 10.1 as filed by the Registrant with Form 8-K filed on June 21, 2022.
10.50 —	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.
10.51 —	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.***
10.52 —	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.***
10.53 —	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. †
10.54 —	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. †
10.55 —	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.

SUBSIDIARIES AND AFFILIATES OF THE REGISTRANT

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Quaker Houghton Argentina S.A.	Argentina	100%
+* Quaker Australia Holdings Pty. Limited	Australia	100%
* Quaker Chemical (Australasia) Pty. Limited	Australia	100%
+* Quaker Houghton Australia Pty. Ltd. (formerly Houghton Australia Party Ltd)	Australia	100%
* Surface Technology Australia	Australia	100%
** Primex, Ltd.	Barbados	33%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	Belgium	100%
+* 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 Houghton Canada Inc. (formerly Lubricor, Inc.)	Canada	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 Shanghai Limited	China	100%
* Houghton CZ s.r.o	Czech Republic	100%
+* Quaker Denmark ApS	Denmark	100%
* Tel Nordic ApS	Denmark	100%
* Quaker Houghton Denmark filial af Quaker Houghton Sales BV (formerly Quaker Houghton Denmark filial af Quaker Houghton Sales Europe BV)	Denmark	100%
* Quaker Houghton BV (formerly Quaker Chemical BV)	Dubai	100%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	Dubai	100%
* SIFCO Concepts Sarl	France	100%
* Quaker Houghton Support France EURL (formerly Quaker Chemical Services EURL)	France	100%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	France	100%
* ECL Engineered Custom Lubricants GmbH	Germany	100%
* Quaker Houghton Production Deutschland GmbH (formerly Houghton Deutschland GmbH)	Germany	100%
* Grindaix GmbH	Germany	100%
* Quaker Houghton Support Deutschland	Germany	100%
* Ultraseal Germany GmbH	Germany	100%
* Internationale Metall Impragnier GmbH	Germany	100%
* Maldaner GmbH	Germany	100%

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Sterr & Eder Industrieservice GmbH	Germany	100%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	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 Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	Ireland	100%
* 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%
* Quaker Houghton Sales Europe BV (formerly Quaker Houghton Sales Europe BV)	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 Asesoría Especializada 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%
* Ultraseal Portugal	Portugal	100%
+* Quaker Chemical Holdings South Africa (Pty) Limited	Republic of South Africa	100%
* Quaker Chemical South Africa (Pty.) Limited	Republic of South Africa	100%
* Quaker Houghton Russia BV	Russia	100%

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* Quaker Houghton Singapore (formerly Houghton Singapore)	Singapore	100%
* GHI Asia Pacific Limited	Singapore	100%
* Houghton Holdings	South Africa	100%
** Korea Houghton Corporation	South Korea	50%
* Quaker Chemical, S.A.	Spain	100%
* Verkol S.A.U.	Spain	100%
+* Quaker Spain Holding, SLU	Spain	100%
* Houghton Iberica S.A.	Spain	100%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	Spain	100%
* Quaker Houghton Production Sweden AB (formerly Binol AB)	Sweden	100%
* SIFCO Concepts Sweden	Sweden	100%
* Quaker Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	Sweden	100%
* Quaker Houghton Taiwan Co. Limited (formerly 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%
+* 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 Specialty Chemicals (UK) Limited	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 Houghton Sales BV (formerly Quaker Houghton Sales Europe BV)	United Kingdom	100%
+* SB Decking, Inc. (formerly Selby, Battersby & Co.)	United States	100%

Name	Jurisdiction of Incorporation	Percentage of Voting Securities Owned Directly or Indirectly by Quaker
* 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 America Inc.	United States	100%
+* Wallover Enterprises, Inc.	United States	100%
* Wallover Oil Company Incorporated	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

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 February 23, 2023 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
February 23, 2023

**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: February 23, 2023

/s/ ANDREW E. TOMETICH

Andrew E. Tometich
Chief Executive Officer

**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: February 23, 2023

/s/ Shane W. Hostetter

Shane W. Hostetter
Chief Financial Officer

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, 2022 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: February 23, 2023

/s/ ANDREW E. TOMETICH

Andrew E. Tometich
Chief Executive Officer of Quaker Chemical Corporation

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, 2022 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: February 23, 2023

/s/ SHANE W. HOSTETTER

Shane W. Hostetter
Chief Financial Officer of Quaker Chemical Corporation