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 1-31763

KRONOS WORLDWIDE, INC.

(Exact name of Registrant as specified in its charter)

DELAWARE (State or other jurisdiction of incorporation or organization)	76-0294959 (IRS Employer Identification No.)

5430 LBJ Freeway, Suite 1700
Dallas, Texas 75240-2620
(Address of principal executive offices)

Registrant's telephone number, including area code: (972) 233-1700

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	KRO	NYSE

No securities are registered pursuant to Section 12(g) of the Act.

Indicate by check mark:

If the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

If the Registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

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 and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files). Yes ☒ No ☐

Whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

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

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.☒

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. ☐

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). ☐

Whether the Registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the 22.1 million shares of voting stock held by nonaffiliates of Kronos Worldwide, Inc. as of June 30, 2022 (the last business day of the Registrant's most recently-completed second fiscal quarter) approximated $407.1 million.

Number of shares of the registrant's common stock, $.01 par value per share, outstanding on February 28, 2023: 115,308,469.

Documents incorporated by reference

The information required by Part III is incorporated by reference from the Registrant's definitive proxy statement to be filed with the Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this report.

Forward-Looking Information

This Annual Report on Form 10-K contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended. Statements in this Annual Report that are not historical facts are forward-looking in nature and represent management’s beliefs and assumptions based on currently available information. In some cases, you can identify forward-looking statements by the use of words such as “believes,” “intends,” “may,” “should,” “could,” “anticipates,” “expects” or comparable terminology, or by discussions of strategies or trends. Although we believe the expectations reflected in forward-looking statements are reasonable, we do not know if these expectations will be correct. Such statements by their nature involve substantial risks and uncertainties that could significantly impact expected results. Actual future results could differ materially from those predicted. The factors that could cause our actual future results to differ materially from those described herein are the risks and uncertainties discussed in this Annual Report and those described from time to time in our other filings with the SEC and include, but are not limited to, the following:

- Future supply and demand for our products
- The extent of the dependence of certain of our businesses on certain market sectors
- The cyclicality of our business
- Customer and producer inventory levels
- Unexpected or earlier-than-expected industry capacity expansion
- Changes in raw material and other operating costs (such as energy and ore costs)
- Changes in the availability of raw materials (such as ore)
- General global economic and political conditions that harm the worldwide economy, disrupt our supply chain, increase material and energy costs or reduce demand or perceived demand for our TiO_2 products or impair our ability to operate our facilities (including changes in the level of gross domestic product in various regions of the world, natural disasters, terrorist acts, global conflicts and public health crises such as COVID-19)
- Operating interruptions (including, but not limited to, labor disputes, leaks, natural disasters, fires, explosions, unscheduled or unplanned downtime, transportation interruptions, cyber-attacks, certain regional and world events or economic conditions and public health crises such as COVID-19)
- Competitive products and substitute products
- Customer and competitor strategies
- Potential consolidation of our competitors
- Potential consolidation of our customers
- The impact of pricing and production decisions
- Competitive technology positions
- Potential difficulties in upgrading or implementing accounting and manufacturing software systems
- The introduction of trade barriers or trade disputes
- Fluctuations in currency exchange rates (such as changes in the exchange rate between the U.S. dollar and each of the euro, the Norwegian krone and the Canadian dollar and between the euro and the Norwegian krone), or possible disruptions to our business resulting from uncertainties associated with the euro or other currencies
- Our ability to renew or refinance credit facilities
- Increases in interest rates
- Our ability to maintain sufficient liquidity

- The ultimate outcome of income tax audits, tax settlement initiatives or other tax matters, including future tax reform
- Our ability to utilize income tax attributes, the benefits of which may or may not have been recognized under the more-likely-than-not recognition criteria
- Environmental matters (such as those requiring compliance with emission and discharge standards for existing and new facilities)
- Government laws and regulations and possible changes therein including new environmental, health and safety or other regulations (such as those seeking to limit or classify TiO_2 or its use)
- Possible future litigation.

Should one or more of these risks materialize (or the consequences of such a development worsen), or should the underlying assumptions prove incorrect, actual results could differ materially from those forecasted or expected. We disclaim any intention or obligation to update or revise any forward-looking statements whether as a result of changes in information, future events or otherwise.

PART I

ITEM 1. BUSINESS

General

Kronos Worldwide, Inc. (NYSE: KRO) (Kronos), incorporated in Delaware in 1989, is a leading global producer and marketer of value-added titanium dioxide pigments, or TiO_2, a base industrial product used in a wide range of applications. We, along with our distributors and agents, sell and provide technical services for our products to approximately 4,000 customers in 100 countries with the majority of our sales in Europe, North America and the Asia Pacific region. We believe we have developed considerable expertise and efficiency in the manufacture, sale, shipment and service of our products in domestic and international markets.

TiO_2 is a white inorganic pigment used in a wide range of products for its exceptional durability and its ability to impart whiteness, brightness and opacity. TiO_2 is a critical component of everyday applications, such as coatings, plastics and paper, as well as many specialty products such as inks, cosmetics and pharmaceuticals. TiO_2 is widely considered to be superior to alternative white pigments in large part due to its hiding power (or opacity), which is the ability to cover or mask other materials effectively and efficiently. TiO_2 is designed, marketed and sold based on specific end-use applications.

TiO_2 is the largest commercially used whitening pigment because it has a high refractive rating, giving it more hiding power than any other commercially produced white pigment. In addition, TiO_2 has excellent resistance to interaction with other chemicals, good thermal stability and resistance to ultraviolet degradation. Although there are other white pigments on the market, we believe there are no effective substitutes for TiO_2 because no other white pigment has the physical properties for achieving comparable opacity and brightness or can be incorporated in as cost-effective a manner. Pigment extenders such as kaolin clays, calcium carbonate and polymeric opacifiers are used together with TiO_2 in a number of end-use markets. However, these products are not able to duplicate the opacity performance characteristics of TiO_2 and we believe these products are unlikely to have a significant impact on the use of TiO_2.

TiO_2 is considered a “quality-of-life” product. Demand for TiO_2 has generally been driven by worldwide gross domestic product and has generally increased with rising standards of living in various regions of the world. According to industry estimates, TiO_2 consumption has grown at a compound annual growth rate of approximately 2% since 2000. Per capita consumption of TiO_2 in Western Europe and North America far exceeds that in other areas of the world, and these regions are expected to continue to be the largest consumers of TiO_2 on a per capita basis for the foreseeable future. We believe that Western Europe and North America currently each account for approximately 16% of global TiO_2 consumption. Markets for TiO_2 are generally increasing in China, the Asia Pacific region, South America and Eastern Europe and we believe these are significant markets which will continue to grow as economies in these regions develop and quality-of-life products, including TiO_2, experience greater demand.

At December 31, 2022, approximately 50% of our common stock was owned by Valhi, Inc. (NYSE: VHI) and approximately 31% was owned by a wholly-owned subsidiary of NL Industries, Inc. (NYSE: NL). Valhi also owns approximately 83% of NL Industries’ outstanding common stock. A wholly-owned subsidiary of Contran Corporation held approximately 92% of Valhi’s outstanding common stock. As discussed in Note 1 to our Consolidated Financial Statements, Lisa K. Simmons and a trust established for the benefit of Ms. Simmons and her late sister and their children (the “Family Trust”) may be deemed to control Contran, and therefore may be deemed to indirectly control the wholly-owned subsidiary of Contran, Valhi, NL and us.

Products and end-use markets

Including our predecessors, we have produced and marketed TiO_2 in North America and Europe, our primary markets, for over 100 years. We believe we are the largest TiO_2 producer in Europe with 45% of our 2022 sales volumes attributable to markets in Europe. The table below shows our estimated market share for our significant markets, Europe and North America, for the last three years.

	2020	2021	2022
Europe	17%	15%	**14%**
North America	18%	17%	**17%**

We believe we are the leading seller of TiO_2 in several countries, including Germany. Overall, we are one of the top five producers of TiO_2 in the world, with an estimated 7% share of worldwide TiO_2 sales volume in 2022.

We offer our customers a broad portfolio of products that include over 40 different TiO_2 pigment grades under the *KRONOS*® trademark, which provide a variety of performance properties to meet customers' specific requirements. Our major customers include domestic and international paint, plastics, decorative laminate and paper manufacturers. We ship TiO_2 to our customers in either a dry or slurry form via rail, truck and/or ocean carrier. Sales of our core TiO_2 pigments represented approximately 92% of our net sales in 2022. We and our agents and distributors primarily sell our products in three major end-use markets: coatings, plastics and paper.

The following tables show our approximate TiO_2 sales volume by geographic region and end-use for the year ended December 31, 2022:

Sales volume percentages by geographic region	
Europe	45 %
North America	39 %
Asia Pacific	9 %
Rest of World	7 %

Sales volume percentages by end-use	
Coatings	50 %
Plastics	29 %
Paper	8 %
Other	13 %

Some of the principal applications for our products include the following:

TiO_2 for coatings – Our TiO_2 is used to provide opacity, durability, tinting strength and brightness in industrial coatings, as well as coatings for commercial and residential interiors and exteriors, automobiles, aircraft, machines, appliances, traffic paint and other special purpose coatings. The amount of TiO_2 used in coatings varies widely depending on the opacity, color and quality desired. In general, the higher the opacity requirement of the coating, the greater the TiO_2 content.

TiO_2 for plastics – We produce TiO_2 pigments that improve the optical and physical properties of plastics, including whiteness and opacity. TiO_2 is used to provide opacity to items such as containers and packaging materials, and vinyl products such as windows, door profiles and siding. TiO_2 also generally provides hiding power, neutral undertone, brightness and surface durability for housewares, appliances, toys, computer cases and food packages. TiO_2's high brightness along with its opacity, is used in some engineering plastics to help mask their undesirable natural color. TiO_2 is also used in masterbatch, which is a concentrate of TiO_2 and other additives and is one of the largest uses for TiO_2 in the plastics end-use market. In masterbatch, the TiO_2 is dispersed at high concentrations into a plastic resin and is then used by manufacturers of plastic containers, bottles, packaging and agricultural films.

TiO_2 for paper – Our TiO_2 is used in the production of several types of paper, including laminate (decorative) paper, filled paper and coated paper to provide whiteness, brightness, opacity and color stability. Although we sell our TiO_2 to all segments of the paper end-use market, our primary focus is on the TiO_2 grades used in paper laminates, where several layers of paper are laminated together using melamine resin under high temperature and pressure. The top layer of paper contains TiO_2 and plastic resin and is the layer that is printed with decorative patterns. Paper laminates are used to replace materials such as wood and tile for such applications as counter tops, furniture and wallboard. TiO_2 is beneficial in these applications because it assists in preventing the material from fading or changing color after prolonged exposure to sunlight and other weathering agents.

TiO_2 for other applications – We produce TiO_2 to improve the opacity and hiding power of printing inks. TiO_2 allows inks to achieve very high print quality while not interfering with the technical requirements of printing machinery, including low abrasion, high printing speed and high temperatures. Our TiO_2 is also used in textile applications where TiO_2 functions as an opacifying and delustering agent. In man-made fibers such as rayon and polyester, TiO_2 corrects an

otherwise undesirable glossy and translucent appearance. Without the presence of TiO_2, these materials would be unsuitable for use in many textile applications.

We produce high-purity sulfate process anatase TiO_2 used to provide opacity, whiteness and brightness in a variety of cosmetic and personal care products, such as skin cream, lipstick, eye shadow and toothpaste. In pharmaceuticals, our TiO_2 is used commonly as a colorant in tablet and capsule coatings as well as in liquid medicines to provide uniformity of color and appearance. KRONOS® purified anatase grades meet the applicable requirements of the CTFA (Cosmetics, Toiletries and Fragrances Association), USP and BP (United States Pharmacopoeia and British Pharmacopoeia) and the FDA (United States Food and Drug Administration).

Our TiO_2 business is enhanced by the following three complementary businesses, which comprised approximately 8% of our net sales in 2022:

- We own and operate an ilmenite mine in Norway pursuant to a governmental concession with an unlimited term. Ilmenite is a raw material used directly as a feedstock by some sulfate-process TiO_2 plants. We supply ilmenite to our sulfate plants in Europe. We also sell ilmenite ore to third parties, some of whom are our competitors. We also sell an ilmenite-based specialty product to the oil and gas industry. The mine has estimated ilmenite reserves that are expected to last at least 50 years.

- We manufacture and sell iron-based chemicals, which are co-products and processed co-products of sulfate and chloride process TiO_2 pigment production. These co-product chemicals are marketed through our Ecochem division and are primarily used as treatment and conditioning agents for industrial effluents and municipal wastewater as well as in the manufacture of iron pigments, cement and agricultural products.

- We manufacture and sell other specialty chemicals, which are side-stream products from the production of TiO_2. These specialty chemicals are used in applications in the formulation of pearlescent pigments, production of electroceramic capacitors for cell phones and other electronic devices and natural gas pipe and other specialty applications.

Manufacturing, operations and properties

We produce TiO_2 in two crystalline forms: rutile and anatase. Rutile TiO_2 is manufactured using both a chloride production process and a sulfate production process, whereas anatase TiO_2 is only produced using a sulfate production process. Manufacturers of many end-use applications can use either form, especially during periods of tight supply for TiO_2. The chloride process is the preferred form for use in coatings and plastics, the two largest end-use markets. Due to environmental factors and customer considerations, the proportion of TiO_2 industry sales represented by chloride process pigments has remained stable relative to sulfate process pigments, and in 2022, chloride process production facilities represented approximately 45% of industry capacity. The sulfate process is preferred for use in selected paper products, ceramics, rubber tires, man-made fibers, pharmaceuticals and cosmetics. Once an intermediate TiO_2 pigment has been produced by either the chloride or sulfate process, it is “finished” into products with specific performance characteristics for particular end-use applications through proprietary processes involving various chemical surface treatments and intensive micronizing (milling).

- *Chloride process* – The chloride process is a continuous process in which chlorine is used to extract rutile TiO_2. The chloride process produces less waste than the sulfate process because much of the chlorine is recycled and feedstock bearing higher titanium content is used. The chloride process also has lower energy requirements and is less labor-intensive than the sulfate process, although the chloride process requires a higher-skilled labor force. The chloride process produces an intermediate base pigment with a wide range of properties.

- *Sulfate process* – The sulfate process is a batch process in which sulfuric acid is used to extract the TiO_2 from ilmenite or titanium slag. After separation from the impurities in the ore (mainly iron), the TiO_2 is precipitated and calcined to form an intermediate base pigment ready for sale or can be upgraded through finishing treatments.

We produced 517,000, 545,000 and 492,000 metric tons of TiO_2 in 2020, 2021 and 2022, respectively. Our production volumes include our share of the output produced by our TiO_2 manufacturing joint venture discussed below. Our average production capacity utilization rates were approximately 92% in 2020, full practical capacity in 2021 and 89% in 2022. Our production rates in 2020 were impacted by the COVID-19 pandemic (primarily in the third quarter). In the fourth quarter of 2022 we adjusted production levels to correspond with reduced customer demand in our European and export markets resulting from challenging economic conditions and geopolitical uncertainties.

We operate facilities throughout North America and Europe, including the only sulfate process plant in North America and four TiO_2 plants in Europe (one in each of Leverkusen, Germany; Nordenham, Germany; Langerbrugge, Belgium; and Fredrikstad, Norway). In North America, we have a TiO_2 plant in Varennes, Quebec, Canada and, through the manufacturing joint venture described below, a 50% interest in a TiO_2 plant near Lake Charles, Louisiana.

As part of our long-term strategy to increase chloride process production, we phased-out sulfate production at our Leverkusen facility during 2020. Our chloride process production and remaining sulfate production capacity has increased by approximately 5% over the past ten years due to debottlenecking programs with only moderate capital expenditures. We operated our facilities at reduced capacities in the fourth quarter of 2022 and into 2023. Based on current assumptions about market performance and demand, we expect to operate our TiO_2 plants at 80% to 90% capacity in the first half of 2023 and near full practical capacity levels by the second half of 2023.

The following table presents the division of our expected 2023 manufacturing capacity by plant location and type of manufacturing process:

		% of capacity by TiO_2 manufacturing process	
Facility	**Description**	**Chloride**	**Sulfate**
Leverkusen, Germany (1)	TiO_2 production, chloride process, co-products	32 %	- %
Nordenham, Germany	TiO_2 production, sulfate process, co-products	-	11
Langerbrugge, Belgium	TiO_2 production, chloride process, co-products, titanium chemicals products	15	-
Fredrikstad, Norway (2)	TiO_2 production, sulfate process, co-products	-	7
Varennes, Canada	TiO_2 production, chloride and sulfate process, slurry facility, titanium chemicals products	17	3
Lake Charles, LA, US (3)	TiO_2 production, chloride process	15	-
Total		79 %	21 %

(1) The Leverkusen facility is located within an extensive manufacturing complex owned by Bayer AG. We own the Leverkusen facility, which represents about one-third of our current TiO_2 production capacity, but we lease the land under the facility from Bayer under a long-term agreement which expires in 2050. Lease payments are periodically negotiated with Bayer for periods of at least two years at a time. A majority-owned subsidiary of Bayer provides some raw materials including chlorine, auxiliary and operating materials, utilities and services necessary to operate the Leverkusen facility under separate supplies and services agreements.

(2) The Fredrikstad facility is located on public land and is leased until 2063.

(3) We operate the facility near Lake Charles through a joint venture with Venator Investments LLC (Venator Investments), a wholly-owned subsidiary of Venator Group, of which Venator Materials PLC (Venator) owns 100% and the amount indicated in the table above represents the share of TiO_2 produced by the joint venture to which we are entitled. See Note 5 to our Consolidated Financial Statements and “TiO_2 manufacturing joint venture.” The joint venture owns the land and facility.

We own the land underlying all of our principal production facilities unless otherwise indicated in the table above.

We also operate an ilmenite mine in Norway pursuant to a governmental concession with an unlimited term. In addition, we operate a rutile slurry manufacturing plant near Lake Charles, Louisiana, which converts dry pigment primarily manufactured for us at the Lake Charles TiO_2 facility into a slurry form that is then shipped to customers.

We have corporate and administrative offices located in the U.S., Germany, Norway, Canada, Belgium and France.

TiO_2 manufacturing joint venture

Kronos Louisiana, Inc., one of our subsidiaries, and Venator Investments each own a 50% interest in a manufacturing joint venture, Louisiana Pigment Company, L.P. (LPC). LPC owns and operates a chloride-process TiO_2 plant located near Lake Charles, Louisiana. We and Venator share production from the plant equally pursuant to separate offtake agreements, unless we and Venator otherwise agree.

A supervisory committee directs the business and affairs of the joint venture, including production and output decisions. This committee is composed of four members, two of whom we appoint and two of whom Venator appoints. Two general managers manage the operations of the joint venture acting under the direction of the supervisory committee. We appoint one general manager and Venator appoints the other.

We do not consolidate LPC because we do not control it. We account for our interest in the joint venture by the equity method. The joint venture operates on a break-even basis and therefore we do not have any equity in earnings of the joint venture. We are required to purchase one half of the TiO_2 produced by the joint venture. All costs and capital expenditures are shared equally with Venator with the exception of feedstock (purchased natural rutile ore or chlorine slag) and packaging costs for the pigment grades produced. Our share of net costs is reported as cost of sales as the TiO_2 is sold. See Notes 5 and 14 to our Consolidated Financial Statements.

Raw materials

The primary raw materials used in chloride process TiO_2 are titanium-containing feedstock (purchased natural rutile ore or chlorine slag), chlorine and petroleum coke. Chlorine is available from a number of suppliers, while petroleum coke is available from a limited number of suppliers. Titanium-containing feedstock suitable for use in the chloride process is available from a limited but increasing number of suppliers principally in Australia, South Africa, Sierra Leone, Canada and India. We purchase feedstock for our chloride process TiO_2 from the following primary suppliers for certain contractually specified volumes for delivery extending, in some cases, through 2026:

Supplier	Product	Renewal Terms
Rio Tinto Iron and Titanium Ltd.	Chloride process grade slag	Auto-renews bi-annually
Rio Tinto Iron and Titanium Ltd.	Upgraded slag	Auto-renews annually
Eramet SA	Chloride process grade slag	Renewal terms upon negotiation
Sierra Rutile Limited	Rutile ore	Renewal terms upon negotiation
Iluka Resources Limited	Rutile ore	Renewal terms upon negotiation
Saraf Agencies Private Limited	Chloride process grade slag	Renewal terms upon negotiation

In the past we have been, and we expect that we will continue to be, successful in obtaining short-term and long-term extensions to these and other existing supply contracts prior to their expiration. We expect the raw materials purchased under these contracts, and contracts that we may enter into, will meet our chloride process feedstock requirements over the next several years. Contracts may be terminated with a 12-month written notice (generally for multi-year agreement terms) or based on certain defaults by either party or failure to agree on pricing as noted in the agreements.

The primary raw materials used in sulfate process TiO_2 are titanium-containing feedstock, primarily ilmenite or purchased sulfate grade slag and sulfuric acid. Sulfuric acid is available from a number of suppliers. Titanium-containing feedstock suitable for use in the sulfate process is available from a limited number of suppliers principally in Norway, Canada, Australia, India and South Africa. As one of the few vertically integrated producers of sulfate process TiO_2, we operate a rock ilmenite mine in Norway, which provided all of the feedstock for our European sulfate process TiO_2 plants in 2022. We expect ilmenite production from our mine to meet our European sulfate process feedstock requirements for the foreseeable future. For our Canadian sulfate process plant, we purchase sulfate grade slag primarily from Rio Tinto Fer et Titane Inc. under a supply contract that renews annually, subject to termination upon twelve months written notice. We expect the raw materials purchased under this contract, and contracts that we may enter into, to meet our sulfate process feedstock requirements over the next several years.

Many of our raw material contracts contain fixed quantities we are required to purchase or specify a range of quantities within which we are required to purchase. The pricing under these agreements is generally negotiated quarterly or semi-annually.

The following table summarizes our raw materials purchased or mined in 2022.

Production process/raw material	Raw materials procured or mined
	(In thousands of metric tons)
Chloride process plants -	
Purchased slag or rutile ore	488
Sulfate process plants:	
Ilmenite ore mined and used internally	220
Purchased slag	20

Sales and marketing

Our marketing strategy is aimed at developing and maintaining strong relationships with new and existing customers. Because TiO_2 represents a significant input cost for our customers, the purchasing decisions are often made by our customers' senior management. We work to maintain close relationships with the key decision makers through in-depth and frequent contact. We endeavor to extend these commercial and technical relationships to multiple levels within our customers' organizations using our direct sales force and technical service group to accomplish this objective. We believe this helps build customer loyalty and strengthens our competitive position. Close cooperation and strong customer relationships enable us to stay closely attuned to trends in our customers' businesses. Where appropriate, we work in conjunction with our customers to solve formulation or application problems by modifying specific product properties or developing new pigment grades. We also focus our sales and marketing efforts on those geographic and end-use market segments where we believe we can realize higher selling prices. This focus includes continuously reviewing and optimizing our customer and product portfolios.

We also work directly with our customers to monitor the success of our products in their end-use applications, evaluate the need for improvements in our product and process technology and identify opportunities to develop new product solutions for our customers. Our marketing staff closely coordinates with our sales force and technical specialists to ensure the needs of our customers are met, and to help develop and commercialize new grades where appropriate.

We sell a majority of our products through our direct sales force operating in Europe and North America. We also utilize sales agents and distributors who are authorized to sell our products in specific geographic areas. In Europe, our sales efforts are conducted primarily through our direct sales force and our sales agents. Our agents do not sell any TiO_2 products other than KRONOS® branded products. In North America, our sales are made primarily through our direct sales force and supported by a network of distributors. We have increased our marketing efforts over the last several years in export markets and our sales are now made through our direct sales force, sales agents and distributors. In addition to our direct sales force and sales agents, many of our sales agents also act as distributors to service our customers in all regions. We offer customer and technical service to customers who purchase our products through distributors as well as to our larger customers serviced by our direct sales force.

We sell to a diverse customer base with only one customer representing 10% or more of our net sales in 2022 (Behr Process Corporation – 10%). Our largest ten customers accounted for approximately 33% of net sales in 2022.

Neither our business as a whole nor any of our principal product groups is seasonal to any significant extent. However, TiO_2 sales are generally higher in the second and third quarters of the year, due in part to the increase in coatings production in the spring to meet demand during the spring and summer painting seasons. With certain exceptions such as during the third quarter of 2020 as a result of the COVID-19 pandemic, and during the fourth quarter of 2022 as a result of reduced customer demand and unprecedentedly high energy costs, we have historically operated our production facilities at near full capacity rates throughout the entire year, which among other things helps to minimize our per-unit

production costs. As a result, we normally build inventories during the first and fourth quarters of each year in order to maximize our product availability during the higher demand periods normally experienced in the second and third quarters.

Competition

The TiO_2 industry is highly competitive. We compete primarily on the basis of price, product quality, technical service and the availability of high-performance pigment grades. Since TiO_2 is not traded through a commodity market, its pricing is largely a product of negotiation between suppliers and their respective customers. Price and availability are the most significant competitive factors along with quality and customer service for the majority of our product grades. Increasingly, we are focused on providing pigments that are differentiated to meet specific customer requests and specialty grades that are differentiated from our competitors' products. During 2022, we had an estimated 7% share of worldwide TiO_2 sales volume, and based on sales volume, we believe we are the leading seller of TiO_2 in several countries, including Germany.

Our principal competitors are The Chemours Company, Tronox Incorporated, LB Group Co. Ltd. and Venator Materials PLC. The top five TiO_2 producers (i.e. we and our four principal competitors) account for approximately 52% of the world's production capacity.

The following chart shows our estimate of worldwide production capacity in 2022:

Worldwide production capacity - 2022	
Chemours	15%
Tronox	12%
LB Group Co. Ltd.	11%
Venator	7%
Kronos	7%
Other	48%

Chemours has approximately one-half of total North American TiO_2 production capacity and is our principal North American competitor. LB Group Co. Ltd. previously announced it plans to add an additional 200,000 tons of chloride capacity which we expect will be added incrementally over the next several years.

The TiO_2 industry is characterized by high barriers to entry consisting of high capital costs, proprietary technology and significant lead times required to construct new facilities or to expand existing capacity. Therefore, over the past ten years, we and our competitors increased industry capacity through debottlenecking projects, although this increase only partly compensated for the shut-down of various TiO_2 plants throughout the world. Although overall industry demand is expected to increase in 2023, other than through debottlenecking projects and the LB Group Co. Ltd. expansion mentioned above, we do not expect any significant efforts will be undertaken by us or our principal competitors to further increase capacity and we believe it is unlikely any new TiO_2 plants will be constructed in Europe or North America for the foreseeable future. If actual developments differ from our expectations, the TiO_2 industry's and our performance could be unfavorably affected.

Research and development

We employ scientists, chemists, process engineers and technicians who are engaged in research and development, process technology and quality assurance activities in Leverkusen, Germany. These individuals have the responsibility for improving our chloride and sulfate production processes, improving product quality and strengthening our competitive position by developing new products and applications. Our expenditures for these activities were approximately $16 million in 2020, $17 million in 2021 and $15 million in 2022. We expect to spend approximately $17 million on research and development in 2023.

We continually seek to improve the quality of our grades and have been successful in developing new grades for existing and new applications to meet the needs of our customers and increase product life cycles. Since the beginning of 2017, we have added nine new grades for pigments and other applications.

Patents, trademarks, trade secrets and other intellectual property rights

We have a comprehensive intellectual property protection strategy that includes obtaining, maintaining and enforcing our patents, primarily in the United States, Canada and Europe. We also protect our trademark and trade secret rights and have entered into license agreements with third parties concerning various intellectual property matters. We have also from time to time been involved in disputes over intellectual property.

Patents – We have obtained patents and have numerous patent applications pending that cover our products and the technology used in the manufacture of our products. Our patent strategy is important to us and our continuing business activities. In addition to maintaining our patent portfolio, we seek patent protection for our technical developments, principally in the United States, Canada and Europe. U.S. patents are generally in effect for 20 years from the date of filing. Our U.S. patent portfolio includes patents having remaining terms ranging from one year to 20 years.

Trademarks and trade secrets – Our trademarks, including KRONOS®, are covered by issued and/or pending registrations, including in Canada and the United States. We protect the trademarks we use in connection with the products we manufacture and sell and have developed goodwill in connection with our long-term use of our trademarks. We conduct research activities in secret and we protect the confidentiality of our trade secrets through reasonable measures, including confidentiality agreements and security procedures, including data security. We rely upon unpatented proprietary knowledge and continuing technological innovation and other trade secrets to develop and maintain our competitive position. Our proprietary chloride production process is an important part of our technology and our business could be harmed if we fail to maintain confidentiality of our trade secrets used in this technology.

Regulatory and environmental matters

Our operations and properties are governed by various environmental laws and regulations which are complex, change frequently and have tended to become stricter over time. These environmental laws govern, among other things, the generation, storage, handling, use and transportation of hazardous materials; the emission and discharge of hazardous materials into the ground, air, or water; and the health and safety of our employees. Certain of our operations are, or have been, engaged in the generation, storage, handling, manufacture or use of substances or compounds that may be considered toxic or hazardous within the meaning of applicable environmental laws and regulations. As with other companies engaged in similar businesses, certain of our past and current operations and products have the potential to cause environmental or other damage. We have implemented and continue to implement various policies and programs in an effort to minimize these risks. Our policy is to comply with applicable environmental laws and regulations at all our facilities and to strive to improve our environmental performance and overall sustainability. It is possible that future developments, such as stricter requirements in environmental laws and enforcement policies, could adversely affect our operations, including production, handling, use, storage, transportation, sale or disposal of hazardous or toxic substances or require us to make capital and other expenditures to comply, and could adversely affect our consolidated financial position and results of operations or liquidity. During 2021, we were notified by government authorities in Norway that the classification of a dam at our mine facilities was changed to the highest level for Norwegian classification of dam structures. As a result, our mine operations are subject to a higher degree of oversight and regulation than existed prior to this change in classification and we have increased our capital expenditures to adapt to the higher classification standards.

We have a history of identifying new ways to reduce consumption and waste by converting byproducts to co-products through our KRONOS ecochem® products. Annually we update and publish our Safety, Environment, Energy and Quality Policy which is translated into local languages and distributed to all our employees and shared publicly via our website. We have implemented rigorous procedures for incident reporting and investigation, including root cause analysis of environmental and safety incidents and near misses. Because TiO_2 production requires significant energy input, we are focused on energy efficiency at all production locations. Three of our five production facilities maintain certifications to the ISO 50001:2018 Energy Management standard and all locations have local energy teams in place. These teams are responsible for maintaining ISO 50001:2018 certifications (where applicable), performing regular reviews of local energy consumption, making recommendations regarding capital projects that reduce energy consumption and associated Greenhouse Gas (GHG) emissions or enhance efficiency. When possible, we look for opportunities to partner with local government authorities through grant opportunities to reduce energy consumption and associated GHG emissions. We also actively manage potential water-related risks, including flooding and water shortages. Our manufacturing facilities are strategically located adjacent to sources of water, which we use for process operations and for

shipping and receiving raw materials and finished products. Water-critical processes are identified and ongoing efforts to minimize water use are incorporated into environmental planning.

Our U.S. manufacturing operations are governed by federal, state and local environmental and worker health and safety laws and regulations. These include the Resource Conservation and Recovery Act, or RCRA, the Occupational Safety and Health Act, the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, the Toxic Substances Control Act and the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, or CERCLA, as well as the state counterparts of these statutes. Some of these laws hold current or previous owners or operators of real property liable for the costs of cleaning up contamination, even if these owners or operators did not know of, and were not responsible for, such contamination. These laws also assess liability on any person who arranges for the disposal or treatment of hazardous substances, regardless of whether the affected site is owned or operated by such person. Although we have not incurred and do not currently anticipate any material liabilities in connection with such environmental laws, we may be required to make expenditures for environmental remediation in the future.

While the laws regulating operations of industrial facilities in Europe vary from country to country, a common regulatory framework is provided by the European Union, or the EU. Germany and Belgium are members of the EU and follow its initiatives. Norway is not a member but generally patterns its environmental regulatory actions after those of the EU.

From time to time, our facilities may be subject to environmental regulatory enforcement under U.S. and non-U.S. statutes. Typically, we establish compliance programs to resolve these matters. Occasionally, we may pay penalties. To date, such penalties have not involved amounts having a material adverse effect on our consolidated financial position, results of operations or liquidity. We believe all of our facilities are in substantial compliance with applicable environmental laws.

From time to time, new environmental, health and safety regulations are passed or proposed in the countries in which we operate or sell our products, seeking to regulate our operations or to restrict, limit or classify TiO_2. We believe we are in substantial compliance with laws applicable to the regulation of TiO_2. However, increased regulatory scrutiny could affect consumer perception of TiO_2 or limit the marketability and demand for TiO_2 or products containing TiO_2 and increase Kronos' regulatory and compliance costs.

On October 1, 2021, EU Regulation No. 1272/2008 classifying dry TiO_2 and mixtures containing dry TiO_2 as a suspected carcinogen via inhalation went into force. Our dry TiO_2 products do not meet the criteria set forth in the regulation and therefore do not require classification labels. On November 23, 2022 the Court of Justice of the European Union annulled the classification of TiO_2 as a suspected carcinogen in its entirety.

Our capital expenditures related to ongoing environmental compliance, protection and improvement programs, including capital expenditures which are primarily focused on increasing operating efficiency but also result in improved environmental protection such as lower emissions from our manufacturing facilities, were $17.6 million in 2022 and are currently expected to be approximately $20 million in 2023.

Environmental, Social and Governance (ESG)

We seek to operate our businesses in line with sound ESG principles that include corporate governance, social responsibility, sustainability and cybersecurity. We believe ESG means conducting operations with high standards of environmental and social responsibility, practicing exemplary ethical standards, focusing on safety as a top priority, respecting human rights and supporting our local communities, and continuously developing our employees. At our facilities, we undertake various environmental sustainability programs, and we promote social responsibility and volunteerism through programs designed to support and give back to the local communities in which we operate. Each of our locations maintains site-specific safety programs and disaster response and business continuity plans. All manufacturing facilities have detailed, site-specific emergency response procedures we believe adequately address regulatory compliance, vulnerability to potential hazards, emergency response and action plans, employee training, alarms and warning systems and crisis communication.

At a corporate level, we engage in periodic reviews of our cybersecurity programs, including cybersecurity risk and threats. Our cybersecurity programs are built on operations and compliance foundations. Operations focus on continuous detection, prevention, measurement, analysis and response to cybersecurity alerts and incidents and on emerging threats. Compliance establishes oversight of our cybersecurity programs by creating risk-based controls to protect the integrity, confidentiality, accessibility and availability of company data stored, processed, or transferred. We periodically update our board of directors on our cyber-related risks and cybersecurity programs.

In an effort to align our non-employee directors' financial interests with those of our stockholders, our Board established share ownership guidelines for our non-management directors.

We have taken steps to integrate ESG considerations into operating decisions with other critical business factors. We biennially publish an ESG Report, which is available on our public website. The primary purpose of our ESG Report is to describe our policies and programs in the area of ESG, including certain internal metrics and benchmarks related to various aspects of ESG. We voluntarily developed these internal metrics and benchmarks, which we use to identify progress and opportunities for improvement. These metrics are not intended to be directly comparable to similar metrics utilized by other companies to track ESG performance, as the standards, methodologies and assumptions used to determine these metrics vary by subsidiary and jurisdiction.

Human capital resources

Employees – Our operating results depend in part on our ability to successfully manage our human capital resources, including attracting, identifying and retaining key talent. We have a well-trained labor force with a substantial number of long-tenured employees. We provide competitive compensation and benefits to our employees, some of which are offered under collective bargaining agreements. In addition to salaries, these programs, which vary by country/region, can include annual bonuses, a defined benefit pension plan, a defined contribution plan with employer matching opportunities, healthcare and insurance benefits, health savings and flexible spending accounts, paid time off, family leave, family care resources, employee assistance programs and tuition assistance.

As of December 31, 2022, we employed the following number of people:

Europe	1,841
Canada	369
United States (1)	56
Total	2,266

(1) Excludes employees of our LPC joint venture.

Certain employees at each of our production facilities are organized by labor unions. We strive to maintain good relationships with all our employees, including the unions and workers' councils representing those employees. In Europe, our union employees are covered by master collective bargaining agreements for the chemical industry that are generally renewed annually. At December 31, 2022, approximately 88% of our worldwide workforce is organized under collective bargaining agreements. We did not experience any work stoppages during 2022, although it is possible that there could be future work stoppages or other labor disruptions that could materially and adversely affect our business, results of operations, financial position, or liquidity.

Health and safety – Protecting the health and safety of our workforce, our customers, our business partners and the natural environment is one of our core values. We are committed to maintaining a strong safety culture where all workers meet or exceed required industry performance standards and continuously seek to improve occupational and process safety performance. We are conducting our businesses in ways that provide all personnel with a safe and healthy work environment and have established safety and environmental programs and goals to achieve such results. We expect our manufacturing facilities to produce our products safely and in compliance with local regulations, policies, standards and practices intended to protect the environment and people and have established global policies designed to promote such compliance. We require our employees to comply with such requirements. We provide our workers with the tools and training necessary to make the appropriate decisions to prevent accidents and injuries. Each of our operating facilities develops, maintains and implements safety programs encompassing key aspects of their operations. In addition,

management reviews and evaluates safety performance throughout the year. We monitor conditions that could lead to a safety incident and keep track of injuries through reporting systems in accordance with laws in the jurisdictions in which we operate. With this data we calculate incident frequency rates to assess the quality of our safety performance. At the global level we also track overall safety performance. Each of our operating locations is subject to local laws and regulations that dictate what injuries are required to be recorded and reported, which may differ from location to location and result in different methods of injury rate calculation. For internal global tracking, benchmarking and identification of opportunities for improvement, we collect the location specific information and apply a U.S.-based injury rate calculation to arrive at a global total frequency rate, which is expressed as the number of incidents at our operating locations per 200,000 hours. This internal safety metric may not be directly comparable to a recordable incident rate calculated under U.S. law. Our global total frequency rate aggregating information about employees and contractors was 1.61 in 2020 (1.54 of the aggregate represents employees only) 1.08 in 2021 (0.90 of the aggregate represents employees only) and 1.01 in 2022 (0.86 of the aggregate represents employees only).

Diversity and inclusion – We recognize that everyone deserves respect and equal treatment. As a global company, we embrace diversity and collaboration in our workforce and our business initiatives. We are an equal opportunity employer and we base employment decisions on merit, competence and qualifications, without regard to race, color, national origin, gender, age, religion, disability, sex, sexual orientation or other characteristics protected by applicable law in the jurisdictions in which we operate. We promote a respectful, diverse and inclusive workplace in which all individuals are treated with respect and dignity.

Website and other available information

Our fiscal year ends December 31. Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports are available on our website at kronosww.com. These reports are available on the website, without charge, as soon as is reasonably practicable after we file or furnish them electronically with the Securities and Exchange Commission, or SEC. Additional information regarding us, including our Audit Committee charter, Code of Business Conduct and Ethics and our Corporate Governance Guidelines, can also be found at this website. Information contained on our website is not part of this report. We will also provide free copies of such documents upon written request. Such requests should be directed to the Corporate Secretary at our address on the cover page of this Form 10-K.

We are an electronic filer and the SEC maintains an internet website that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC at www.sec.gov.

ITEM 1A. RISK FACTORS

Below are certain risk factors associated with our business. See also certain risk factors discussed in Item 7-"*Management's Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates*." In addition to the potential effect of these risk factors, any risk factor which could result in reduced earnings or operating losses, or reduced liquidity, could in turn adversely affect our ability to service our liabilities or pay dividends on our common stock or adversely affect the quoted market prices for our securities.

Operational Risk Factors

Demand for, and prices of, certain of our products are influenced by changing market conditions for our products, which may result in reduced earnings or in operating losses.

Our sales and profitability are largely dependent on the TiO_2 industry. In 2022, 92% of our sales were attributable to sales of TiO_2. TiO_2 is used in many "quality of life" products for which demand historically has been linked to global, regional and local gross domestic product and discretionary spending, which can be negatively impacted by regional and world events or economic conditions. Such events are likely to cause a decrease in demand for our products and, as a result, may have an adverse effect on our results of operations and financial condition.

Pricing within the global TiO_2 industry over the long term is cyclical and changes in economic conditions worldwide can significantly impact our earnings and operating cash flows. Historically, the markets for many of our

products have experienced alternating periods of increasing and decreasing demand. Relative changes in the selling prices for our products are one of the main factors that affect the level of our profitability. In periods of increasing demand, our selling prices and profit margins generally will tend to increase, while in periods of decreasing demand our selling prices and profit margins generally tend to decrease. In addition, pricing may affect customer inventory levels as customers may from time to time accelerate purchases of TiO_2 in advance of anticipated price increases or defer purchases of TiO_2 in advance of anticipated price decreases. Our ability to further increase capacity without additional investment in greenfield or brownfield capacity may be limited and as a result, our profitability may become even more dependent upon the selling prices of our products.

The TiO_2 industry is concentrated and highly competitive and we face price pressures in the markets in which we operate, which may result in reduced earnings or operating losses.

The global market in which we operate our business is concentrated, with the top five TiO_2 producers accounting for approximately 52% of the world's production capacity and is highly competitive. Competition is based on a number of factors, such as price, product quality and service. Some of our competitors may be able to drive down prices for our products if their costs are lower than our costs. In addition, some of our competitors' financial, technological and other resources may be greater than our resources and such competitors may be better able to withstand changes in market conditions. Our competitors may be able to respond more quickly than we can to new or emerging technologies and changes in customer requirements. Further, consolidation of our competitors or customers may result in reduced demand for our products or make it more difficult for us to compete with our competitors. The occurrence of any of these events could result in reduced earnings or operating losses.

Higher costs or limited availability of our raw materials may reduce our earnings and decrease our liquidity. In addition, many of our raw material contracts contain fixed quantities we are required to purchase.

The number of sources for and availability of certain raw materials is specific to the particular geographical region in which our facilities are located. Titanium-containing feedstocks suitable for use in our TiO_2 facilities are available from a limited number of suppliers around the world. Political and economic instability or increased regulations in the countries from which we purchase or mine our raw material supplies could adversely affect raw material availability. If we or our worldwide vendors are unable to meet our planned or contractual obligations and we are unable to obtain necessary raw materials, we could incur higher costs for raw materials or we may be required to reduce production levels. We experienced increases in feedstock costs in 2021 and 2022, and we expect feedstock costs to continue to increase in 2023. We may also experience higher operating costs such as energy costs, which could affect our profitability. We may not always be able to increase our selling prices to offset the impact of any higher costs or reduced production levels, which could reduce earnings and decrease liquidity.

We have supply contracts that provide for our TiO_2 feedstock requirements that currently expire in 2023 and one contract that extends through 2026. While we believe we will be able to renew these contracts, we do not know if we will be successful in renewing them or in obtaining long-term extensions to them prior to expiration. Our current agreements (including those entered into through February 2023) require us to purchase certain minimum quantities of feedstock with minimum purchase commitments aggregating approximately $1.0 billion beginning in 2023 and extending through 2026. In addition, we have other long-term supply and service contracts that provide for various raw materials and services. These agreements require us to purchase certain minimum quantities or services with minimum purchase commitments aggregating approximately $84 million at December 31, 2022. Our commitments under these contracts could adversely affect our financial results if we significantly reduce our production and we are unable to modify the contractual commitments.

Financial Risk Factors

Our leverage may impair our financial condition or limit our ability to operate our businesses.

We have a significant amount of debt, primarily related to our Senior Notes issued in September 2017. As of December 31, 2022, our total consolidated debt was approximately $425 million. Our level of debt could have important consequences to our stockholders and creditors, including:

- making it more difficult for us to satisfy our obligations with respect to our liabilities;

- increasing our vulnerability to adverse general economic and industry conditions;
- requiring that a portion of our cash flows from operations be used for the payment of interest on our debt, which reduces our ability to use our cash flow to fund working capital, capital expenditures, dividends on our common stock, acquisitions or general corporate requirements;
- limiting the ability of our subsidiaries to pay dividends to us;
- limiting our ability to obtain additional financing to fund future working capital, capital expenditures, acquisitions or general corporate requirements;
- limiting our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate; and
- placing us at a competitive disadvantage relative to other less leveraged competitors.

Indebtedness outstanding under our global revolving credit facility accrues interest at variable rates. To the extent market interest rates rise, the cost of our debt could increase, adversely affecting our financial condition, results of operations and cash flows.

In addition to our indebtedness, we are party to various lease and other agreements (including feedstock purchase contracts and other long-term supply and service contracts, as discussed above) pursuant to which, along with our indebtedness, we are committed to pay approximately $689 million in 2023. Our ability to make payments on and refinance our debt and to fund planned capital expenditures depends on our ability to generate cash flow in the future. To some extent, this is subject to general economic, financial, competitive, legislative, regulatory and other factors that are beyond our control. In addition, our ability to borrow funds under our revolving credit facility in the future, in some instances, will depend in part on our ability to maintain specified financial ratios and satisfy certain financial covenants contained in the applicable credit agreement.

Our business may not generate cash flows from operating activities sufficient to enable us to pay our debts when they become due and to fund our other liquidity needs. As a result, we may need to refinance all or a portion of our debt before maturity. We may not be able to refinance any of our debt in a timely manner on favorable terms, if at all, in the current credit markets. Any inability to generate sufficient cash flows or to refinance our debt on favorable terms could have a material adverse effect on our financial condition.

Changes in currency exchange rates and interest rates can adversely affect our net sales, profits and cash flows.

We operate our businesses in several different countries and sell our products worldwide. For example, during 2022, 45% of our sales volumes were sold into European markets. The majority (but not all) of our sales from our operations outside the United States are denominated in currencies other than the United States dollar, primarily the euro, other major European currencies and the Canadian dollar. Therefore, we are exposed to risks related to the need to convert currencies we receive from the sale of our products into the currencies required to pay for certain of our operating costs and expenses and other liabilities (including indebtedness), all of which could result in future losses depending on fluctuations in currency exchange rates and affect the comparability of our results of operations between periods.

Legal, Compliance and Regulatory Risk Factors

We may be subject to litigation, the disposition of which could have a material adverse effect on our results of operations.

The nature of our operations exposes us to possible litigation claims, including disputes with customers and suppliers and matters relating to, among other things, antitrust, product liability, intellectual property, employment and environmental claims. It is possible that judgments could be rendered against us in these or other types of cases for which we could be uninsured or not covered by indemnity, or which may be beyond the amounts that we currently have reserved or anticipate incurring for such matters. Some of the lawsuits may seek fines or penalties and damages in large amounts or seek to restrict our business activities. Because of the uncertain nature of litigation and coverage decisions, we cannot predict the outcome of these matters or whether insurance claims may mitigate any damages ultimately determined to be

owed by us. Any liability we might incur in the future could be material. In addition, litigation is very costly, and the costs associated with defending litigation matters could have a material adverse effect on our results of operations.

Environmental, health and safety laws and regulations may result in increased regulatory scrutiny which could decrease demand for our products, increase our manufacturing and compliance costs or obligations and result in unanticipated losses which could negatively impact our financial results or limit our ability to operate our business.

From time to time, new environmental, health and safety regulations are passed or proposed in the countries in which we operate or sell our products, seeking to regulate our operations or to restrict, limit or classify TiO_2, or its use. Increased regulatory scrutiny could affect consumer perception of TiO_2 or limit the marketability and demand for TiO_2 or products containing TiO_2 and increase our manufacturing and regulatory compliance obligations and costs. Increased compliance obligations and costs or restrictions on operations, raw materials and certain TiO_2 applications could negatively impact our future financial results through increased costs of production, or reduced sales which may decrease our liquidity, operating income and results of operations.

If our intellectual property were to be declared invalid, or copied by or become known to competitors, or if our competitors were to develop similar or superior intellectual property or technology, our ability to compete could be adversely impacted.

Protection of our intellectual property rights, including patents, trade secrets, confidential information, trademarks and tradenames, is important to our business and our competitive position. We endeavor to protect our intellectual property rights in key jurisdictions in which our products are produced or used and in jurisdictions into which our products are imported. However, we may be unable to obtain protection for our intellectual property in key jurisdictions. Although we own and have applied for numerous patents and trademarks throughout the world, we may have to rely on judicial enforcement of our patents and other proprietary rights. Our patents and other intellectual property rights may be challenged, invalidated, circumvented and rendered unenforceable or otherwise compromised. A failure to protect, defend or enforce our intellectual property could have an adverse effect on our financial condition and results of operations. Similarly, third parties may assert claims against us and our customers and distributors alleging our products infringe upon third-party intellectual property rights.

Although it is our practice to enter into confidentiality agreements with our employees and third parties to protect our proprietary expertise and other trade secrets, these agreements may not provide sufficient protection for our trade secrets or proprietary know-how, or adequate remedies for breaches of such agreements may not be available in the event of an unauthorized use or disclosure of such trade secrets and know-how. We also may not be able to readily detect breaches of such agreements. The failure of our patents or confidentiality agreements to protect our proprietary technology, know-how or trade secrets could result in a material loss of our competitive position, which could lead to significantly lower revenues, reduced profit margins or loss of market share.

If we must take legal action to protect, defend or enforce our intellectual property rights, any suits or proceedings could result in significant costs and diversion of resources and management’s attention, and we may not prevail in any such suits or proceedings. A failure to protect, defend or enforce our intellectual property rights could have an adverse effect on our financial condition and results of operations.

Global climate change laws and regulations could negatively impact our financial results or limit our ability to operate our businesses.

We operate production facilities in several countries and many of our facilities require large amounts of energy, including electricity and natural gas, in order to conduct operations. The U.S. government and various non-U.S. governmental agencies of countries in which we operate have determined the consumption of energy derived from fossil fuels is a major contributor to climate change and have introduced or are contemplating regulatory changes in response to the potential impact of climate change, including laws and regulations requiring enhanced reporting (such as the Corporate Social Responsibility Directive adopted by the European Union on November 28, 2022) as well as legislation regarding carbon emission costs, GHG emissions and renewable energy targets. International treaties or agreements may also result in increasing regulation of GHG emissions, including emissions permits and/or energy taxes or the introduction of carbon emissions trading mechanisms. To date, the existing GHG laws and regulations in effect in the various countries in which we operate have not had a material adverse effect on our financial results. Until the timing, scope and extent of any new or future regulation becomes known, we cannot predict the effect on our business, results of operations or financial condition. However, if further GHG laws and regulations were to be enacted in one or more countries, it could negatively impact our future results of operations through increased costs of production, particularly as it relates to our energy requirements or our need to obtain emissions permits. If such increased costs of production were to materialize, we may be unable to pass price increases on to our customers to compensate for increased production costs, which may decrease our liquidity, operating income and results of operations. In addition, any adopted future laws and regulations focused on climate change and/or GHG emissions could negatively impact our ability (or that of our customers and suppliers) to compete with companies situated in areas not subject to such laws and regulations.

General Risk Factors

Operating as a global business presents risks associated with global and regional economic, political and regulatory environments.

We have significant international operations which, along with our customers and suppliers, could be substantially affected by a number of risks arising from operating a multi-national business, including trade barriers, tariffs, economic sanctions, exchange controls, global and regional economic downturns, terrorism, armed conflict (such as the current conflict between Russia and Ukraine), natural disasters, health crises (such as COVID-19) and political conditions. We may encounter difficulties enforcing agreements or other legal rights and our effective tax rate may fluctuate based on the variability of geographic earnings and statutory tax rates. TiO_2 production requires significant energy input, and economic sanctions or supply disruptions resulting from armed conflict could lead to additional volatility in global energy prices and energy supply disruptions. These risks, individually or in the aggregate, could have an adverse effect on our results of operations and financial condition.

Technology failures or cybersecurity breaches could have a material adverse effect on our operations.

We rely on integrated information technology systems to manage, process and analyze data, including to facilitate the manufacture and distribution of products to and from our plants, receive, process and ship orders, manage the billing of and collections from customers and manage payments to vendors. Although we have systems and procedures in place to protect our information technology systems, there can be no assurance that such systems and procedures will be sufficiently effective. Therefore, any of our information technology systems may be susceptible to outages, disruptions or destruction from power outages, telecommunications failures, employee error, cybersecurity breaches or attacks and other similar events. This could result in a disruption of our business operations, injury to people, harm to the environment or our assets, and/or the inability to access our information technology systems and could adversely affect our results of operations and financial condition. We have in the past experienced, and we expect to continue to experience, cyber-attacks, including phishing and other attempts to breach, or gain unauthorized access to, our systems, and vulnerabilities introduced into our systems by trusted third-party vendors who have experienced cyber-attacks. To date we have not suffered breaches in our systems, either directly or through a trusted third-party vendor, which have led to material losses. Due to the increase in global cybersecurity incidents it has become increasingly difficult to obtain insurance coverage on reasonable pricing terms to mitigate some risks associated with technology failures or cybersecurity breaches, and we are experiencing such difficulties in obtaining insurance coverage.

Physical impacts of climate change could have a material adverse effect on our costs and operations.

Climate change may increase both the frequency and severity of extreme weather conditions and natural disasters, such as hurricanes, thunderstorms, tornadoes, drought and snow or ice storms. Extreme weather conditions may increase our costs or cause damage to our facilities, and any damage resulting from extreme weather may not be fully insured. Climate change has also been associated with rising sea levels and many of our facilities are located near coastal areas or waterways where rising sea levels or flooding could disrupt our operations or adversely impact our facilities. Furthermore, periods of extended inclement weather or associated droughts or flooding may inhibit our facility operations and delay or hinder shipments of our products to customers. Any such events could have a material adverse effect on our costs or results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None

ITEM 2. PROPERTIES

Information on our properties is incorporated by reference to Item 1: Manufacturing, Operations and Properties above. Our corporate headquarters is located in Dallas, Texas. See Notes 1 and 7 to our Consolidated Financial Statements for information on our leases.

ITEM 3. LEGAL PROCEEDINGS

We are involved in various environmental, contractual, intellectual property, product liability and other claims and disputes incidental to our business. Information required for this Item is incorporated by reference to Note 15 to our Consolidated Financial Statements.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable

ITEM 5. MARKET FOR REGISTRANT’S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is listed and traded on the New York Stock Exchange (symbol: KRO). As of February 28, 2023, there were approximately 1,700 holders of record of our common stock.

Purchases of Equity Securities

In December 2010, our board of directors authorized the repurchase of up to 2.0 million shares of our common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. In 2022 we repurchased 217,778 shares, and we have 1,331,332 shares available for repurchase under the stock repurchase program at December 31, 2022. See Note 13 to our Consolidated Financial Statements.

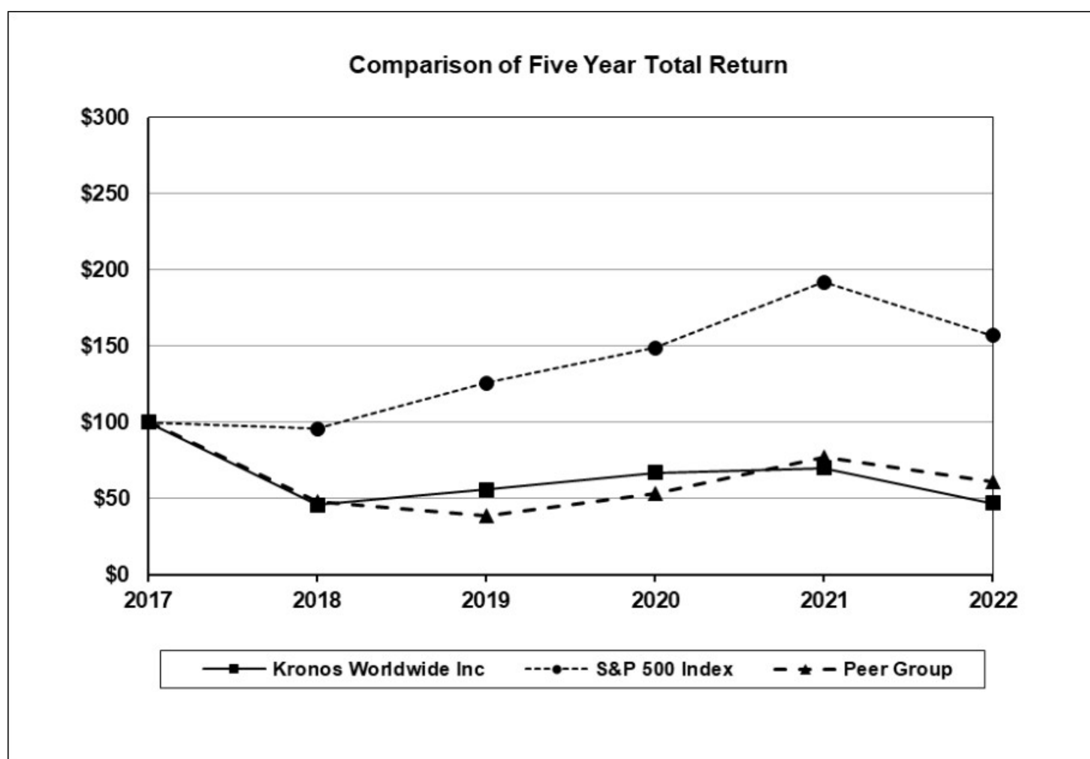
The following table discloses certain information regarding the shares of our common stock we purchased during the fourth quarter of 2022 (we made no purchases in October 2022). All of these purchases were made under the repurchase program in open market transactions.

Period	Total number of shares purchased	Average price paid per share	Total number of shares purchased as part of the publicly announced plan	Maximum number of shares that may yet be purchased under the publicly announced plan
November 2022	46,931	9.71	46,931	1,428,298
December 2022	96,966	9.46	96,966	1,331,332

Performance graph

Set forth below is a table and line graph comparing the yearly change in our cumulative total stockholder return on our common stock against the cumulative total return of the S&P 500 Composite Stock Index and an index of a self-selected peer group of companies. The peer group index is comprised of The Chemours Company, Venator Materials PLC and Tronox Ltd. The graph shows the value at December 31 of each year, assuming an original investment of $100 at December 31, 2017 and reinvestment of cash dividends and other distributions to stockholders.

	2017	2018	2019	2020	2021	2022
Kronos common stock	$ 100	$ 46	$ 56	$ 67	$ 70	$ 47
S&P 500 Composite Stock Index	100	96	126	149	192	157
Peer Group	100	48	39	53	77	61



The information contained in the performance graph shall not be deemed "soliciting material" or "filed" with the SEC, or subject to the liabilities of Section 18 of the Securities Exchange Act, except to the extent we specifically request that the material be treated as soliciting material or specifically incorporate this performance graph by reference into a document filed under the Securities Act or the Securities Exchange Act.

Equity compensation plan information

We have an equity compensation plan, which was approved by our stockholders, pursuant to which an aggregate of 200,000 shares of our common stock can be awarded to members of our board of directors. At December 31, 2022, 111,800 shares are available for awards under this plan. See Note 13 to our Consolidated Financial Statements.

ITEM 6. RESERVED

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

RESULTS OF OPERATIONS

Business overview

We are a leading global producer and marketer of value-added TiO_2. TiO_2 is used for a variety of manufacturing applications, including plastics, paints, paper and other industrial and specialty products. During 2022, 45% of our sales volumes were sold into European markets. We believe we are the largest producer of TiO_2 in Europe with an estimated 14% share of European TiO_2 sales volumes in 2022. In addition, we estimate we have a 17% share of North American TiO_2 sales volumes in 2022. Our production facilities are located in Europe and North America.

We consider TiO_2 to be a "quality of life" product, with demand affected by gross domestic product, or GDP, and overall economic conditions in our markets located in various regions of the world. Over the long-term, we expect demand for TiO_2 will grow by 2% to 3% per year, consistent with our expectations for the long-term growth in GDP. However, even if we and our competitors maintain consistent shares of the worldwide market, demand for TiO_2 in any interim or annual period may not change in the same proportion as the change in GDP, in part due to relative changes in the TiO_2 inventory levels of our customers. We believe our customers' inventory levels are influenced in part by their expectation for future changes in TiO_2 selling prices as well as their expectation for future availability of product. Although certain of our TiO_2 grades are considered specialty pigments, the majority of our grades and substantially all of our production are considered commodity pigment products with price and availability being the most significant competitive factors along with product quality, and customer and technical support services.

The factors having the most impact on our reported operating results are:

- TiO_2 selling prices,
- TiO_2 sales and production volumes,
- Manufacturing costs, particularly raw materials such as third-party feedstock, maintenance and energy-related expenses, and
- Currency exchange rates (particularly the exchange rate for the U.S. dollar relative to the euro, the Norwegian krone and the Canadian dollar and the euro relative to the Norwegian krone).

Our key performance indicators are our TiO_2 average selling prices, our TiO_2 sales and production volumes and the cost of titanium-containing feedstock purchased from third parties. TiO_2 selling prices generally follow industry trends and selling prices will increase or decrease generally as a result of competitive market pressures.

Executive summary

We reported net income of $104.5 million, or $.90 per share, in 2022 compared to $112.9 million, or $.98 per share in 2021. We reported lower net income in 2022 as compared to 2021 primarily due to lower income from operations resulting from the net effects of lower sales volumes, higher production costs, including raw material and energy costs and higher average TiO_2 selling prices. Our results of operations for the year ended December 31, 2022 were significantly impacted by unabsorbed fixed production and other costs associated with production curtailments at two of our European facilities (discussed in greater detail below) and reduced demand for certain of our products occurring primarily in our European and export markets. Comparability of our results was also impacted by the effects of changes in currency exchange rates.

We reported net income of $112.9 million, or $.98 per share, in 2021 compared to $63.9 million, or $.55 per share in 2020. Our results of operations for the year ended December 31, 2020 were significantly impacted by the COVID-19 pandemic, specifically through reduced demand for certain of our products occurring primarily in the second quarter, with demand improving throughout the second half of 2020 and through 2021.

Our net income in 2022 includes the recognition of a pre-tax insurance settlement gain of $2.7 million recognized in the third quarter ($2.2 million, or $.02 per share, net of income tax expense) related to a business interruption insurance claim arising from Hurricane Laura in 2020.

Our net income in 2020 includes the first quarter recognition of a pre-tax insurance settlement gain of $1.5 million ($1.2 million, or $.01 per share, net of income tax expense) related to a property damage claim.

Comparison of 2022 to 2021 Results of Operations

	Years ended December 31,			
	2021		2022	
	(Dollars in millions)			
Net sales	$ 1,939.4	100 %	**$ 1,930.2**	**100 %**
Cost of sales	1,493.2	77	**1,539.1**	**80**
Gross margin	446.2	23	**391.1**	**20**
Selling, general and administrative expense	248.9	13	**231.3**	**12**
Other operating income (expense):				
Currency transactions, net	1.6	-	**11.5**	**1**
Other operating expense, net	(11.8)	-	**(11.7)**	**(1)**
Income from operations	$ 187.1	10 %	**$ 159.6**	**8 %**
				% Change
TiO_2 operating statistics:				
Sales volumes*	563		**481**	**(15)%**
Production volumes*	545		**492**	**(10)%**
Percentage change in net sales:				
TiO_2 product pricing				**21 %**
TiO_2 sales volumes				**(15)**
TiO_2 product mix/other				**(1)**
Changes in currency exchange rates				**(5)**
Total				**- %**

** Thousands of metric tons*

Industry conditions and 2022 overview – We started 2022 with average TiO_2 selling prices 16% higher than at the beginning of 2021 and our average TiO_2 selling prices increased 16% throughout 2022 in response to our rising production costs. Overall sales volumes declined in 2022 compared to 2021 primarily due to demand contraction in our European and export markets, particularly in the third and fourth quarters.

The following table shows our capacity utilization rates during 2022 and 2021. Throughout most of 2021 and continuing into the first quarter of 2022, our production facilities operated at full practical capacity. Due to the decreased demand in our European and export markets along with increased production costs, particularly energy costs in Europe, we curtailed production in the third and fourth quarters of 2022 at certain of our European facilities to align our production and inventory levels to anticipated near-term customer demand.

	Production Capacity Utilization Rates	
	2021	2022
First Quarter	97%	**100%**
Second Quarter	100%	**95%**
Third Quarter	100%	**93%**
Fourth Quarter	100%	**65%**
Overall	100%	**89%**

Net sales – Our net sales in 2022 were consistent with net sales in 2021 primarily due to the net effects of a 21% increase in average TiO_2 selling prices (which increased net sales by approximately $407 million) and a 15% decrease in sales volumes (which decreased net sales by approximately $291 million). We estimate that changes in currency exchange rates (primarily the euro) decreased our net sales by approximately $106 million, or 5% in 2022 as compared to 2021. TiO_2 selling prices will increase or decrease generally as a result of competitive market pressures, changes in the relative level of supply and demand as well as changes in raw material and other manufacturing costs.

Our sales volumes decreased 15% in 2022 as compared to 2021 primarily due to lower demand in our European and export markets which we began experiencing towards the end of the second quarter and which accelerated during the third and fourth quarters of 2022. Our sales volumes were 40% lower in the fourth quarter of 2022 as compared to the fourth quarter of 2021. We also experienced lower sales volumes in our North American market in the second half of 2022, although to a lesser extent than the declines in our European and export markets.

Cost of sales and gross margin – Cost of sales increased $45.9 million, or 3%, in 2022 compared to 2021 primarily due to the net effects of higher production costs of approximately $285 million (including higher costs for raw materials and energy), a 15% decrease in sales volumes and changes in currency exchange rates. Our cost of sales as a percentage of net sales increased to 80% in 2022 compared to 77% in 2021 due to the impact of higher production costs, including higher raw material and energy costs partially offset by the favorable effects of higher average TiO_2 selling prices. In addition, cost of sales in 2022 includes approximately $26 million of unabsorbed fixed production and other manufacturing costs associated with production curtailments at certain of our European facilities throughout the fourth quarter.

Gross margin as a percentage of net sales decreased to 20% in 2022 compared to 23% in 2021. As discussed and quantified above, our gross margin as a percentage of net sales decreased primarily due to the net effects of higher average TiO_2 selling prices, lower production and sales volumes, higher production costs and fluctuations in currency exchange rates.

Selling, general and administrative expense – Selling, general and administrative expenses decreased $17.6 million, or 7%, in 2022 compared to 2021 primarily due to changes in currency exchange rates (primarily the euro) and lower variable costs (primarily distribution costs) related to lower overall sales volumes. Selling, general and administrative expense as a percentage of net sales decreased to 12% of net sales in 2022 compared to 13% in 2021.

Income from operations – Income from operations decreased by $27.5 million or 15%, from $187.1 million in 2021 to $159.6 million in 2022. Income from operations as a percentage of net sales decreased to 8% in 2022 from 10% in 2021. We experienced a loss from operations of $19.7 million in the fourth quarter of 2022 compared to income from operations of $52.0 million in the fourth quarter of 2021. This decrease was driven by the net effects of lower gross margin and selling, general and administrative expenses for the comparable periods discussed above. We also recognized a gain of $2.7 million in 2022 related to cash received from the settlement of a business interruption insurance claim related to hurricane Laura. See Note 17 to our Consolidated Financial Statements. We estimate that changes in currency exchange rates increased income from operations by approximately $23 million in 2022 as compared to 2021, as discussed in the Effects of currency exchange rates section below.

Other non-operating income (expense) – We recognized a loss of $1.0 million in 2022 compared to a gain of $2.0 million in 2021 on the change in value of our marketable equity securities. See Note 6 to our Consolidated Financial Statements. Other components of net periodic pension and OPEB cost in 2022 decreased $3.6 million compared to 2021 primarily due to the net effects of higher discount rates impacting interest cost and previously unrecognized actuarial losses. See Note 10 to our Consolidated Financial Statements. Interest expense in 2022 decreased $2.7 million compared to 2021 due to fees associated with the refinancing of our revolving credit facility in the second quarter of 2021 (see Note 8 to our Consolidated Financial Statements) and the effects of changes in currency exchange rates.

Income tax expense – We recognized income tax expense of $29.4 million in 2022 compared to income tax expense of $40.5 million in 2021. The difference is primarily due to lower earnings in 2022, the jurisdictional mix of our earnings and the release of a portion of our valuation allowance associated with the 2022 utilization of a portion of our business interest expense carryforwards.

Our earnings are subject to income tax in various U.S. and non-U.S. jurisdictions, and the income tax rates applicable to the pre-tax earnings (losses) of our non-U.S. operations are generally higher than the income tax rates applicable to our U.S. operations. We would generally expect our overall effective tax rate, excluding the impact of the reversal of a portion of our deferred income tax asset valuation allowance, to be higher than the U.S. federal statutory rate of 21% primarily because of our sizeable non-U.S. operations. See Note 12 to our Consolidated Financial Statements for a tabular reconciliation of our statutory income tax provision to our actual tax provision.

Our consolidated effective income tax rate in 2023 is expected to be higher than the U.S. federal statutory rate of 21% because the income tax rates applicable to the earnings (losses) of our non-U.S. operations will be higher than the income tax rates applicable to our U.S. operations and due to the expected mix of earnings.

Comparison of 2020 to 2021 Results of Operations

	Years ended December 31,			
	2020		**2021**	
	(Dollars in millions)			
Net sales	$ 1,638.8	100 %	**$ 1,939.4**	**100 %**
Cost of sales	1,287.6	79	**1,493.2**	**77**
Gross margin	351.2	21	**446.2**	**23**
Selling, general and administrative expense	218.6	13	**248.9**	**13**
Other operating income (expense):				
Currency transactions, net	(4.0)	-	**1.6**	**-**
Other operating expense, net	(12.4)	(1)	**(11.8)**	**-**
Income from operations	$ 116.2	7 %	**$ 187.1**	**10 %**
				% Change
TiO_2 operating statistics:				
Sales volumes*	531		**563**	**6 %**
Production volumes*	517		**545**	**5 %**
Percentage change in net sales:				
TiO_2 product pricing				**8 %**
TiO_2 sales volumes				**6**
TiO_2 product mix/other				**1**
Changes in currency exchange rates				**3**
Total				**18 %**

* *Thousands of metric tons*

Net sales – Our net sales increased $300.6 million, or 18%, in 2021 compared to 2020, primarily due to an 8% increase in average TiO_2 selling prices (which increased net sales by approximately $131 million) and a 6% increase in sales volumes (which increased net sales by approximately $98 million). In addition to the impact of higher sales volumes and higher average selling prices, we estimate that changes in currency exchange rates (primarily the euro) increased our net sales by approximately $43 million, or 3%, as compared to 2020. TiO_2 selling prices will increase or decrease generally as a result of competitive market pressures, changes in the relative level of supply and demand as well as changes in raw material and other manufacturing costs.

Our sales volumes increased 6% in 2021 as compared to 2020 primarily due to higher demand in our European, North American and Latin American markets, with a significant portion of the increase occurring in the second and third quarters as a result of the impact of COVID-19 on the comparable periods in 2020, as discussed above.

Cost of sales and gross margin – Cost of sales increased $205.6 million, or 16%, in 2021 compared to 2020 due to a 6% increase in sales volumes and higher production costs of approximately $69 million (including higher costs for raw materials and energy) and the effects of currency fluctuations (primarily the Canadian dollar). Our cost of sales as a percentage of net sales decreased to 77% in 2021 compared to 79% in 2020 primarily due to the favorable effects of higher

average TiO_2 selling prices and increased coverage of fixed costs from higher production, partially offset by higher production costs (including higher raw material and energy costs) as well as the effects of fluctuations in currency exchange rates, as discussed below.

Gross margin as a percentage of net sales increased to 23% in 2021 compared to 21% in 2020. As discussed and quantified above, our gross margin as a percentage of net sales increased primarily due to the net effects of higher average TiO_2 selling prices, higher production and sales volumes, higher production costs and fluctuations in currency exchange rates.

Selling, general and administrative expense – Selling, general and administrative expenses increased $30.3 million, or 14%, in 2021 compared to 2020 primarily due to higher variable costs (primarily distribution costs) related to higher overall sales volumes. Selling, general and administrative expenses were approximately 13% of net sales in each of 2021 and 2020.

Income from operations – Income from operations increased by $70.9 million or 61%, from $116.2 million in 2020 to $187.1 million in 2021. Income from operations as a percentage of net sales increased to 10% in 2021 from 7% in 2020. This increase was driven by the higher gross margin for the comparable periods discussed above. We estimate that changes in currency exchange rates decreased income from operations by approximately $13 million in 2021 as compared to 2020 as discussed in the Effects of currency exchange rates section below.

Our income from operations was minimally impacted by the effects of Hurricane Laura which temporarily halted production at LPC on August 24, 2020 with resumption of operations on September 25, 2020. LPC believes insurance (subject to applicable deductibles) will cover a majority of its losses, including those related to property damage and the disruption of its operations. We believe insurance (subject to applicable deductibles) will cover a majority of our losses from the hurricane, including property damage, business interruption losses related to our share of LPC's lost production and other costs resulting from the disruption of operations. As of December 31, 2021, we had not yet recognized any insurance recoveries because the ultimate disposition of our portion of the business interruption claim was not yet determinable; however, as of December 31, 2021, LPC had received a portion of the proceeds related to its property damage claim. On October 9, 2020 Hurricane Delta caused an additional temporary halt to production at the LPC facility. Damages resulting from Hurricane Delta were not as severe and production activities were resumed within five days from the time of initial shutdown prior to landfall of the hurricane. Similar to Hurricane Laura, losses determined to be incurred by LPC and us as a result of Hurricane Delta are expected to be recoverable from insurance (subject to applicable deductibles).

Other non-operating income (expense) – We recognized a gain of $2.0 million in 2021 and a loss of $1.1 million in 2020 on the change in value of our marketable equity securities. See Note 6 to our Consolidated Financial Statements. Other components of net periodic pension and OPEB cost in 2021 decreased $2.9 million compared to 2020 primarily due to higher expected returns on plan assets offset by the net effects of lower discount rates impacting interest cost and previously unrecognized actuarial losses. See Note 10 to our Consolidated Financial Statements. We recognized an insurance settlement gain of $1.5 million during 2020 related to a property damage claim. Interest expense in 2021 increased $.6 million compared to 2020 due to the refinancing of our revolving credit facility in the second quarter of 2021 (see Note 8 to our Consolidated Financial Statements) and the effects of changes in currency exchange rates.

Income tax expense – We recognized income tax expense of $40.5 million in 2021 compared to income tax expense of $16.1 million in 2020. The difference is primarily due to higher earnings in 2021 and the jurisdictional mix of our earnings.

Our earnings are subject to income tax in various U.S. and non-U.S. jurisdictions, and the income tax rates applicable to the pre-tax earnings (losses) of our non-U.S. operations are generally higher than the income tax rates applicable to our U.S. operations. We would generally expect our overall effective tax rate to be higher than the U.S. federal statutory rate of 21% primarily because of our sizeable non-U.S. operations. However, in 2020 our consolidated effective income tax rate was lower than the U.S. federal statutory rate of 21% due to the effect of lower earnings and tax benefits associated with losses incurred in certain high tax jurisdictions. See Note 12 to our Consolidated Financial Statements for a tabular reconciliation of our statutory income tax provision to our actual tax provision.

Effects of currency exchange rates

We have substantial operations and assets located outside the United States (primarily in Germany, Belgium, Norway and Canada). The majority of our sales from non-U.S. operations are denominated in currencies other than the U.S. dollar, principally the euro, other major European currencies and the Canadian dollar. A portion of our sales generated from our non-U.S. operations is denominated in the U.S. dollar (and consequently our non-U.S. operations will generally hold U.S. dollars from time to time). Certain raw materials used in all our production facilities, primarily titanium-containing feedstocks, are purchased primarily in U.S. dollars, while labor and other production and administrative costs are incurred primarily in local currencies. Consequently, the translated U.S. dollar value of our non-U.S. sales and operating results are subject to currency exchange rate fluctuations which may favorably or unfavorably impact reported earnings and may affect the comparability of period-to-period operating results. In addition to the impact of the translation of sales and expenses over time, our non-U.S. operations also generate currency transaction gains and losses which primarily relate to (i) the difference between the currency exchange rates in effect when non-local currency sales or operating costs (primarily U.S. dollar denominated) are initially accrued and when such amounts are settled with the non-local currency and (ii) changes in currency exchange rates during time periods when our non-U.S. operations are holding non-local currency (primarily U.S. dollars).

Overall, we estimate that fluctuations in currency exchange rates had the following effects on our sales and income from operations for the periods indicated.

Impact of changes in currency exchange rates - 2022 vs. 2021

	Transaction gains recognized			Translation gains/(losses) impact of rate changes	Total currency impact 2022 vs. 2021
	2021	2022	Change		
	(In millions)				
Impact on:					
Net sales	$ -	$ -	$ -	$ (106)	$ (106)
Income from operations	2	12	10	13	23

The $106 million decrease in net sales (translation losses) was caused primarily by a strengthening of the U.S. dollar relative to the euro, as our euro-denominated sales were translated into fewer U.S. dollars in 2022 as compared to 2021. The strengthening of the U.S. dollar relative to the Canadian dollar and the Norwegian krone in 2022 did not have a significant effect on the reported amount of our net sales, as a substantial portion of the sales generated by our Canadian and Norwegian operations are denominated in the U.S. dollar.

The $23 million increase in income from operations was comprised of the following:

- Higher net currency transaction gains of approximately $10 million primarily caused by relative changes in currency exchange rates at each applicable balance sheet date between the U.S. dollar and the euro, Canadian dollar and the Norwegian krone, and between the euro and the Norwegian krone, which causes increases or decreases, as applicable, in U.S. dollar-denominated receivables and payables and U.S. dollar currency held by our non-U.S. operations, and in Norwegian krone denominated receivables and payables held by our non-U.S. operations, and

- Approximately $13 million from net currency translation gains primarily caused by a strengthening of the U.S. dollar relative to the Canadian dollar and Norwegian krone, as local currency-denominated operating costs were translated into fewer U.S. dollars in 2022 as compared to 2021, partially offset by net currency translation losses primarily caused by a strengthening of the U.S. dollar relative to the euro as the negative effects of the stronger U.S. dollar on euro-denominated sales more than offset the favorable effects of euro-denominated operating costs being translated into fewer U.S. dollars in 2022 as compared to 2021.

Impact of changes in currency exchange rates - 2021 vs. 2020

	Transaction gains/(losses) recognized			Translation gains/(losses) impact of rate changes	Total currency impact 2021 vs. 2020
	2020	2021	Change		
			(In millions)		
Impact on:					
Net sales	$ -	$ -	$ -	$ 43	$ 43
Income from operations	(4)	2	6	(19)	(13)

The $43 million increase in net sales (translation gain) was caused primarily by a weakening of the U.S. dollar relative to the euro, as our euro-denominated sales were translated into more U.S. dollars in 2021 as compared to 2020. The weakening of the U.S. dollar relative to the Canadian dollar and the Norwegian krone in 2021 did not have a significant effect on the reported amount of our net sales, as a substantial portion of the sales generated by our Canadian and Norwegian operations are denominated in the U.S. dollar.

The $13 million decrease in income from operations was comprised of the following:

- Higher net currency transaction gains of approximately $6 million primarily caused by relative changes in currency exchange rates at each applicable balance sheet date between the U.S. dollar and the euro, Canadian dollar and the Norwegian krone, and between the euro and the Norwegian krone, which causes increases or decreases, as applicable, in U.S. dollar-denominated receivables and payables and U.S. dollar currency held by our non-U.S. operations, and in Norwegian krone denominated receivables and payables held by our non-U.S. operations, and
- Approximately $19 million from net currency translation losses primarily caused by a weakening of the U.S. dollar relative to the Canadian dollar and Norwegian krone, as local currency-denominated operating costs were translated into more U.S. dollars in 2021 as compared to 2020, partially offset by net currency translation gains primarily caused by a weakening of the U.S. dollar relative to the euro as the positive effects of the weaker U.S. dollar on euro-denominated sales more than offset the unfavorable effects of euro-denominated operating costs being translated into more U.S. dollars in 2021 as compared to 2020.

Outlook

As previously reported, late in the third quarter of 2022, demand in Europe and the export markets began to rapidly deteriorate as many of our customers in those regions reduced their production rates in response to economic conditions and geopolitical uncertainties. This weakness continued through the fourth quarter. In addition, in the second half of 2022 we experienced rapidly rising costs particularly in Europe, led by natural gas, electricity and certain key raw materials. In response to this decline in demand coupled with increased production costs, we implemented production curtailments at certain of our European facilities throughout the fourth quarter to manage inventory levels. We also experienced declining demand in North America in the late second half of 2022, but to a lesser extent than our European and export markets.

At the beginning of 2023 we began to see pockets of improving demand in Europe and certain export markets bolstered by customer inventory replenishment after significant destocking in the fourth quarter 2022. We are experiencing continued weak demand in North America in the first quarter of 2023. We expect customer demand to gradually return during the first half of the year particularly in Europe and export markets. Accordingly, at the beginning of 2023, we began a measured ramp up of production with the expectation of operating our facilities at full practical capacity by the end of the second quarter of 2023. Our selling prices have remained stable at the beginning of 2023; however, we expect selling prices to rise throughout the last three quarters of 2023 in response to higher production costs. Based on the net effects of these factors, we expect to report lower operating results for the full year of 2023 as compared to 2022.

We will continue to monitor current and anticipated near-term customer demand levels and will align our production and inventories accordingly. The long-term outlook for our industry remains very positive, and the steps we

are taking in the near term are intended to preserve our global market share and position our business to profitably grow in the future.

Our expectations for the TiO_2 industry and our operations are based on a number of factors outside our control. As noted above, we have experienced global market disruptions including high energy costs and availability concerns and future impacts on our operations will depend on, among other things, future energy costs and availability and the impact economic conditions and geopolitical events have on our operations or our customers' and suppliers' operations, all of which remain uncertain and cannot be predicted.

Operations outside the United States

As discussed above, we have substantial operations located outside the United States for which the functional currency is not the U.S. dollar. As a result, the reported amount of our assets and liabilities related to our non-U.S. operations, and therefore our consolidated net assets, will fluctuate based upon changes in currency exchange rates. At December 31, 2022, we had substantial net assets denominated in the euro, Canadian dollar and Norwegian krone.

Critical accounting policies and estimates

Our significant accounting policies are more fully described in Note 1 to our Consolidated Financial Statements. Our Consolidated Financial Statements have been prepared in accordance with accounting principles generally accepted in the United States of America, or GAAP which requires management to make estimates, judgments and assumptions that we believe are reasonable based on our historical experience, observance of known trends in our Company and industry as a whole and information available from outside sources. Our estimates affect the reported amounts of assets and liabilities and related disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expense during the reporting period. Actual results may differ significantly from those initial estimates.

We believe the most critical accounting policies and estimates involving significant judgment primarily relate to long-lived assets, defined benefit pension plans and income taxes.

- *Long-lived assets* – The net book value of our property and equipment totaled $484.5 million at December 31, 2022. We recognize an impairment charge associated with our long-lived assets, including property and equipment, whenever we determine that recovery of such long-lived asset is not probable. Such determination is based upon, among other things, estimates of the amount of future net cash flows to be generated by the long-lived asset and estimates of the current fair value of the asset. Significant judgment is required in estimating such cash flows. Adverse changes in such estimates of future net cash flows or estimates of fair value could result in an inability to recover the carrying value of the long-lived asset, thereby possibly requiring an impairment charge to be recognized in the future. We do not assess our property and equipment for impairment unless certain impairment indicators are present. We did not evaluate any long-lived assets for impairment during 2022 because no such impairment indicators were present.

- *Defined benefit pension plans* – We maintain various defined benefit pension plans in the U.S., Europe and Canada. See Note 10 to our Consolidated Financial Statements. We recognized consolidated defined benefit pension plan expense of $32.7 million in 2020, $31.3 million in 2021 and $24.1 million in 2022. The funding requirements for these defined benefit pension plans are generally based upon applicable regulations (such as ERISA in the U.S.) and will generally differ from pension expense for financial reporting purposes. We made contributions to all of our plans which aggregated $16.6 million in 2020, $19.1 million in 2021 and $15.3 million in 2022.

  Under defined benefit pension plan accounting, defined benefit pension plan expense, pension assets and accrued pension costs are each recognized based on certain actuarial assumptions. These assumptions are principally the assumed discount rate, the assumed long-term rate of return on plan assets, the fair value of plan assets and the assumed increase in future compensation levels. We recognize the full funded status of our defined benefit pension plans as either an asset (for overfunded plans) or a liability (for underfunded plans) on our Consolidated Balance Sheets.

The discount rates we use for determining defined benefit pension expense and the related pension obligations are based on current interest rates earned on long-term bonds that receive one of the two highest ratings given by recognized rating agencies in the applicable country where the defined benefit pension benefits are being paid. In addition, we receive third-party advice about appropriate discount rates and these advisors may in some cases use their own market indices. We adjust these discount rates as of each December 31 valuation date to reflect then-current interest rates on such long-term bonds. We use these discount rates to determine the actuarial present value of the pension obligations as of December 31 of that year. We also use these discount rates to determine the interest component of defined benefit pension expense for the following year.

At December 31, 2022, approximately 69%, 16%, 8% and 3% of the projected benefit obligations related to our plans in Germany, Canada, Norway and the U.S., respectively. We use several different discount rate assumptions in determining our consolidated defined benefit pension plan obligation and expense. This is because we maintain defined benefit pension plans in several different countries in Europe and North America and the interest rate environment differs from country to country.

We used the following discount rates for our defined benefit pension plans:

	Discount rates used for:		
	Obligations at December 31, 2020 and expense in 2021	**Obligations at December 31, 2021 and expense in 2022**	**Obligations at December 31, 2022 and expense in 2023**
Germany	.7%	1.2%	3.7%
Canada	2.4%	2.9%	5.1%
Norway	1.7%	1.9%	3.6%
U.S.	2.2%	2.6%	5.3%

The assumed long-term rate of return on plan assets represents the estimated average rate of earnings expected to be earned on the funds invested or to be invested in the plans' assets provided to fund the benefit payments inherent in the projected benefit obligations. Unlike the discount rate, which is adjusted each year based on changes in current long-term interest rates, the assumed long-term rate of return on plan assets will not necessarily change based upon the actual short-term performance of the plan assets in any given year. Defined benefit pension expense each year is based upon the assumed long-term rate of return on plan assets for each plan, the actual fair value of the plan assets as of the beginning of the year and an estimate of the amount of contributions to and distributions from the plan during the year. Differences between the expected return on plan assets for a given year and the actual return are deferred and amortized over future periods based either upon the expected average remaining service life of the active plan participants (for plans for which benefits are still being earned by active employees) or the average remaining life expectancy of the inactive participants (for plans for which benefits are not still being earned by active employees).

At December 31, 2022, approximately 59%, 21%, 12% and 3% of the plan assets related to our plans in Germany, Canada, Norway and the U.S., respectively. We use several different long-term rates of return on plan asset assumptions in determining our consolidated defined benefit pension plan expense. This is because the plan assets in different countries are invested in a different mix of investments and the long-term rates of return for different investments differ from country to country.

In determining the expected long-term rate of return on plan asset assumptions, we consider the long-term asset mix (e.g. equity vs. fixed income) for the assets for each of our plans and the expected long-term rates of return for such asset components. In addition, we receive third-party advice about appropriate long-term rates of return. We regularly review our actual asset allocation for each of our U.S. and non-U.S. plans and will periodically rebalance the investments in each plan to more accurately reflect the targeted allocation when considered appropriate.

Our assumed long-term rates of return on plan assets for 2020, 2021 and 2022 were as follows:

	2020	2021	2022
Germany	1.0%	2.0%	2.0%
Canada	3.5%	3.1%	3.8%
Norway	4.0%	2.8%	3.0%
U.S.	4.5%	4.0%	4.0%

Our long-term rate of return on plan asset assumptions in 2023 used for purposes of determining our 2023 defined benefit pension plan expense for Germany, Canada, Norway and the U.S. are 4.8%, 4.4%, 4.8% and 5.0%, respectively.

We follow ASC Topic 820, *Fair Value Measurements and Disclosures*, in determining the fair value of plan assets within our defined benefit pension plans. While we believe the valuation methods used to determine the fair value of plan assets are appropriate, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different estimate of fair value at the reporting date.

To the extent that a plan's particular pension benefit formula calculates the pension benefit in whole or in part based upon future compensation levels, the projected benefit obligations and the pension expense will be based in part upon expected increases in future compensation levels. For all of our plans for which the benefit formula is so calculated, we generally base the assumed expected increase in future compensation levels upon average long-term inflation rates for the applicable country.

In addition to the actuarial assumptions discussed above, the amount of recognized defined benefit pension expense and the amount of net pension asset and net pension liability will vary based upon relative changes in currency exchange rates.

Based on the actuarial assumptions described above and our current expectation for what actual average currency exchange rates will be during 2023, we expect our defined benefit pension expense will approximate $9.8 million in 2023. In comparison, we expect to be required to contribute approximately $17 million to such plans during 2023. See Note 10 to our Consolidated Financial Statements for additional discussion of actuarial assumptions used in determining defined benefit pension assets, liabilities and expenses.

As noted above, defined benefit pension expense and the amounts recognized as accrued pension costs are based upon the actuarial assumptions discussed above. We believe all of the actuarial assumptions used are reasonable and appropriate. However, if we had lowered the assumed discount rate by 25 basis points for all plans as of December 31, 2022, our aggregate projected benefit obligations would have increased by approximately $18 million at that date and our defined benefit pension expense would be expected to increase by approximately $.1 million during 2023. Similarly, if we lowered the assumed long-term rate of return on plan assets by 25 basis points for all of our plans, our defined benefit pension expense would be expected to increase by approximately $1.1 million during 2023.

- *Income taxes* – We operate globally and the calculation of our provision for income taxes and our deferred tax assets and liabilities involves the interpretation and application of complex tax laws and regulations in a multitude of jurisdictions across our global operations. Our effective tax rate is highly dependent upon the geographic distribution of our earnings or losses and the effects of tax laws and regulations in each tax-paying jurisdiction in which we operate. Significant judgments and estimates are required in determining our consolidated provision for income taxes due to the global nature of our operations. Our provision for income taxes and deferred tax assets and liabilities reflect our best assessment of estimated current and future taxes to be paid, including the recognition and measurement of deferred tax assets and liabilities.

We recognize deferred taxes for future tax effects of temporary differences between financial and income tax reporting. Deferred income tax assets and liabilities for each tax-paying jurisdiction in which we operate

are netted and presented as either a noncurrent deferred income tax asset or liability, as applicable. We record a valuation allowance to reduce our deferred income tax assets to the amount that is believed to be realized under the more-likely-than-not recognition criteria. While we have considered future taxable income and ongoing prudent and feasible tax planning strategies in assessing the need for a valuation allowance, it is possible that we may change our estimate of the amount of the deferred income tax assets that would more-likely-than-not be realized in the future, resulting in an adjustment to the deferred income tax asset valuation allowance that would either increase or decrease, as applicable, reported net income in the period such change in estimate was made.

For example, at December 31, 2022 we have substantial net operating loss carryforwards in Germany (the equivalent of $414 million for German corporate tax purposes) and Belgium (the equivalent of $13 million for Belgian corporate tax purposes). At December 31, 2022, we have concluded that no deferred income tax asset valuation allowance is required to be recognized with respect to such carryforwards, principally because (i) such carryforwards have an indefinite carryforward period, (ii) we have utilized a portion of such carryforwards during the most recent three-year period and (iii) we currently expect to utilize the remainder of such carryforwards over the long term. However, prior to the complete utilization of such carryforwards, if we were to generate additional losses in our German or Belgian operations for an extended period of time, or if applicable law were to change such that the carryforward period was no longer indefinite, it is possible that we might conclude the benefit of such carryforwards would no longer meet the more-likely-than-not recognition criteria, at which point we would be required to recognize a valuation allowance against some or all of the then-remaining tax benefit associated with the carryforwards.

LIQUIDITY AND CAPITAL RESOURCES

Consolidated cash flows

Operating activities

Trends in cash flows as a result of our operating activities (excluding the impact of significant asset dispositions and relative changes in assets and liabilities) are generally similar to trends in our earnings. In addition to the impact of the operating, investing and financing cash flows discussed below, changes in the amount of cash, cash equivalents and restricted cash we report from year to year can be impacted by changes in currency exchange rates, since a portion of our cash, cash equivalents and restricted cash is held by our non-U.S. subsidiaries. For example, during 2022, relative changes in currency exchange rates resulted in a $5.1 million decrease in the reported amount of our cash, cash equivalents and restricted cash compared to a $10.6 million decrease in 2021 and a $13.8 million increase in 2020.

Cash provided by operating activities was $81.7 million in 2022 compared to $206.5 million in 2021. This $124.8 million decrease in the amount of cash provided was primarily due to the net effect of the following:

- lower income from operations in 2022 of $27.5 million,
- higher amount of net cash used associated with relative changes in our inventories, receivables, payables and accruals in 2022 of $94.9 million,
- higher net contributions to our TiO_2 manufacturing joint venture in 2022 of $14.3 million, and
- lower cash paid for income taxes of $4.3 million due to decreased earnings in 2022.

Cash provided by operating activities was $206.5 million in 2021 compared to $102.5 million in 2020. This $104.0 million increase in the amount of cash provided was primarily due to the net effect of the following:

- higher income from operations in 2021 of $70.9 million,
- lower amount of net cash used associated with relative changes in our inventories, receivables, payables and accruals in 2021 of $51.8 million as compared to 2020,
- higher cash paid for income taxes in 2021 of $26.3 million due to increased earnings, and

- higher net distributions from our TiO_2 manufacturing joint venture in 2021 of $16.6 million.

Changes in working capital are affected by accounts receivable and inventory changes. As shown below:

- Our average days sales outstanding, or DSO, decreased from December 31, 2021 to December 31, 2022, primarily due to relative changes in the timing of collections, and
- Our average days sales in inventory, or DSI, increased from December 31, 2021 to December 31, 2022, primarily due to higher inventory volumes attributable to production volumes exceeding sales volumes in 2022 compared to 2021 and due to supply disruptions and other transportation delays impacting the timing of raw material shipments at the end of 2021.

For comparative purposes, we have provided prior year numbers below.

	December 31, 2020	December 31, 2021	December 31, 2022
DSO	68 days	65 days	64 days
DSI	74 days	59 days	79 days

Investing activities

Our capital expenditures were $63.2 million in 2022 compared to $58.6 million in 2021 and $62.8 million in 2020. Capital expenditures are primarily incurred to maintain and improve the cost effectiveness of our manufacturing facilities. Our capital expenditures during the past three years include an aggregate of $53.6 million (including $17.6 million in 2022) for our ongoing environmental protection and compliance programs.

During 2022, 2021 and 2020, we had no loans or collections under our unsecured revolving demand promissory note with Valhi.

In addition, we received $1.5 million in 2020 from an insurance settlement related to a property damage claim.

Financing activities

During 2022, we:

- paid quarterly dividends of $.19 per share to stockholders aggregating $87.8 million, and
- acquired 217,778 shares of our common stock in market transactions for an aggregate purchase price of $2.3 million.

During 2021, we:

- paid quarterly dividends of $.18 per share to stockholders aggregating $83.2 million, and
- acquired 14,409 shares of our common stock in market transactions for an aggregate purchase price of $.2 million.

During 2020, we:

- paid quarterly dividends of $.18 per share to stockholders aggregating $83.2 million, and
- acquired 122,489 shares of our common stock in market transactions for an aggregate purchase price of $1.0 million.

In February 2023, our board of directors declared a first quarter 2023 regular quarterly dividend of $.19 per share, payable March 16, 2023 to stockholders of record as of March 7, 2023.

Outstanding debt obligations and borrowing availability

At December 31, 2022, our consolidated debt comprised:

- €400 million aggregate outstanding on our Kronos International, Inc. (KII) 3.75% Senior Secured Notes due in September 2025 (Senior Secured Notes), which had a $424.1 million carrying amount, net of unamortized debt issuance costs, and
- approximately $1.1 million of other indebtedness.

We had no outstanding borrowings on our $225 million global revolving credit facility (Global Revolver) at December 31, 2022 and approximately $211 million was available for borrowings thereunder. Our Senior Secured Notes and our Global Revolver contain a number of covenants and restrictions which, among other things, restrict our ability to incur or guarantee additional debt, incur liens, pay dividends or make other restricted payments, or merge or consolidate with, or sell or transfer substantially all of our assets to, another entity, and contain other provisions and restrictive covenants customary in lending transactions of these types. Our credit agreements contain provisions which could result in the acceleration of indebtedness prior to their stated maturity for reasons other than defaults for failure to comply with typical financial or payment covenants. For example, the credit agreements allow the lender to accelerate the maturity of the indebtedness upon a change of control (as defined in the agreement) of the borrower. In addition, the credit agreements could result in the acceleration of all or a portion of the indebtedness following a sale of assets outside the ordinary course of business. The terms of all of our debt instruments (including our revolving line of credit for which we have no outstanding borrowings at December 31, 2022) are discussed in Note 8 to our Consolidated Financial Statements. We are in compliance with all of our debt covenants at December 31, 2022. We believe we will be able to continue to comply with the financial covenants contained in our credit facility through their maturity.

Our assets consist primarily of investments in operating subsidiaries, and our ability to service our obligations, including the Senior Secured Notes, depends in part upon the distribution of earnings of our subsidiaries, whether in the form of dividends, advances or payments on account of intercompany obligations or otherwise. Our Senior Secured Notes are collateralized by, among other things, a first priority lien on (i) 100% of the common stock or other ownership interests of each existing and future direct domestic subsidiary of KII and the guarantors, and (ii) 65% of the voting common stock or other ownership interests and 100% of the non-voting common stock or other ownership interests of each non-U.S. subsidiary that is directly owned by KII or any guarantor. Our Global Revolver is collateralized by, among other things, a first priority lien on the borrower's trade receivables and inventories. See Note 8 to our Consolidated Financial Statements.

Future cash requirements

Liquidity

Our primary source of liquidity on an ongoing basis is cash flows from operating activities which is generally used to (i) fund capital expenditures, (ii) repay any short-term indebtedness incurred for working capital purposes, (iii) provide for the payment of dividends and (iv) fund purchases of shares of our common stock under our stock repurchase program. From time-to-time we will incur indebtedness, generally to (i) fund short-term working capital needs, (ii) refinance existing indebtedness or (iii) fund major capital expenditures or the acquisition of other assets outside the ordinary course of business. We will also from time-to-time sell assets outside the ordinary course of business and use the proceeds to (i) repay existing indebtedness, (ii) make investments in marketable and other securities, (iii) fund major capital expenditures or the acquisition of other assets outside the ordinary course of business or (iv) pay dividends.

The TiO_2 industry is cyclical, and changes in industry economic conditions significantly impact earnings and operating cash flows. Changes in TiO_2 pricing, production volumes and customer demand, among other things, could significantly affect our liquidity.

We routinely evaluate our liquidity requirements, alternative uses of capital, capital needs and availability of resources in view of, among other things, our dividend policy, our debt service, our capital expenditure requirements and estimated future operating cash flows. As a result of this process, we have in the past and may in the future seek to reduce, refinance, repurchase or restructure indebtedness, raise additional capital, repurchase shares of our common stock, modify

our dividend policy, restructure ownership interests, sell interests in our subsidiaries or other assets, or take a combination of these steps or other steps to manage our liquidity and capital resources. Such activities have in the past and may in the future involve related companies. In the normal course of our business, we may investigate, evaluate, discuss and engage in acquisition, joint venture, strategic relationship and other business combination opportunities in the TiO_2 industry. In the event of any future acquisition or joint venture opportunity, we may consider using then-available liquidity, issuing our equity securities or incurring additional indebtedness.

Based upon our expectation for the TiO_2 industry and anticipated demands on cash resources, we expect to have sufficient liquidity to meet our short term obligations (defined as the twelve-month period ending December 31, 2023) and our long-term obligations (defined as the five-year period ending December 31, 2027, our time period for long-term budgeting). If actual developments differ from our expectations, our liquidity could be adversely affected.

Cash, cash equivalents, restricted cash and marketable securities

At December 31, 2022 we had:

	Held by		
	U.S. entities	Non-U.S. entities	Total
		(In millions)	
Cash and cash equivalents	$ 185.8	$ 142.0	$ 327.8
Current restricted cash	-	2.0	2.0
Noncurrent restricted cash	-	4.8	4.8
Noncurrent marketable securities	3.2	-	3.2

Following implementation of a territorial tax system under the 2017 Tax Act, repatriation of any cash and cash equivalents held by our non-U.S. subsidiaries would not be expected to result in any material income tax liability as a result of such repatriation.

Stock repurchase program

At December 31, 2022, we have 1,331,332 shares available for repurchase under a stock repurchase program authorized by our board of directors. See Note 13 to our Consolidated Financial Statements.

Capital expenditures

We intend to spend approximately $46 million on capital expenditures during 2023 (including approximately $17.6 million contractually committed at December 31, 2022), primarily to maintain and improve our existing facilities. We estimate approximately $20 million of our 2023 capital expenditures will be in environmental compliance, protection and improvement programs which are primarily focused on increasing operating efficiency but also result in improved environmental protection, such as lower emissions from our manufacturing plants. Capital spending for 2023 is expected to be funded through cash on hand or borrowing under our existing credit facility. It is possible we will delay planned capital projects based on market conditions.

Commitments and contingencies

See Notes 12 and 15 to our Consolidated Financial Statements for a description of certain income tax contingencies, certain legal proceedings and other commitments.

As described in the Notes to the Consolidated Financial Statements, we are a party to various debt, lease, raw material supply and other agreements which contractually and unconditionally commit us to pay certain amounts in the future. See Notes 7, 8, 14 and 15 to our Consolidated Financial Statements.

Recent accounting pronouncements

Not applicable

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

General

We are exposed to market risk from changes in interest rates, currency exchange rates, equity security and raw material prices.

Interest rates

At December 31, 2021 and 2022, our fixed-rate, euro-denominated Senior Secured Notes comprised the majority of our aggregate indebtedness. The fixed-rate debt instrument minimizes earnings volatility that would result from changes in interest rates. Our Global Revolver is a variable-rate instrument; however, we had no borrowings under this facility during 2021 or 2022. The following table presents principal amounts and weighted average interest rates for our aggregate outstanding indebtedness at December 31, 2021 and 2022. Information shown below for our euro-denominated Senior Secured Notes is presented in its U.S. dollar equivalent at December 31, 2021 and 2022 (net of unamortized debt issuance costs of $3.5 million and $2.4 million, respectively) using an exchange rate of U.S. $1.131 per euro and $1.066 per euro, respectively. See Note 8 to our Consolidated Financial Statements.

	Indebtedness amount		Year-end	
	Carrying amount	Fair value	interest rate	Maturity date
	(In millions)			
December 31, 2022				
Fixed-rate Senior Secured Notes	**$ 424.1**	**$ 374.2**	**3.75 %**	**2025**
December 31, 2021				
Fixed-rate Senior Secured Notes	$ 448.8	$ 460.2	3.75 %	2025

Currency exchange rates

We are exposed to market risk arising from changes in currency exchange rates as a result of manufacturing and selling our products worldwide. Earnings are primarily affected by fluctuations in the value of the U.S. dollar relative to the euro, the Canadian dollar, the Norwegian krone and to a lesser extent the United Kingdom pound sterling and the value of the euro relative to the Norwegian krone.

The majority of our sales from non-U.S. operations are denominated in currencies other than the U.S. dollar, principally the euro, other major European currencies and the Canadian dollar. A portion of our sales generated from our non-U.S. operations is denominated in the U.S. dollar (and consequently our non-U.S. operations will generally hold U.S. dollars from time to time). Certain raw materials used in all our production facilities, primarily titanium-containing feedstocks, are purchased primarily in U.S. dollars, while labor and other production and administrative costs are incurred primarily in local currencies. Consequently, the translated U.S. dollar value of our non-U.S. sales and operating results are subject to currency exchange rate fluctuations which may favorably or unfavorably impact reported earnings. In addition to the impact of the translation of sales and expenses over time, our non-U.S. operations also generate currency transaction gains and losses which primarily relate to (i) the difference between the currency exchange rates in effect when non-local currency sales or operating costs (primarily U.S. dollar denominated) are initially accrued and when such amounts are settled with the non-local currency and (ii) changes in currency exchange rates during time periods when our non-U.S. operations are holding non-local currency (primarily U.S. dollars).

We periodically use currency forward contracts to manage a very nominal portion of currency exchange rate risk associated with trade receivables denominated in a currency other than the holder’s functional currency or similar exchange rate risk associated with future sales. We have not entered into these contracts for trading or speculative purposes in the past. However, we may enter into such contracts in the future to manage our currency exchange rate risk. We are not party to any currency forward contracts at December 31, 2022.

Also, we are subject to currency exchange rate risk associated with our Senior Secured Notes, as such indebtedness is denominated in euros. At December 31, 2022, we had the equivalent of $426.5 million outstanding under our euro-denominated Senior Secured Notes (exclusive of unamortized debt issuance costs.) The potential increase in the

U.S. dollar equivalent of such indebtedness resulting from a hypothetical 10% adverse change in exchange rates at December 31, 2022 would be approximately $43 million.

Raw materials

We are exposed to market risk from changes in commodity prices relating to our raw materials. As discussed in Item 1 we generally enter into long-term supply agreements for certain of our raw material requirements. Many of our raw material contracts contain fixed quantities we are required to purchase or specify a range of quantities within which we are required to purchase. Raw material pricing under these agreements is generally negotiated quarterly or semi-annually depending upon the suppliers. For certain raw material requirements we do not have long-term supply agreements either because we have assessed the risk of the unavailability of those raw materials and/or the risk of a significant change in the cost of those raw materials to be low, or because long-term supply agreements for those raw materials are generally not available.

Other

We believe there may be a certain amount of incompleteness in the sensitivity analyses presented above. For example, the hypothetical effect of changes in exchange rates discussed above ignores the potential effect on other variables which affect our results of operations and cash flows, such as demand for our products, sales volumes and selling prices and operating expenses. Accordingly, the amounts presented above are not necessarily an accurate reflection of the potential losses we would incur assuming the hypothetical changes in exchange rates were actually to occur.

The above discussion and estimated sensitivity analysis amounts include forward-looking statements of market risk which assume hypothetical changes in currency exchange rates. Actual future market conditions will likely differ materially from such assumptions. Accordingly, such forward-looking statements should not be considered to be projections by us of future events, gains or losses.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information called for by this Item is contained in a separate section of this Annual Report. See “Index of Financial Statements” (page F-1).

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of disclosure controls and procedures

We maintain disclosure controls and procedures which, as defined in Exchange Act Rule 13a-15(e), means controls and other procedures that are designed to ensure that information required to be disclosed in the reports that we file or submit to the SEC under the Securities Exchange Act of 1934, as amended (the Act), is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information we are required to disclose in the reports we file or submit to the SEC under the Act is accumulated and communicated to our management, including our principal executive officer and our principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions to be made regarding required disclosure. Each of James M. Buch, our President and Chief Executive Officer and Tim C. Hafer, our Executive Vice President and Chief Financial Officer, have evaluated the design and effectiveness of our disclosure controls and procedures as of December 31, 2022. Based upon their evaluation, these executive officers have concluded that our disclosure controls and procedures are effective as of the date of such evaluation.

Management's report on internal control over financial reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting which, as defined by Exchange Act Rule 13a-15(f) means a process designed by, or under the supervision of, our principal executive and principal financial officers, or persons performing similar functions, and effected by the board of directors, management and other personnel, 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, and includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets,
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that receipts and expenditures are being made only in accordance with authorizations of management and directors and
- Provide reasonable assurance regarding prevention or timely detection of an unauthorized acquisition, use or disposition of assets that could have a material effect on our Consolidated Financial Statements.

Our evaluation of the effectiveness of internal control over financial reporting is based upon the criteria established in *Internal Control – Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013 (commonly referred to as the "2013 COSO" framework). Based on our evaluation under that framework, we have concluded that our internal control over financial reporting was effective as of December 31, 2022.

PricewaterhouseCoopers LLP, the independent registered public accounting firm that has audited our consolidated financial statements included in this Annual Report, has audited the effectiveness of our internal control over financial reporting as of December 31, 2022, as stated in their report, which is included in this Annual Report on Form 10-K.

Other

As permitted by the SEC, our assessment of internal control over financial reporting excludes (i) internal control over financial reporting of equity method investees and (ii) internal control over the preparation of any financial statement schedules which would be required by Article 12 of Regulation S-X. However, our assessment of internal control over financial reporting with respect to equity method investees did include controls over the recording of amounts related to our investment that are recorded in the consolidated financial statements, including controls over the selection of accounting methods for our investments, the recognition of equity method earnings and losses and the determination, valuation and recording of our investment account balances.

Changes in internal control over financial reporting

There has been no change to our internal control over financial reporting during the quarter ended December 31, 2022 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Certifications

Our chief executive officer is required to annually file a certification with the New York Stock Exchange, or NYSE, certifying our compliance with the corporate governance listing standards of the NYSE. During 2022, our chief executive officer filed such annual certification with the NYSE. The 2022 certification was unqualified.

Our chief executive officer and chief financial officer are also required to, among other things, file quarterly certifications with the SEC regarding the quality of our public disclosures, as required by Section 302 of the Sarbanes-Oxley Act of 2002. The certifications for the quarter ended December 31, 2022 have been filed as Exhibits 31.1 and 31.2 to this Annual Report on Form 10-K.

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

The information required by this Item is incorporated by reference to our 2023 definitive proxy statement to be filed with the SEC pursuant to Regulation 14A within 120 days after the end of the fiscal year covered by this report.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item is incorporated by reference to our 2023 proxy statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this Item is incorporated by reference to our 2023 proxy statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this Item is incorporated by reference to our 2023 proxy statement. See also Note 14 to our Consolidated Financial Statements.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this Item is incorporated by reference to our 2023 proxy statement.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) and (c) **Financial Statements**

The Registrant

The consolidated financial statements of the Registrant listed on the accompanying Index of Financial Statements (see page F-1) are filed as part of this Annual Report.

50%-or-less owned persons

We are not required to provide any consolidated financial statements pursuant to Rule 3-09 of Regulation S-X.

(b) **Exhibits**

Included as exhibits are the items listed in the Exhibit Index. We will furnish a copy of any of the exhibits listed below upon payment of $4.00 per exhibit to cover our costs to furnish the exhibits. Pursuant to Item 601(b)(4)(iii) of Regulation S-K, any instrument defining the rights of holders of long-term debt issues and other agreements related to indebtedness which do not exceed 10% of consolidated total assets as of December 31, 2022 will be furnished to the Commission upon request.

Item No.	Exhibit Index
3.1+	Restated First Amended and Restated Certificate of Incorporation of Kronos Worldwide, Inc., as amended on May 12, 2011 – incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K (File No. 001-31763) filed on May 12, 2011.
3.2	Amended and Restated Bylaws of Kronos Worldwide, Inc. as of February 24, 2021 – incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K (File No. 001-31763) filed with the U.S. Securities and Exchange Commission on February 24, 2021.
4.1	Description of the Registrant's Capital Stock – incorporated by reference to Exhibit 4.1 to the Registrant's Annual Report on Form 10-K (File No. 001-31763) for the year ended December 31, 2019.
10.1	Tax Agreement between Valhi, Inc. and Kronos Worldwide, Inc. dated as of January 1, 2020 – incorporated by reference to Exhibit 10.1 to the Registrant's Annual Report on Form 10-K (File No. 001-31763) for the year ended December 31, 2019.
10.2	Intercorporate Services Agreement by and between Contran Corporation and Kronos Worldwide, Inc., effective as of January 1, 2004 – incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q of the Registrant (File No. 001-31763) for the quarter ended March 31, 2004.
10.3*	Kronos Worldwide, Inc. 2012 Director Stock Plan – incorporated by reference to Exhibit 4.4 of the Registration statement on Form S-8 of the Registrant (File No. 333-113425).
10.4	Lease Contract, dated June 21, 1952, between Farbenfabriken Bayer Aktiengesellschaft and Titangesellschaft mit beschrankter Haftung (German language version and English translation thereof)-incorporated by reference to Exhibit 10.14 to the Annual Report on Form 10-K (File No. 001-00640) of NL Industries, Inc. for the year ended December 31, 1985. (P)
10.5	Master Technology Exchange Agreement, dated as of October 18, 1993, among Kronos Worldwide, Inc. (f/k/a Kronos, Inc.), Kronos Louisiana, Inc., Kronos International, Inc., Tioxide Group Limited and Tioxide Group Services Limited – incorporated by reference to Exhibit 10.8 to the Quarterly Report on Form 10-Q (File No. 001-00640) of NL Industries, Inc. for the quarter ended September 30, 1993. (P)

10.6	Form of Assignment and Assumption Agreement, dated as of January 1, 1999, between Kronos Inc. (formerly known as Kronos (USA), Inc.) and Kronos International, Inc. – incorporated by reference to Exhibit 10.9 to Kronos International, Inc.'s Registration Statement on Form S-4 (File No. 333-100047). (P)
10.7	Form of Cross License Agreement, effective as of January 1, 1999, between Kronos Inc. (formerly known as Kronos (USA), Inc.) and Kronos International, Inc. – incorporated by reference to Exhibit to Kronos International, Inc.'s Registration Statement on Form S-4 (File No. 333-100047). (P)
10.8	Formation Agreement dated as of October 18, 1993 among Tioxide Americas Inc., Kronos Louisiana, Inc. and Louisiana Pigment Company, L.P. – incorporated by reference to Exhibit 10.2 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.9	Joint Venture Agreement dated as of October 18, 1993 between Tioxide Americas Inc. and Kronos Louisiana, Inc. – incorporated by reference to Exhibit 10.3 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.10	Kronos Offtake Agreement dated as of October 18, 1993 between Kronos Louisiana, Inc. and Louisiana Pigment Company, L.P. – incorporated by reference to Exhibit 10.4 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.11	Amendment No. 1 to Kronos Offtake Agreement dated as of December 20, 1995 between Kronos Louisiana, Inc. and Louisiana Pigment Company, L.P. – incorporated by reference to Exhibit 10.22 to NL Industries, Inc.'s Annual Report on Form 10-K (File No. 001-00640) for the year ended December 31, 1995. (P)
10.12	Tioxide Americas Offtake Agreement dated as of October 18, 1993 between Tioxide Americas Inc. and Louisiana Pigment Company, L.P. – incorporated by reference to Exhibit 10.5 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.13	Amendment No. 1 to Tioxide Americas Offtake Agreement dated as of December 20, 1995 between Tioxide Americas Inc. and Louisiana Pigment Company, L.P. – incorporated by reference to Exhibit 10.24 to NL Industries, Inc.'s Annual Report on Form 10-K (File No. 001-00640) for the year ended December 31, 1995. (P)
10.14	Parents' Undertaking dated as of October 18, 1993 between ICI American Holdings Inc. and Kronos Worldwide, Inc. (f/k/a Kronos, Inc.) – incorporated by reference to Exhibit 10.9 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.15	Allocation Agreement dated as of October 18, 1993 between Tioxide Americas Inc., ICI American Holdings, Inc., Kronos Worldwide, Inc. (f/k/a Kronos, Inc.) and Kronos Louisiana, Inc. – incorporated by reference to Exhibit 10.10 to NL Industries, Inc.'s Quarterly Report on Form 10-Q (File No. 001-00640) for the quarter ended September 30, 1993. (P)
10.16	Second Amended and Restated Agreement Regarding Shared Insurance among CompX International Inc., Contran Corporation, Kronos Worldwide, Inc., NL Industries, Inc., and Valhi, Inc. dated January 25, 2019 – incorporated by reference to Exhibit 10.16 to the Registrant's Annual Report on Form 10-K (File No. 001-31763) for the year ended December 31, 2018.
10.17**	Unsecured Revolving Demand Promissory Note dated December 31, 2022 in the principal amount of $25.0 million executed by Valhi, Inc. and payable to the order of Kronos Worldwide, Inc.
10.18	Restated and Amended Agreement by and between Richards Bay Titanium (Proprietary) Limited (acting through its sales agent Rio Tinto Iron & Titanium Limited) and Kronos (US), Inc. effective January 1, 2016 – incorporated by reference to Exhibit 10.26 to the Registrant's Annual Report on Form 10-K (File No. 001-31763) for the year ended December 31, 2015.

10.19	Indenture, dated as of September 13, 2017, among Kronos International, Inc., the guarantors named therein, and Deutsche Bank Trust Company Americas, as trustee, collateral agent, paying agent, transfer agent and registrar – incorporated by reference to Exhibit 4.1 to the Current Report on Form 8-K (File No. 001-31763) dated September 13, 2017 and filed by the registrant on September 13, 2017.
10.20	Pledge Agreement, dated as of September 13, 2017, among Kronos International, Inc., the guarantors named therein and Deutsche Bank Trust Company Americas, as collateral agent – incorporated by reference to Exhibit 4.2 to the Current Report on Form 8-K (File No. 001-31763) dated September 13, 2017 and filed by the registrant on September 13, 2017.
10.21	Credit Agreement dated as of April 20, 2021, by and among the Company, Kronos Louisiana, Inc., Kronos (US), Inc., Kronos Canada, Inc., Kronos Europe NV, Kronos Titan GmbH and Wells Fargo Bank, National Association as administrative agent and lender – incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-31763) for the quarter ended March 31, 2021.
10.22	Guaranty and Security Agreement dated as of April 20, 2021, by and among the Company, Kronos Louisiana, Inc., Kronos (US), Inc., Kronos Canada, Inc., Kronos International, Inc. and Wells Fargo Bank, National Association as administrative agent and lender – incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q (File No. 001-31763) for the quarter ended March 31, 2021.
21.1**	Subsidiaries.
23.1**	Consent of PricewaterhouseCoopers LLP.
31.1**	Certification.
31.2**	Certification.
32.1**	Certification.
101.INS**	Inline XBRL Instance - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH**	Inline XBRL Taxonomy Extension Schema
101.CAL**	Inline XBRL Taxonomy Extension Calculation Linkbase
101.DEF**	Inline XBRL Taxonomy Extension Definition Linkbase
101.LAB**	Inline XBRL Taxonomy Extension Label Linkbase
101.PRE**	Inline XBRL Taxonomy Extension Presentation Linkbase
104	Cover page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

\+ Exhibit 3.1 is restated for the purposes of the disclosure requirements of Item 601 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission and does not represent a restated certificate of incorporation that has been filed with the Delaware Secretary of State.

* Management contract, compensatory plan or arrangement

** Filed herewith

(P) Paper exhibits

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Kronos Worldwide, Inc.
(Registrant)

By: /s/ James M. Buch
James M. Buch, March 8, 2023
(President and Chief Executive Officer)

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

/s/ Loretta J. Feehan
Loretta J. Feehan, March 8, 2023
(Chair of the Board (non-executive))

/s/ John E. Harper
John E. Harper, March 8, 2023
(Director)

/s/ Michael S. Simmons
Michael S. Simmons, March 8, 2023
(Vice Chairman of the Board)

/s/ Meredith W. Mendes
Meredith W. Mendes, March 8, 2023
(Director)

/s/ James M. Buch
James M. Buch, March 8, 2023
(President and Chief Executive Officer)

/s/ Cecil H. Moore, Jr.
Cecil H. Moore, Jr., March 8, 2023
(Director)

/s/ Tim C. Hafer
Tim C. Hafer, March 8, 2023
(Executive Vice President and Chief Financial Officer, Principal Financial Officer)

/s/ Thomas P. Stafford
Thomas P. Stafford, March 8, 2023
(Director)

/s/ R. Gerald Turner
R. Gerald Turner, March 8, 2023
(Director)

KRONOS WORLDWIDE, INC.

Annual Report on Form 10-K

Items 8, 15(a) and 15(c)

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All financial statement schedules have been omitted either because they are not applicable or required, or the information that would be required to be included is disclosed in the Notes to the Consolidated Financial Statements.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Kronos Worldwide, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Kronos Worldwide, Inc. and its subsidiaries (the “Company”) as of December 31, 2022 and 2021, and the related consolidated statements of income, of comprehensive income, of stockholders’ 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 Management’s report on internal control over financial reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

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

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.

Income Taxes

As described in Note 12 to the consolidated financial statements, the Company recorded a provision for income taxes of $29.4 million and recorded noncurrent deferred tax asset and deferred tax liability amounts of $52.0 million and $26.4 million, respectively, for the year ended December 31, 2022. As disclosed by management, the Company operates globally and the calculation of the Company's provision for income taxes and its deferred tax assets and liabilities involves the interpretation and application of complex tax laws and regulations in a multitude of jurisdictions across the Company's global operations. The Company's effective tax rate is highly dependent upon the geographic distribution of its earnings or losses and the effects of tax laws and regulations in each tax-paying jurisdiction in which the Company operates. Significant judgments and estimates are required by management in determining the consolidated provision for income taxes due to the global nature of the Company's operations. The Company's provision for income taxes and deferred tax assets and liabilities reflect management's best assessment of estimated current and future taxes to be paid, including the recognition and measurement of deferred tax assets and liabilities.

The principal considerations for our determination that performing procedures relating to income taxes is a critical audit matter are the significant judgment by management when developing the estimate of current and future taxes to be paid, including the recognition and measurement of deferred tax assets and liabilities. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating evidence related to the recognition and measurement of deferred tax assets and liabilities and management's assessment of the estimated current and future taxes to be paid, including evaluating management's interpretation of tax laws and regulations.

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 accounting for income taxes, including controls over the identification, completeness, and recognition of permanent and temporary differences within jurisdictions, the recognition and measurement of deferred tax assets and liabilities, the application of tax laws and regulations in the various jurisdictions in which the Company operates, the rate reconciliation and the provision to tax return reconciliation. These procedures also included, among others, (i) evaluating the provision for income taxes, including the accuracy of the underlying information used in the calculation by jurisdiction, as well as the reasonableness of management's judgments and estimates in the application of tax laws and regulations; (ii) testing the current and deferred income tax provision, including evaluating permanent and temporary differences within certain jurisdictions and management's assessment of the technical merits of the differences; (iii) performing procedures over the Company's rate reconciliation; and (iv) testing the reconciliation of the provision to the tax returns.

/s/ PricewaterhouseCoopers LLP
Dallas, Texas
March 8, 2023

We have served as the Company's auditor since 1997.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(In millions, except per share data)

ASSETS	December 31, 2021	December 31, 2022
Current assets:		
Cash and cash equivalents	$ 406.0	**$ 327.8**
Restricted cash	2.1	**2.0**
Accounts and other receivables, net	360.7	**252.4**
Receivables from affiliates	18.4	**2.7**
Inventories, net	432.3	**608.7**
Prepaid expenses and other	38.5	**48.6**
Total current assets	1,258.0	**1,242.2**
Other assets:		
Investment in TiO_2 manufacturing joint venture	101.9	**112.9**
Restricted cash	4.5	**4.8**
Marketable securities	4.2	**3.2**
Operating lease right-of-use assets	19.9	**21.5**
Deferred income taxes	106.8	**52.0**
Other	14.1	**13.3**
Total other assets	251.4	**207.7**
Property and equipment:		
Land	43.9	**41.9**
Buildings	222.2	**214.7**
Equipment	1,122.1	**1,093.2**
Mining properties	129.6	**119.6**
Construction in progress	72.7	**76.5**
	1,590.5	**1,545.9**
Less accumulated depreciation and amortization	1,087.1	**1,061.4**
Net property and equipment	503.4	**484.5**
Total assets	$ 2,012.8	**$ 1,934.4**

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS (CONTINUED)

(In millions, except per share data)

LIABILITIES AND STOCKHOLDERS' EQUITY	December 31,	
	2021	2022
Current liabilities:		
Current maturities of long-term debt	$ 1.4	**$ 1.1**
Accounts payable and accrued liabilities	256.9	**289.4**
Payables to affiliates	18.2	**22.9**
Income taxes	12.3	**13.3**
Total current liabilities	288.8	**326.7**
Noncurrent liabilities:		
Long-term debt	449.8	**424.1**
Accrued pension costs	287.4	**128.6**
Payable to affiliate - income taxes	44.7	**33.5**
Operating lease liabilities	15.8	**17.4**
Deferred income taxes	28.1	**26.4**
Other	28.0	**20.5**
Total noncurrent liabilities	853.8	**650.5**
Stockholders' equity:		
Common stock, $.01 par value; 240.0 shares authorized; 115.5 shares issued and outstanding	1.2	**1.2**
Additional paid-in capital	1,395.4	**1,394.3**
Retained deficit	(122.1)	**(105.4)**
Accumulated other comprehensive loss	(404.1)	**(331.5)**
Treasury stock, at cost	(.2)	**(1.4)**
Total stockholders' equity	870.2	**957.2**
Total liabilities and stockholders' equity	$ 2,012.8	**$ 1,934.4**

Commitments and contingencies (Notes 12 and 15)

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF INCOME

(In millions, except per share data)

	Years ended December 31,		
	2020	**2021**	**2022**
Net sales	$ 1,638.8	$ 1,939.4	**$ 1,930.2**
Cost of sales	1,287.6	1,493.2	**1,539.1**
Gross margin	351.2	446.2	**391.1**
Selling, general and administrative expense	218.6	248.9	**231.3**
Other operating income (expense):			
Currency transactions, net	(4.0)	1.6	**11.5**
Other income, net	1.4	3.2	**3.4**
Corporate expense	(13.8)	(15.0)	**(15.1)**
Income from operations	116.2	187.1	**159.6**
Other income (expense):			
Interest and dividend income	1.8	.4	**5.1**
Insurance settlement gain	1.5	-	**-**
Marketable equity securities	(1.1)	2.0	**(1.0)**
Other components of net periodic pension and OPEB cost	(19.4)	(16.5)	**(12.9)**
Interest expense	(19.0)	(19.6)	**(16.9)**
Income before income taxes	80.0	153.4	**133.9**
Income tax expense	16.1	40.5	**29.4**
Net income	$ 63.9	$ 112.9	**$ 104.5**
Net income per basic and diluted share	$ .55	$ .98	**$ .90**
Weighted average shares used in the calculation of net income per share	115.6	115.5	**115.5**

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

(In millions)

	Years ended December 31,		
	2020	**2021**	**2022**
Net income	$ 63.9	$ 112.9	**$ 104.5**
Other comprehensive income (loss), net of tax:			
Currency translation	13.4	(7.0)	**(28.8)**
Defined benefit pension plans	(12.3)	51.2	**100.2**
Other postretirement benefit plans	(.5)	(.1)	**1.2**
Total other comprehensive income, net	.6	44.1	**72.6**
Comprehensive income	$ 64.5	$ 157.0	**$ 177.1**

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

Years ended December 31, 2020, 2021 and 2022

(In millions)

	Common stock	Additional paid-in capital	Retained deficit	Accumulated other comprehensive loss	Treasury stock	Total
Balance at December 31, 2019	$ 1.2	$ 1,396.2	$ (132.5)	$ (448.8)	$ -	$ 816.1
Net income	-	-	63.9	-	-	63.9
Other comprehensive income, net of tax	-	-	-	.6	-	.6
Issuance of common stock	-	.1	-	-	-	.1
Dividends paid - $.72 per share	-	-	(83.2)	-	-	(83.2)
Treasury stock acquired	-	-	-	-	(1.0)	(1.0)
Treasury stock retired	-	(1.0)	-	-	1.0	-
Balance at December 31, 2020	1.2	1,395.3	(151.8)	(448.2)	-	796.5
Net income	-	-	112.9	-	-	112.9
Other comprehensive income, net of tax	-	-	-	44.1	-	44.1
Issuance of common stock	-	.1	-	-	-	.1
Dividends paid - $.72 per share	-	-	(83.2)	-	-	(83.2)
Treasury stock acquired	-	-	-	-	(.2)	(.2)
Balance at December 31, 2021	1.2	1,395.4	(122.1)	(404.1)	(.2)	870.2
Net income	-	-	**104.5**	-	-	**104.5**
Other comprehensive income, net of tax	-	-	-	**72.6**	-	**72.6**
Issuance of common stock	-	**.2**	-	-	-	**.2**
Dividends paid - $.76 per share	-	-	**(87.8)**	-	-	**(87.8)**
Treasury stock acquired	-	-	-	-	**(2.5)**	**(2.5)**
Treasury stock retired	-	**(1.3)**	-	-	**1.3**	-
Balance at December 31, 2022	**$ 1.2**	**$ 1,394.3**	**$ (105.4)**	**$ (331.5)**	**$ (1.4)**	**$ 957.2**

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In millions)

	Years ended December 31,		
	2020	2021	2022
Cash flows from operating activities:			
Net income	$ 63.9	$ 112.9	**$ 104.5**
Depreciation	58.1	51.3	**51.7**
Amortization of operating lease right-of-use assets	6.5	6.6	**4.5**
Deferred income taxes	(3.2)	14.3	**(1.4)**
Benefit plan expense greater than cash funding	15.7	11.9	**8.7**
Marketable equity securities	1.1	(2.0)	**1.0**
Distributions from (contributions to) TiO_2 manufacturing joint venture, net	(12.8)	3.8	**(10.5)**
Other, net	.9	.8	**3.5**
Change in assets and liabilities:			
Accounts and other receivables, net	(4.7)	(58.6)	**85.7**
Inventories, net	13.3	65.8	**(198.4)**
Prepaid expenses	(3.0)	(20.5)	**(12.5)**
Accounts payable and accrued liabilities	(33.2)	47.2	**36.7**
Income taxes	6.6	(1.6)	**(.1)**
Accounts with affiliates	(4.3)	(26.3)	**8.7**
Other noncurrent assets	(4.6)	(5.1)	**.3**
Other noncurrent liabilities	2.2	6.0	**(.7)**
Net cash provided by operating activities	102.5	206.5	**81.7**
Cash flows from investing activities:			
Capital expenditures	(62.8)	(58.6)	**(63.2)**
Proceeds from insurance settlement	1.5	-	**-**
Other	-	-	**.1**
Net cash used in investing activities	(61.3)	(58.6)	**(63.1)**
Cash flows from financing activities:			
Payments on long-term debt	(1.1)	(1.4)	**(1.3)**
Deferred financing fees	-	(1.9)	**(.1)**
Dividends paid	(83.2)	(83.2)	**(87.8)**
Treasury stock acquired	(1.0)	(.2)	**(2.3)**
Net cash used in financing activities	(85.3)	(86.7)	**(91.5)**

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS (CONTINUED)

(In millions)

	Years ended December 31,		
	2020	2021	2022
Cash, cash equivalents and restricted cash - net change from:			
Operating, investing and financing activities	$ (44.1)	$ 61.2	**$ (72.9)**
Effect of currency exchange rate changes on cash	13.8	(10.6)	**(5.1)**
Net change for the year	(30.3)	50.6	**(78.0)**
Balance at beginning of year	392.3	362.0	**412.6**
Balance at end of year	$ 362.0	$ 412.6	**$ 334.6**
Supplemental disclosures:			
Cash paid for:			
Interest, net of amount capitalized	$ 18.0	$ 18.0	**$ 15.7**
Income taxes	15.3	41.6	**37.3**
Accrual for capital expenditures	5.8	4.8	**6.6**

See accompanying Notes to Consolidated Financial Statements.

Note 1 – Summary of significant accounting policies:

Organization and basis of presentation – At December 31, 2022, Valhi, Inc. (NYSE: VHI) held approximately 50% of our outstanding common stock and a wholly-owned subsidiary of NL Industries, Inc. (NYSE: NL) held approximately 31% of our common stock. Valhi owned approximately 83% of NL's outstanding common stock and a wholly-owned subsidiary of Contran Corporation held approximately 92% of Valhi's outstanding common stock. A majority of Contran's outstanding voting stock is held directly by Lisa K. Simmons and various family trusts established for the benefit of Ms. Simmons, Thomas C. Connelly (the husband of Ms. Simmons' late sister) and their children and for which Ms. Simmons or Mr. Connelly, as applicable, serve as trustee (collectively, the "Other Trusts"). With respect to the Other Trusts for which Mr. Connelly serves as trustee, he is required to vote the shares of Contran voting stock held in such trusts in the same manner as Ms. Simmons. Such voting rights of Ms. Simmons last through April 22, 2030 and are personal to Ms. Simmons. The remainder of Contran's outstanding voting stock is held by another trust (the "Family Trust"), which was established for the benefit of Ms. Simmons and her late sister and their children and for which a third-party financial institution serves as trustee. Consequently, at December 31, 2022, Ms. Simmons and the Family Trust may be deemed to control Contran, and therefore may be deemed to indirectly control the wholly-owned subsidiary of Contran, Valhi, NL and us.

Unless otherwise indicated, references in this report to "we," "us" or "our" refer to Kronos Worldwide, Inc. and its subsidiaries, taken as a whole.

Management's estimates – In preparing our financial statements in conformity with accounting principles generally accepted in the United States of America (GAAP) we are required to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amount of revenues and expenses during the reporting period. Actual results may differ significantly from previously estimated amounts under different assumptions or conditions.

Principles of consolidation – The consolidated financial statements include our accounts and those of our majority-owned subsidiaries. We have eliminated all material intercompany accounts and balances.

Translation of currencies – We translate the assets and liabilities of our subsidiaries whose functional currency is other than the U.S. dollar at year-end exchange rates, while we translate our revenues and expenses at average exchange rates prevailing during the year. We accumulate the resulting translation adjustments in stockholders' equity as part of accumulated other comprehensive loss, net of related deferred income taxes. We recognize currency transaction gains and losses in income currently.

Derivatives and hedging activities – We recognize derivatives as either assets or liabilities measured at fair value. We recognize the effect of changes in the fair value of derivatives either in net income or other comprehensive income (loss), depending on the intended use of the derivative.

Cash and cash equivalents – We classify bank time deposits and highly-liquid investments, including government and commercial notes and bills, with original maturities of three months or less as cash equivalents.

Restricted cash – We classify cash that has been segregated or is otherwise limited in use as restricted. Such restrictions or limitations relate primarily to financial assurance for landfill closure obligations at our Belgium facility and certain Norwegian payroll tax and employee benefit obligations. To the extent the restricted amount relates to a recognized liability, we classify such restricted amount as either a current or noncurrent asset to correspond with the classification of

the liability. To the extent the restricted amount does not relate to a recognized liability, we classify restricted cash as a current asset. Restricted cash classified as a current asset and restricted cash classified as a noncurrent asset are presented separately on our Consolidated Balance Sheets.

Marketable securities and securities transactions – We carry marketable securities at fair value. Accounting Standards Codification (ASC) Topic 820, *Fair Value Measurements and Disclosures*, establishes a consistent framework for measuring fair value and (with certain exceptions) this framework is generally applied to all financial statement items required to be measured at fair value. The standard requires fair value measurements to be classified and disclosed in one of the following three categories:

- Level 1 – Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities;
- Level 2 – Quoted prices in markets that are not active, or inputs which are observable, either directly or indirectly, for substantially the full term of the assets or liability; and
- Level 3 – Prices or valuation techniques that require inputs that are both significant to the fair value measurement and unobservable.

We classify all of our marketable securities as available-for-sale. Unrealized gains or losses on the marketable equity securities are recognized in Other income (expense) - Marketable equity securities on our Consolidated Statements of Income. We accumulate unrealized gains and losses on marketable debt securities as part of accumulated other comprehensive income (loss), net of related deferred income taxes. We base realized gains and losses upon the specific identification of the securities sold. See Notes 6 and 10.

Accounts receivable – We provide an allowance for doubtful accounts for known and estimated potential losses arising from sales to customers based on a periodic review of these accounts. See Note 3.

Inventories and cost of sales – We state inventories at the lower of cost or net realizable value, net of allowance for obsolete and slow-moving inventories. We generally base inventory costs for all inventory categories on average cost that approximates the first-in, first-out method. Inventories include the costs for raw materials, the cost to manufacture the raw materials into finished goods and overhead. Depending on the inventory's stage of completion, our manufacturing costs can include the costs of packing and finishing, utilities, maintenance, depreciation and salaries and benefits associated with our manufacturing process. We allocate fixed manufacturing overhead costs based on normal production capacity. Unallocated overhead costs resulting from periods with abnormally low production levels are charged to expense as incurred. As inventory is sold to third parties, we recognize the cost of sales in the same period that the sale occurs. We periodically review our inventory for estimated obsolescence or instances when inventory is no longer marketable for its intended use, and we record any write-down equal to the difference between the cost of inventory and its estimated net realizable value based on assumptions about alternative uses, market conditions and other factors. See Note 4.

Investment in TiO_2 manufacturing joint venture – We account for our investment in a 50%-owned manufacturing joint venture by the equity method. Distributions received from such investee are classified for statement of cash flow purposes using the "nature of distribution" approach under ASC Topic 320. See Note 5.

Leases – We enter into various arrangements (or leases) that convey the rights to use and control identified underlying assets for a period of time in exchange for consideration. We lease various manufacturing facilities, land and equipment. From time to time, we may also enter into an arrangement in which the right to use and control an identified underlying asset is embedded in another type of contract.

We determine if an arrangement is a lease (including leases embedded in another type of contract) at inception. All of our leases are classified as operating leases. Operating leases are included in operating lease right-of-use assets, current operating lease liabilities and noncurrent operating lease liabilities on our Consolidated Balance Sheets. See Note 9. As permitted by ASC Topic 842, *Leases*, we elected the practical expedients related to nonlease components (in which nonlease components associated with a lease and paid by us to the lessor, such as property taxes, insurance and maintenance, are treated as a lease component and considered part of minimum lease rental payments), and short-term

leases (in which leases with an original maturity of 12 months or less are excluded from the recognition requirements of ASC 842).

Right-of-use assets represent our right to use an underlying asset for the lease term and operating lease liabilities represent our obligation to make lease payments arising from the lease. The right-of-use operating lease assets and liabilities are recognized based on the estimated present value of lease payments over the lease term as of the respective lease commencement dates.

We use an estimated incremental borrowing rate to determine the present value of lease payments (unless we can determine the rate implicit in the lease, which is generally not the case). Our incremental borrowing rate for each of our leases is derived from available information, including our current debt and credit facility and U.S. and European yield curves as well as publicly available data for instruments with similar characteristics, adjusted for factors such as collateralization and term.

Our leases generally do not include termination or purchase options. Certain of our leases include an option to renew the lease after expiration of the initial lease term, but we have not included such renewal periods in our lease term because it is not reasonably certain that we would exercise the renewal option. Our leases generally have fixed lease payments, with no contingent or incentive payments. Certain of our leases include variable lease payments that depend on a specified index or rate. Our lease agreements do not contain any residual value guarantees.

Property and equipment and depreciation – We state property and equipment at cost, including capitalized interest on borrowings during the actual construction period of major capital projects. Capitalized interest costs were $.5 million in 2020, $1.1 million in 2021 and $1.2 million in 2022. We compute depreciation of property and equipment for financial reporting purposes (including mining equipment) principally by the straight-line method over the estimated useful lives of the assets as follows:

Asset	Useful lives
Buildings and improvements	10 to 40 years
Machinery and equipment	3 to 20 years
Mine development costs	units-of-production

We use accelerated depreciation methods for income tax purposes, as permitted. Upon the sale or retirement of an asset, we remove the related cost and accumulated depreciation from the accounts and recognize any gain or loss in income currently.

We expense costs incurred for maintenance, repairs and minor renewals (including planned major maintenance) while we capitalize expenditures for major improvements.

We have a governmental concession with an unlimited term to operate our ilmenite mine in Norway. Mining properties consist of buildings and equipment used in our Norwegian ilmenite mining operations. While we own the land and ilmenite reserves associated with the mining operations, such land and reserves were acquired for nominal value and we have no material asset recognized for the land and reserves related to our mining operations.

We perform impairment tests when events or changes in circumstances indicate the carrying value may not be recoverable. We consider all relevant factors. We perform the impairment test by comparing the estimated future undiscounted cash flows (exclusive of interest expense) associated with the asset to the asset’s net carrying value to determine if a write-down to fair value is required.

Long-term debt – We state long-term debt net of any unamortized original issue premium, discount or deferred financing costs (other than deferred financing costs associated with revolving credit facilities, which are recognized as an asset). We classify amortization of all deferred financing costs and any premium or discount associated with the issuance of indebtedness as interest expense and compute such amortization by either the interest method or the straight-line method over the term of the applicable issue. See Note 8.

Employee benefit plans – Accounting and funding policies for our defined benefit pension and defined contribution retirement plans are described in Note 10. We also provide certain postretirement benefits other than pensions (OPEB), consisting of health care and life insurance benefits, to certain U.S. and Canadian retired employees, which are not material. See Note 11.

Income taxes – We, Valhi and our qualifying subsidiaries are members of Contran's consolidated U.S. federal income tax group (the Contran Tax Group) and we and certain of our qualifying subsidiaries also file consolidated income tax returns with Contran in various U.S. state jurisdictions. As a member of the Contran Tax Group, we are jointly and severally liable for the federal income tax liability of Contran and the other companies included in the Contran Tax Group for all periods in which we are included in the Contran Tax Group. See Note 15. As a member of the Contran Tax Group, we are a party to a tax sharing agreement which provides that we compute our provision for U.S. income taxes on a separate-company basis using the tax elections made by Contran. Pursuant to the tax sharing agreement, we make payments to or receive payments from Valhi in amounts we would have paid to or received from the U.S. Internal Revenue Service or the applicable state tax authority had we not been a member of the Contran Tax Group. We made net payments of income taxes to Valhi of $6.6 million, $17.6 million and $15.9 million in 2020, 2021 and 2022, respectively.

We recognize deferred income tax assets and liabilities for the expected future tax consequences of temporary differences between the income tax and financial reporting carrying amounts of assets and liabilities, including investments in our subsidiaries and affiliates who are not members of the Contran Tax Group and undistributed earnings of non-U.S. subsidiaries which are not deemed to be permanently reinvested. At December 31, 2022, we continue to assert indefinite reinvestment as it relates to our outside basis difference attributable to our investments in our non-U.S. subsidiaries, other than post-1986 undistributed earnings of our European subsidiaries and all undistributed earnings of our Canadian subsidiary, which are not subject to permanent reinvestment plans. It is not practical for us to determine the amount of the unrecognized deferred income tax liability related to our investments in our non-U.S. subsidiaries which are permanently reinvested due to the complexities associated with our organizational structure, changes in the Tax Cuts and Jobs Act (2017 Tax Act), and the U.S. taxation of such investments in the states in which we operate. Deferred income tax assets and liabilities for each tax-paying jurisdiction in which we operate are netted and presented as either a noncurrent deferred income tax asset or liability, as applicable. We periodically evaluate our deferred tax assets in the various taxing jurisdictions in which we operate and adjust any related valuation allowance based on the estimate of the amount of such deferred tax assets that we believe does not meet the more-likely-than-not recognition criteria.

The 2017 Tax Act imposed a tax on global intangible low-tax income (GILTI). We record GILTI tax as a current-period expense when incurred under the period cost method. While our future global operations depend on a number of different factors, we do expect to have future U.S. inclusions in taxable income related to GILTI.

We account for the tax effects of a change in tax law as a component of the income tax provision related to continuing operations in the period of enactment, including the tax effects of any deferred income taxes originally established through a financial statement component other than continuing operations (i.e. other comprehensive income). Changes in applicable income tax rates over time as a result of changes in tax law, or times in which a deferred income tax asset valuation allowance is initially recognized in one year and subsequently reversed in a later year, can give rise to "stranded" tax effects in accumulated other comprehensive income in which the net accumulated income tax (benefit) remaining in accumulated other comprehensive income does not correspond to the then-applicable income tax rate applied to the pre-tax amount which resides in accumulated other comprehensive income. As permitted by GAAP, our accounting policy is to remove any such stranded tax effect remaining in accumulated other comprehensive income by recognizing an offset to our provision for income taxes related to continuing operations, only at the time when there is no remaining pre-tax amount in accumulated other comprehensive income. For accumulated other comprehensive income related to currency translation, this would occur only upon the sale or complete liquidation of one of our non-U.S. subsidiaries. For defined pension benefit plans and OPEB plans, this would occur whenever one of our subsidiaries which previously sponsored a defined benefit pension or OPEB plan had terminated such a plan and had no future obligation or plan asset associated with such a plan.

We record a reserve for uncertain tax positions for tax positions where we believe that it is more-likely-than-not our position will not prevail with the applicable tax authorities. The amount of the benefit associated with our uncertain tax positions that we recognize is limited to the largest amount for which we believe the likelihood of realization is greater

than 50%. We accrue penalties and interest on the difference between tax positions taken on our tax returns and the amount of benefit recognized for financial reporting purposes. We classify our reserves for uncertain tax positions in a separate current or noncurrent liability, depending on the nature of the tax position. See Note 12.

Net sales – Our sales involve single performance obligations to ship our products pursuant to customer purchase orders. In some cases, the purchase order is supported by an underlying master sales agreement, but our purchase order acceptance generally evidences the contract with our customer by specifying the key terms of product and quantity ordered, price and delivery and payment terms. In accordance with *Revenues from Contracts with Customers, (ASC 606)*, we record revenue when we satisfy our performance obligation to our customers by transferring control of our products to them, which generally occurs at point of shipment or upon delivery. Such transfer of control is also evidenced by transfer of legal title and other risks and rewards of ownership (giving the customer the ability to direct the use of, and obtain substantially all of the benefits of, the product), and our customers becoming obligated to pay us and it is probable we will receive payment. In certain arrangements we provide shipping and handling activities after the transfer of control to our customer (e.g. when control transfers prior to delivery) that are considered fulfillment activities, and accordingly, such costs are accrued when the related revenue is recognized. Sales arrangements with consignment customers occur when our product is shipped to a consignment customer location but we maintain control until the product is used in the customer's manufacturing process. In these instances, we recognize sales when the consignment customer uses our product, as control of our product has not passed to the customer until that time and all other revenue recognition criteria have been satisfied.

Revenue is recorded in an amount that reflects the net consideration we expect to receive in exchange for our products. Prices for our products are based on terms specified in published list prices and purchase orders, which generally do not include financing components, noncash consideration or consideration paid to our customers. As our standard payment terms are less than one year, we have elected the practical expedient under ASC 606 and have not assessed whether a contract has a significant financing component. We state sales net of price, early payment and distributor discounts and volume rebates (collectively, variable consideration). Variable consideration, to the extent present, is recognized as the amount to which we are most-likely to be entitled, using all information (historical, current and forecasted) that is reasonably available to us, and only to the extent that a significant reversal in the amount of the cumulative revenue recognized is not probable of occurring in a future period. Differences, if any, between estimates of the amount of variable consideration to which we will be entitled and the actual amount of such variable consideration have not been material in the past. Amounts received or receivable from our customers with respect to variable consideration we expect to refund to our customers is recognized as a current liability and classified as accrued sales discounts and rebates. See Note 9. We report any tax assessed by a governmental authority that we collect from our customers that is both imposed on and concurrent with our revenue-producing activities (such as sales, use, value added and excise taxes) on a net basis (meaning we do not recognize these taxes either in our revenues or in our costs and expenses).

Frequently, we receive orders for products to be delivered over dates that may extend across reporting periods. We invoice for each delivery upon shipment and recognize revenue for each distinct shipment when all sales recognition criteria for that shipment have been satisfied. As scheduled delivery dates for these orders are within a one-year period, under the optional exemption provided by ASC 606, we do not disclose sales allocated to future shipments of partially completed contracts.

ASC 606 requires a disaggregation of our sales into categories that depict how the nature, amount, timing and uncertainty of revenue and cash flows are affected by economic factors. We have determined such disaggregation of our sales is the same as the disclosure of our sales by place of manufacture (point of origin) and to the location of the customer (point of destination). See Note 2.

Selling, general and administrative expense; distribution costs – Selling, general and administrative expense includes costs related to marketing, sales, distribution (shipping and handling), research and development, legal and administrative functions such as accounting, treasury and finance, and includes costs for salaries and benefits not associated with our manufacturing process, travel and entertainment, promotional materials and professional fees. We include distribution (shipping and handling) costs in selling, general and administrative expense and these costs were $112 million in 2020, $132 million in 2021 and $122 million in 2022. We expense research and development costs as incurred, and these costs were $16 million in 2020, $17 million in 2021 and $15 million in 2022. We expense advertising costs as incurred and these costs were not material in any year presented.

Note 2 – Geographic information:

Our operations are associated with the production and sale of titanium dioxide pigments (TiO_2). TiO_2 is used to impart whiteness, brightness, opacity and durability to a wide variety of products, including paints, plastics, paper, fibers and ceramics. Additionally, TiO_2 is a critical component of everyday applications, such as coatings, plastics and paper, as well as many specialty products such as inks, foods and cosmetics. At December 31, 2021 and 2022, the net assets of non-U.S. subsidiaries included in consolidated net assets approximated $338 million and $504 million, respectively.

For geographic information, we attribute net sales to the place of manufacture (point of origin) and to the location of the customer (point of destination); we attribute property and equipment to their physical location.

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Net sales - point of origin:			
United States	$ 978.8	$ 1,052.1	**$ 1,226.6**
Germany	836.0	971.7	**895.4**
Canada	319.5	371.9	**389.4**
Belgium	249.5	295.7	**306.5**
Norway	211.8	257.2	**273.5**
Eliminations	(956.8)	(1,009.2)	**(1,161.2)**
Total	$ 1,638.8	$ 1,939.4	**$ 1,930.2**
Net sales - point of destination:			
Europe	$ 783.2	$ 945.0	**$ 878.3**
North America	569.3	645.7	**695.7**
Other	286.3	348.7	**356.2**
Total	$ 1,638.8	$ 1,939.4	**$ 1,930.2**

	December 31,	
	2021	2022
	(In millions)	
Identifiable assets - net property and equipment:		
Germany	$ 207.3	**$ 198.5**
Belgium	106.9	**100.8**
Canada	90.5	**87.8**
Norway	85.2	**82.7**
Other	13.5	**14.7**
Total	$ 503.4	**$ 484.5**

Note 3 – Accounts and other receivables, net:

	December 31,	
	2021	2022
	(In millions)	
Trade receivables	$ 326.3	**$ 220.3**
Recoverable VAT and other receivables	32.4	**28.5**
Refundable income taxes	4.0	**7.1**
Allowance for doubtful accounts	(2.0)	**(3.5)**
Total	$ 360.7	**$ 252.4**

Note 4 – Inventories, net:

	December 31,	
	2021	2022
	(In millions)	
Raw materials	$ 76.3	**$ 145.3**
Work in process	30.4	**32.0**
Finished products	245.6	**349.9**
Supplies	80.0	**81.5**
Total	$ 432.3	**$ 608.7**

Note 5 – Investment in TiO_2 manufacturing joint venture:

We own a 50% interest in Louisiana Pigment Company, L.P. (LPC). LPC is a manufacturing joint venture whose other 50%-owner is Venator Investments LLC (Venator Investments). Venator Investments is a wholly-owned subsidiary of Venator Group, of which Venator Materials PLC owns 100% and is the ultimate parent. LPC owns and operates a chloride-process TiO_2 plant near Lake Charles, Louisiana.

We and Venator Investments are both required to purchase one-half of the TiO_2 produced by LPC, unless we and Venator Investments agree otherwise. LPC operates on a break-even basis and, accordingly, we report no equity in earnings of LPC. Each owner's acquisition transfer price for its share of the TiO_2 produced is equal to its share of the joint venture's production costs and interest expense, if any. Our share of net cost is reported as cost of sales as the related TiO_2 acquired from LPC is sold. We report distributions we receive from LPC, which generally relate to excess cash generated by LPC from its non-cash production costs, and contributions we make to LPC, which generally relate to cash required by LPC when it builds working capital, as part of our cash flows from operating activities in our Consolidated Statements of Cash Flows. The components of our net cash distributions from (contributions to) LPC are shown in the table below.

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Distributions from LPC	$ 32.7	$ 28.5	**$ 58.3**
Contributions to LPC	(45.5)	(24.7)	**(68.8)**
Net distributions (contributions)	$ (12.8)	$ 3.8	**$ (10.5)**

Summary balance sheets of LPC are shown below:

	December 31,	
	2021	2022
	(In millions)	
ASSETS		
Current assets	$ 111.7	**$ 122.2**
Property and equipment, net	142.6	**147.4**
Total assets	$ 254.3	**$ 269.6**
LIABILITIES AND PARTNERS' EQUITY		
Other liabilities, primarily current	$ 47.8	**$ 41.2**
Partners' equity	206.5	**228.4**
Total liabilities and partners' equity	$ 254.3	**$ 269.6**

Summary income statements of LPC are shown below:

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Revenues and other income:			
Kronos	$ 167.8	$ 188.6	**$ 225.6**
Venator Investments	168.3	189.6	**225.9**
Total revenues and other income	336.1	378.2	**451.5**
Cost and expenses:			
Cost of sales	335.7	377.8	**451.1**
General and administrative	.4	.4	**.4**
Total costs and expenses	336.1	378.2	**451.5**
Net income	$ -	$ -	**$ -**

We have certain related party transactions with LPC, as more fully described in Note 14.

Note 6 – Marketable securities:

Our marketable securities consist of investments in the publicly-traded shares of related parties: Valhi, NL and CompX International Inc. NL owns the majority of CompX's outstanding common stock. All of our marketable securities are accounted for as available-for-sale securities, which are carried at fair value using quoted market prices in active markets for each marketable security and represent a Level 1 input within the fair value hierarchy. Unrealized gains or losses on equity securities are recognized in Other income (expense) - Marketable equity securities on our Consolidated Statements of Income.

Marketable security	Fair value measurement level	Market value	Cost basis	Unrealized gain (loss)
			(In millions)	
December 31, 2021:				
Valhi common stock	1	$ 4.1	$ 3.2	$ .9
NL and CompX common stocks	1	.1	.1	-
Total		$ 4.2	$ 3.3	$ .9
December 31, 2022:				
Valhi common stock	1	**$ 3.2**	**$ 3.2**	**$ -**

At December 31, 2021 and 2022, we held approximately 144,000 shares of Valhi's common stock. The per share quoted market price of Valhi's common stock was $28.75 and $22.00, at December 31, 2021 and 2022, respectively. We held a nominal number of shares of CompX and NL common stocks at December 31, 2021. During the second quarter of 2022 we sold all of our shares of NL and CompX common stock to the respective issuer in two separate private transactions that were approved in advance by our independent directors (using a 10-day trailing average price per share to determine the purchase price) for an aggregate sales price of $.1 million.

The Valhi common stock we own is subject to the restrictions on resale pursuant to certain provisions of the Securities and Exchange Commission (SEC) Rule 144. In addition, as a majority-owned subsidiary of Valhi we cannot vote our shares of Valhi common stock under Delaware General Corporation Law, but we do receive dividends from Valhi on these shares, when declared and paid.

Note 7 – Leases:

We enter into various operating leases for manufacturing facilities, land and equipment. Our operating leases are included in operating lease right-of-use assets, current operating lease liabilities and noncurrent operating lease liabilities on our Consolidated Balance Sheets. See Note 9. Our principal German operating subsidiary leases the land under its Leverkusen TiO_2 production facility pursuant to a lease with Bayer AG that expires in 2050. The Leverkusen facility itself, which we own and which represents approximately one-third of our current TiO_2 production capacity, is located within Bayer's extensive manufacturing complex.

During 2020, 2021 and 2022, our operating lease expense approximated $7.6 million, $7.7 million and $5.5 million, respectively (which approximates the amount of cash paid during each year for our operating leases included in the determination of our cash flows from operating activities). During 2020, 2021 and 2022, variable lease expense and short-term lease expense were not material. During 2020, 2021 and 2022, we entered into new operating leases which resulted in the recognition of $2.5 million, $3.8 million and $6.6 million, respectively, in right-of-use operating lease assets and corresponding liabilities on our Consolidated Balance Sheets. At December 31, 2021 and 2022, the weighted average remaining lease term of our operating leases was approximately 17 years and 15 years, respectively, and the weighted average discount rate associated with such leases was approximately 5.0% in both 2021 and 2022. Such average remaining lease term is weighted based on each arrangement's lease obligation, and such average discount rate is weighted based on each arrangement's total remaining lease payments.

At December 31, 2022, maturities of our operating lease liabilities were as follows:

Years ending December 31,	**Amount**
	(In millions)
2023	$ 4.5
2024	3.3
2025	2.7
2026	2.4
2027	1.5
2028 and thereafter	17.0
Total remaining lease payments	31.4
Less imputed interest	10.2
Total lease obligations	21.2
Less current obligations	3.8
Long term lease obligations	$ 17.4

With respect to our land lease associated with our Leverkusen facility, we periodically establish the amount of rent for such land lease by agreement with Bayer for periods of at least two years at a time. The lease agreement provides for no formula, index or other mechanism to determine changes in the rent of such land lease; rather, any change in the rent is subject solely to periodic negotiation between Bayer and us. As such, we will account for any change in the rent associated with such lease as a lease modification. Of the $21.2 million total lease obligations at December 31, 2022, $7.2 million relates to our Leverkusen facility land lease.

At December 31, 2022, we have no significant lease commitments that have not yet commenced.

Note 8 – Long-term debt:

	December 31,	
	2021	2022
	(In millions)	
Kronos International, Inc. 3.75% Senior Notes	$ 448.8	**$ 424.1**
Other	2.4	**1.1**
Total debt	451.2	**425.2**
Less current maturities	1.4	**1.1**
Total long-term debt	$ 449.8	**$ 424.1**

Senior Secured Notes – On September 13, 2017, Kronos International, Inc. (KII), our wholly-owned subsidiary, issued €400 million aggregate principal amount of its 3.75% Senior Secured Notes due September 15, 2025 (Senior Notes), at par value ($477.6 million when issued). The Senior Notes:

- bear interest at 3.75% per annum, payable semi-annually on March 15 and September 15 of each year, payments began on March 15, 2018;
- have a maturity date of September 15, 2025. We may redeem the Senior Notes at 100.938% of the principal amount, declining to 100% on or after September 15, 2023. If we experience certain specified change of control events, we would be required to make an offer to purchase the Senior Notes at 101% of the principal amount. We would also be required to make an offer to purchase a specified portion of the Senior Notes at par value in the event that we generate a certain amount of net proceeds from the sale of assets outside the ordinary course of business, and such net proceeds are not otherwise used for specified purposes within a specified time period;
- are fully and unconditionally guaranteed, jointly and severally, on a senior secured basis by Kronos Worldwide, Inc. and each of our direct and indirect domestic, wholly-owned subsidiaries;
- are collateralized by a first priority lien on (i) 100% of the common stock or other ownership interests of each existing and future direct domestic subsidiary of KII and the guarantors, and (ii) 65% of the voting common stock or other ownership interests and 100% of the non-voting common stock or other ownership interests of each non-U.S. subsidiary that is directly owned by KII or any guarantor;
- contain a number of covenants and restrictions which, among other things, restrict our ability to incur or guarantee additional debt, incur liens, pay dividends or make other restricted payments, or merge or consolidate with, or sell or transfer substantially all of our assets to, another entity, and contain other provisions and restrictive covenants customary in lending transactions of this type (however, there are no ongoing financial maintenance covenants); and
- contain customary default provisions, including a default under any of our other indebtedness in excess of $50.0 million.

The carrying value of the Senior Notes at December 31, 2022 is stated net of unamortized debt issuance costs of $2.4 million (December 31, 2021 - $3.5 million).

Revolving credit facility **–** On April 20, 2021, we entered into a $225 million global revolving credit facility (Global Revolver) which matures in April 2026. Borrowings under the Global Revolver are available for our general corporate purposes. Available borrowings are based on formula-determined amounts of eligible trade receivables and inventories, as defined in the agreement, less any outstanding letters of credit issued under the Global Revolver. Borrowings by our Canadian, Belgian and German subsidiaries are limited to $25 million, €30 million and €60 million, respectively. Any amounts outstanding under the Global Revolver bear interest, at our option, at the applicable non-base rate (LIBOR, CDOR or EURIBOR, dependent on the currency of the borrowing) plus a margin ranging from 1.5% to 2.0%, or at the applicable base rate, as defined in the agreement, plus a margin ranging from .5% to 2.0%. The Global Revolver is collateralized by, among other things, a first priority lien on the borrowers' trade receivables and inventories. The facility contains a number of covenants and restrictions customary in lending transactions of this type which, among other things, restrict the borrowers' ability to incur additional debt, incur liens, pay additional dividends or merge or

consolidate with, or sell or transfer all or substantially all of their assets to another entity and, under certain conditions, requires the maintenance of a fixed charge coverage ratio, as defined in the agreement, of at least 1.0 to 1.0.

During 2022, we had no borrowings or repayments under our Global Revolver and at December 31, 2022, approximately $211 million was available for borrowing under this revolving facility.

Aggregate maturities and other – Aggregate maturities of debt at December 31, 2022 are presented in the table below.

Years ending December 31,	Amount
	(In millions)
2023	$ 1.1
2024	-
2025	426.5
2026	-
2027	-
2028 and thereafter	-
Gross maturities	427.6
Less debt issuance costs	2.4
Total	$ 425.2

We are in compliance with all of our debt covenants at December 31, 2022.

Note 9 – Accounts payable and accrued liabilities:

	December 31,	
	2021	**2022**
	(In millions)	
Accounts payable	$ 143.6	**$ 177.2**
Accrued sales discounts and rebates	28.7	**25.6**
Employee benefits	28.9	**22.9**
Operating lease liabilities	3.7	**3.8**
Other	52.0	**59.9**
Total	$ 256.9	**$ 289.4**

Note 10 – Defined contribution and defined benefit retirement plans:

Defined contribution plans – We maintain various defined contribution pension plans with our contributions based on matching or other formulas. Defined contribution plan expense approximated $3.4 million in 2020 and $3.9 million in 2021 and 2022.

Defined benefit pension plans – We sponsor various defined benefit pension plans. Certain non-U.S. employees are covered by plans in their respective countries. Our U.S. plan was closed to new participants in 1996, and existing participants no longer accrue any additional benefits after that date. The benefits under all of our defined benefit pension plans are based upon years of service and employee compensation. Our funding policy is to contribute annually the minimum amount required under ERISA (or equivalent non-U.S.) regulations plus additional amounts as we deem appropriate. We recognize an asset or liability for the over or under funded status of each of our individual defined benefit pension plans on our Consolidated Balance Sheets. Changes in the funded status of these plans are recognized either in net income, to the extent they are reflected in periodic benefit cost, or through other comprehensive income (loss).

We expect to contribute the equivalent of approximately $17 million to all of our defined benefit pension plans during 2023. Benefit payments to plan participants out of plan assets are expected to be the equivalent of:

Years ending December 31,	**Amount**
	(In millions)
2023	$ 23.0
2024	24.7
2025	25.1
2026	26.4
2027	28.5
Next 5 years	158.7

The funded status of our non-U.S. defined benefit pension plans is presented in the table below.

	December 31,	
	2021	**2022**
	(In millions)	
Change in projected benefit obligations (PBO):		
Benefit obligations at beginning of the year	$ 846.7	**$ 748.1**
Service cost	14.7	**11.3**
Interest cost	8.2	**10.5**
Participant contributions	2.0	**1.7**
Actuarial gains	(45.4)	**(195.8)**
Settlements	-	**(1.2)**
Change in currency exchange rates	(55.0)	**(50.3)**
Benefits paid	(23.1)	**(21.5)**
Benefit obligations at end of the year	748.1	**502.8**
Change in plan assets:		
Fair value of plan assets at beginning of the year	481.8	**470.1**
Actual return on plan assets	17.7	**(49.5)**
Employer contributions	18.7	**15.0**
Participant contributions	2.0	**1.7**
Settlements	-	**(1.2)**
Change in currency exchange rates	(27.0)	**(31.0)**
Benefits paid	(23.1)	**(21.5)**
Fair value of plan assets at end of year	470.1	**383.6**
Funded status	$ (278.0)	**$ (119.2)**
Amounts recognized in the balance sheet:		
Noncurrent pension asset	$ 7.6	**$ 8.2**
Noncurrent accrued pension costs	(285.6)	**(127.4)**
Total	$ (278.0)	**$ (119.2)**
Amounts recognized in accumulated other comprehensive loss:		
Actuarial losses	$ 233.3	**$ 85.4**
Prior service cost	.4	**.4**
Total	$ 233.7	**$ 85.8**
Accumulated benefit obligations (ABO)	$ 723.7	**$ 488.0**

The total net underfunded status of our non-U.S. defined benefit pension plans decreased from $278.0 million at December 31, 2021 to $119.2 million at December 31, 2022 due to the change in our PBO during 2022 exceeding the change in plan assets during 2022. The decrease in our PBO in 2022 was primarily attributable to higher actuarial gains

due to the increase in discount rates from year end 2021 and favorable currency fluctuations, primarily from the strengthening of the U.S. dollar relative to the euro. The decrease in our plan assets in 2022 was primarily attributable to the net effects of negative plan asset returns in 2022, unfavorable currency fluctuations, primarily from the strengthening of the U.S. dollar relative to the euro and employer contributions.

The components of our net periodic defined benefit pension cost for our non-U.S. defined benefit pension plans are presented in the table below. The amounts shown below for the amortization of prior service cost and recognized actuarial losses for 2020, 2021 and 2022 were recognized as components of our accumulated other comprehensive loss at December 31, 2019, 2020 and 2021, respectively, net of deferred income taxes.

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Net periodic pension cost (income):			
Service cost	$ 13.3	$ 14.7	**$ 11.3**
Interest cost	10.0	8.2	**10.5**
Expected return on plan assets	(8.7)	(11.2)	**(11.0)**
Amortization of prior service cost	.2	.2	**.1**
Recognized actuarial losses	17.3	19.4	**12.5**
Settlements	-	-	**.3**
Total	$ 32.1	$ 31.3	**$ 23.7**

Information concerning certain of our non-U.S. defined benefit pension plans (for which the ABO exceeds the fair value of plan assets as of the indicated date) is presented in the table below.

	December 31,	
	2021	2022
	(In millions)	
Plans for which the ABO exceeds plan assets:		
PBO	$ 695.2	**$ 403.5**
ABO	674.4	**392.4**
Fair value of plan assets	409.4	**276.0**

The weighted-average rate assumptions used in determining the actuarial present value of benefit obligations for our non-U.S. defined benefit pension plans as of December 31, 2021 and 2022 are presented in the table below.

	December 31,	
Rate	2021	2022
Discount rate	1.5%	**3.9%**
Increase in future compensation levels	2.6%	**2.7%**

The weighted-average rate assumptions used in determining the net periodic pension cost for our non-U.S. defined benefit pension plans for 2020, 2021 and 2022 are presented in the table below.

	Years ended December 31,		
Rate	2020	2021	2022
Discount rate	1.4%	1.0%	**1.5%**
Increase in future compensation levels	2.6%	2.6%	**2.6%**
Long-term return on plan assets	2.0%	2.4%	**2.5%**

Variances from actuarially assumed rates will result in increases or decreases in accumulated pension obligations, pension expense and funding requirements in future periods.

The funded status of our U.S. defined benefit pension plan is presented in the table below.

	December 31,	
	2021	2022
	(In millions)	
Change in PBO:		
Benefit obligations at beginning of the year	$ 19.4	**$ 17.7**
Interest cost	.5	**.4**
Actuarial gains	(.6)	**(3.9)**
Settlements	(.5)	**-**
Benefits paid	(1.1)	**(1.0)**
Benefit obligations at end of the year	17.7	**13.2**
Change in plan assets:		
Fair value of plan assets at beginning of the year	16.1	**15.9**
Actual return on plan assets	.5	**(3.2)**
Employer contributions	.4	**.3**
Benefits paid	(1.1)	**(1.0)**
Fair value of plan assets at end of year	15.9	**12.0**
Funded status	$ (1.8)	**$ (1.2)**
Amounts recognized in the balance sheet:		
Accrued pension costs:		
Current	$ -	**$ -**
Noncurrent	(1.8)	**(1.2)**
Total	$ (1.8)	**$ (1.2)**
Amounts recognized in accumulated other comprehensive loss - actuarial losses	$ 9.8	**$ 9.2**
ABO	$ 17.7	**$ 13.2**

The components of our net periodic defined benefit pension cost for our U.S. defined benefit pension plan is presented in the table below. The amounts shown below for recognized actuarial losses for 2020, 2021 and 2022 were recognized as components of our accumulated other comprehensive loss at December 31, 2019, 2020 and 2021 respectively, net of deferred income taxes.

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Net periodic pension cost (income):			
Interest cost	$ .6	$ .5	**$ .4**
Expected return on plan assets	(.6)	(.6)	**(.6)**
Recognized actuarial losses	.6	.6	**.6**
Settlements	-	(.5)	**-**
Total	$ .6	$ -	**$ .4**

The discount rate assumptions used in determining the actuarial present value of the benefit obligation for our U.S. defined benefit pension plan as of December 31, 2021 and 2022 are 2.6% and 5.3%, respectively. The impact of assumed increases in future compensation levels does not have an effect on the benefit obligation as the plan is frozen with regards to compensation.

The weighted-average rate assumptions used in determining the net periodic pension cost for our U.S. defined benefit pension plan for 2020, 2021 and 2022 are presented in the table below. The impact of assumed increases in future compensation levels also does not have an effect on the periodic pension cost as the plan is frozen with regards to compensation.

Rate	Years ended December 31, 2020	2021	2022
Discount rate	3.1%	2.2%	**2.6%**
Long-term return on plan assets	4.5%	4.0%	**4.0%**

Variances from actuarially assumed rates will result in increases or decreases in accumulated pension obligations, pension expense and funding requirements in future periods.

The amounts shown in the tables above for actuarial losses and prior service cost at December 31, 2021 and 2022 have not yet been recognized as components of our periodic defined benefit pension cost as of those dates. These amounts will be recognized as components of our periodic defined benefit cost in future years and are recognized, net of deferred income taxes, in our accumulated other comprehensive loss at December 2021 and 2022.

The table below details the changes in our consolidated other comprehensive income (loss) during 2020, 2021 and 2022.

	Years ended December 31, 2020	2021 (In millions)	2022
Changes in plan assets and benefit obligations recognized in other comprehensive income (loss):			
Current year:			
Net actuarial (losses) gains	$ (36.8)	$ 52.5	**$ 135.1**
Amortization of unrecognized:			
Net actuarial losses	17.9	20.0	**13.0**
Prior service cost	.2	.2	**.1**
Settlement loss	-	-	**.3**
Total	$ (18.7)	$ 72.7	**$ 148.5**

In determining the expected long-term rate of return on our U.S. and non-U.S. plan asset assumptions, we consider the long-term asset mix (e.g. equity vs. fixed income) for the assets for each of our plans and the expected long-term rates of return for such asset components. In addition, we receive third-party advice about appropriate long-term rates of return. Such assumed asset mixes are summarized below:

- In Germany, the composition of our plan assets is established to satisfy the requirements of the German insurance commissioner. Our German pension plan assets represent an investment in a large collective investment fund established and maintained by Bayer AG in which several pension plans, including our German pension plans and Bayer's pension plans, have invested. Our plan assets represent a very nominal portion of the total collective investment fund maintained by Bayer. These plan assets are a Level 3 in the fair value hierarchy because there is not an active market that approximates the value of our investment in the Bayer investment fund. We estimate the fair value of the Bayer plan assets based on periodic reports we receive from the managers of the Bayer fund and using a model we developed with assistance from our third-party actuary that uses estimated asset allocations and correlates such allocation to similar asset mixes in fund indexes quoted on an active market. We periodically evaluate the results of our valuation model against actual returns in the Bayer fund and adjust the model as needed. The Bayer fund periodic reports are subject to audit by the German pension regulator.
- In Canada, we currently have a plan asset target allocation of 10 - 20% to equity securities and 80 - 90% to fixed income securities. We expect the long-term rate of return for such investments to approximate the

applicable average equity or fixed income index. The Canadian assets are Level 1 inputs because they are traded in active markets.

- In Norway, we currently have a plan asset target allocation of 15% to equity securities, 62% to fixed income securities, 14% to real estate and the remainder primarily to other investments and liquid investments such as money markets. The expected long-term rate of return for such investments is approximately 7%, 4%, 6% and 4%, respectively. The majority of Norwegian plan assets are Level 1 inputs because they are traded in active markets; however approximately 17% of our Norwegian plan assets are invested in real estate and other investments not actively traded and are therefore a Level 3 input.
- In the U.S. we currently have a plan asset target allocation of 34% to equity securities, 59% to fixed income securities, and the remainder is allocated to multi-asset strategies. The expected long-term rate of return for such investments is approximately 7%, 5% and 4%, respectively (before plan administrative expenses). Approximately 90% of our U.S. plan assets are invested in funds that are valued at net asset value (NAV) and, in accordance with ASC 820-10, not subject to classification in the fair value hierarchy.
- We also have plan assets in Belgium and the United Kingdom. The Belgium plan assets are invested in certain individualized fixed income insurance contracts for the benefit of each plan participant as required by the local regulators and are therefore a Level 3 input. The United Kingdom plan assets are invested primarily in insurance contracts that are a Level 3 input.

We regularly review our actual asset allocation for each plan and will periodically rebalance the investments in each plan to more accurately reflect the targeted allocation and/or maximize the overall long-term return when considered appropriate.

The composition of our pension plan assets by asset category and fair value level at December 31, 2021 and 2022 is shown in the tables below.

	Fair Value Measurements at December 31, 2021				
	Total	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Assets measured at NAV
			(In millions)		
Germany	$ 282.9	$ -	$ -	$ 282.9	$ -
Canada:					
Local currency equities	.2	.2	-	-	-
Non local currency equities	21.9	21.9	-	-	-
Local currency fixed income	89.3	89.3	-	-	-
Cash and other	.8	.8	-	-	-
Norway:					
Local currency equities	3.1	3.1	-	-	-
Non local currency equities	5.9	5.9	-	-	-
Local currency fixed income	25.1	15.9	9.2	-	-
Non local currency fixed income	6.7	6.7	-	-	-
Real estate	9.1	-	-	9.1	-
Cash and other	7.0	6.4	-	.6	-
U.S.:					
Equities	5.6	.4	-	-	5.2
Fixed income	9.3	-	-	-	9.3
Cash and other	1.0	.6	-	-	.4
Other	18.1	.4	-	17.7	-
Total	$ 486.0	$ 151.6	$ 9.2	$ 310.3	$ 14.9

	Fair Value Measurements at December 31, 2022				
	Total	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Assets measured at NAV
			(In millions)		
Germany	$ 234.0	$ -	$ -	$ 234.0	$ -
Canada:					
Local currency equities	.1	.1	-	-	-
Non local currency equities	11.0	11.0	-	-	-
Local currency fixed income	72.9	72.9	-	-	-
Cash and other	.6	.6	-	-	-
Norway:					
Local currency equities	2.3	2.3	-	-	-
Non local currency equities	4.7	4.7	-	-	-
Local currency fixed income	21.8	7.0	14.8	-	-
Non local currency fixed income	8.4	8.4	-	-	-
Real estate	7.8	-	-	7.8	-
Cash and other	2.7	2.4	-	.3	-
U.S.:					
Equities	3.8	.3	-	-	3.5
Fixed income	7.0	.1	-	-	6.9
Cash and other	1.2	.9	-	-	.3
Other	17.3	.4	-	16.9	-
Total	$ 395.6	$ 111.1	$ 14.8	$ 259.0	$ 10.7

A rollforward of the change in fair value of Level 3 assets follows.

	December 31,	
	2021	2022
	(In millions)	
Fair value at beginning of year	$ 314.3	$ 310.3
Gain (loss) on assets held at end of year	15.6	(31.0)
Gain (loss) on assets sold during the year	.4	(.7)
Assets purchased	16.2	13.8
Assets sold	(14.8)	(14.9)
Transfers in	3.5	-
Currency exchange rate fluctuations	(24.9)	(18.5)
Fair value at end of year	$ 310.3	$ 259.0

Note 11 – Other noncurrent liabilities:

	December 31,	
	2021	2022
	(In millions)	
Accrued postretirement benefits	$ 8.4	$ 5.9
Employee benefits	6.1	4.8
Other	13.5	9.8
Total	$ 28.0	$ 20.5

Note 12 – Income taxes:

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Pre-tax income:			
U.S.	$ 20.9	$ 25.5	**$ 44.1**
Non-U.S.	59.1	127.9	**89.8**
Total	$ 80.0	$ 153.4	**$ 133.9**
Expected tax expense, at U.S. federal statutory income tax rate of 21%	$ 16.8	$ 32.2	**$ 28.1**
Non-U.S. tax rates	.7	4.6	**2.1**
Incremental net tax benefit on earnings and losses of U.S. and non-U.S. companies	(5.5)	(3.9)	**(.5)**
Valuation allowance, net	.8	3.1	**(3.6)**
Global intangible low-tax income, net	2.7	2.8	**2.1**
Tax rate changes	(.3)	-	**-**
Assessment (refund) of prior tax payments, net	(.1)	.1	**-**
Adjustment to the reserve for uncertain tax positions, net	.1	-	**(.4)**
Nondeductible expenses	.9	1.0	**.9**
U.S. state income taxes and other, net	-	.6	**.7**
Income tax expense	$ 16.1	$ 40.5	**$ 29.4**
Components of income tax expense:			
Current payable:			
U.S. federal and state	$ 4.8	$ 4.6	**$ 10.7**
Non-U.S.	14.9	21.6	**20.1**
	19.7	26.2	**30.8**
Deferred income taxes (benefit):			
U.S. federal and state	(2.6)	3.3	**(3.0)**
Non-U.S.	(1.0)	11.0	**1.6**
	(3.6)	14.3	**(1.4)**
Income tax expense	$ 16.1	$ 40.5	**$ 29.4**
Comprehensive provision for income taxes allocable to:			
Net income	$ 16.1	$ 40.5	**$ 29.4**
Other comprehensive income (loss):			
Pension plans	(6.0)	24.0	**49.3**
OPEB plans	(.2)	-	**.4**
Total	$ 9.9	$ 64.5	**$ 79.1**

The amount shown in the preceding table of our income tax rate reconciliation for non-U.S. tax rates represents the result determined by multiplying the pre-tax earnings or losses of each of our non-U.S. subsidiaries by the difference between the applicable statutory income tax rate for each non-U.S. jurisdiction and the U.S. federal statutory tax rate. The amount shown on such table for incremental net tax benefit on earnings and losses of U.S. and non-U.S. companies includes, as applicable, (i) deferred income taxes (or deferred income tax benefits) associated with the current-year earnings of all of our non-U.S. subsidiaries and (ii) current U.S. income taxes (or current income tax benefit), including U.S. personal holding company tax, as applicable, attributable to current-year income (losses) of one of our non-U.S. subsidiaries, which subsidiary is treated as a dual resident for U.S. income tax purposes, to the extent the current-year income (losses) of such subsidiary is subject to U.S. income tax under the U.S. dual-resident provisions of the Internal Revenue Code.

The components of our net deferred income taxes at December 31, 2021 and 2022 are summarized in the following table.

	December 31,			
	2021		**2022**	
	Assets	**Liabilities**	**Assets**	**Liabilities**
	(In millions)			
Tax effect of temporary differences related to:				
Inventories	$ -	$ (2.9)	**$ -**	**$ (5.5)**
Property and equipment	-	(62.5)	**-**	**(59.1)**
Lease assets (liabilities)	5.0	(5.1)	**5.3**	**(5.4)**
Accrued OPEB costs	2.3	-	**1.7**	**-**
Accrued pension costs	73.6	-	**21.6**	**-**
Other accrued liabilities and deductible differences	12.1	-	**15.3**	**-**
Other taxable differences	-	(3.3)	**-**	**(3.9)**
Tax on unremitted earnings of non-U.S. subsidiaries	-	(11.2)	**-**	**(11.3)**
Tax loss and tax credit carryforwards	78.1	-	**70.7**	**-**
Valuation allowance	(7.4)	-	**(3.8)**	**-**
Adjusted gross deferred tax assets (liabilities)	163.7	(85.0)	**110.8**	**(85.2)**
Netting by tax jurisdiction	(56.9)	56.9	**(58.8)**	**58.8**
Net noncurrent deferred tax asset (liability)	$ 106.8	$ (28.1)	**$ 52.0**	**$ (26.4)**

We have substantial net operating loss (NOL) carryforwards in Germany (the equivalent of $414 million for German corporate tax purposes at December 31, 2022) and in Belgium (the equivalent of $13 million for Belgian corporate tax purposes at December 31, 2022). At December 31, 2022, we have concluded that no deferred income tax asset valuation allowance is required to be recognized with respect to such carryforwards, principally because (i) such carryforwards have an indefinite carryforward period, (ii) we have utilized a portion of such carryforwards during the most recent three-year period and (iii) we currently expect to utilize the remainder of such carryforwards over the long term. However, prior to the complete utilization of such carryforwards, if we were to generate additional losses in our German or Belgian operations for an extended period of time, or if applicable law were to change such that the carryforward period was no longer indefinite, it is possible that we might conclude the benefit of such carryforwards would no longer meet the more-likely-than-not recognition criteria, at which point we would be required to recognize a valuation allowance against some or all of the then-remaining tax benefit associated with the carryforwards.

Prior to the enactment of the 2017 Tax Act, the undistributed earnings of our European subsidiaries were deemed to be permanently reinvested (we had not made a similar determination with respect to the undistributed earnings of our Canadian subsidiary). Pursuant to the one-time repatriation tax (Transition Tax) provisions of the 2017 Tax Act which imposed a one-time repatriation tax on post-1986 undistributed earnings, we recognized current income tax expense of $74.5 million and elected to pay such tax over an eight year period beginning in 2018. At December 31, 2022, the balance of our unpaid Transition Tax is $44.7 million, which will be paid in annual installments over the remainder of the eight-year period, which ends in 2025. Of such $44.7 million, $33.5 million is recorded as a noncurrent payable to affiliate (income taxes payable to Valhi) classified as a noncurrent liability on our Consolidated Balance Sheet at December 31, 2022, and $11.2 million is included with our current payable to affiliate (income taxes payable to Valhi) classified as a current liability (a portion of our noncurrent income tax payable to affiliate was reclassified to our current payable to affiliate for the portion of our 2022 Transition Tax installment due within the next twelve months).

On March 27, 2020, the "Coronavirus Aid, Relief and Economic Security (CARES) Act" was signed into law in response to the COVID-19 pandemic. The CARES Act, among other things, includes provisions relating to refundable payroll tax credits, deferment of employer side social security payments, modifications to the limitation of business interest for tax years beginning in 2019 and 2020 and technical corrections to tax depreciation methods for qualified improvement property. The 2017 Tax Act limited our business interest expense to the sum of our business interest income and 30% of our adjusted taxable income as defined in the Tax Act. Any business interest expense disallowed as a deduction as a result of the limitation may be carried forward indefinitely. We determined our interest expense was limited under these provisions and we recorded deferred tax assets for the carryforwards associated with the nondeductible portion of our interest expense. We also concluded we were required to recognize a valuation allowance for such deferred tax asset under the more-likely-than-not recognition criteria. The CARES Act modification to the business interest provisions increased the business interest limitation from 30% of adjusted taxable income to 50% of adjusted taxable income which increased our allowable interest expense deduction for 2019 and 2020. Consequently, in the first quarter of 2020 we recognized a cash tax benefit of $.5 million related to the reversal of the valuation allowance recognized in 2019 for the portion of the disallowed interest expense we did not expect to fully utilize at December 31, 2019 and we considered such modifications in our 2020 provision for income taxes. These CARES Act provisions expired at the end of 2020, and in 2021 we recognized additional disallowed interest expense and increased the valuation allowance by $2.8 million for the portion of the carryforward we believed did not meet the more-likely-than-not measurement criteria. During 2022, we determined we were able to utilize a portion of the business interest expense carryforward and accordingly we recognized an aggregate non-cash income tax benefit of $3.5 million as a reduction of the valuation allowance.

On August 16, 2022, the Inflation Reduction Act was signed into law. Among other things, this legislation provides for a 15% corporate alternative minimum tax on certain large corporations, imposes a 1% excise tax on qualifying stock buybacks occurring after December 31, 2022, and provides for certain energy-related tax credits. We have evaluated the relevant provisions of the Act and do not expect them to have a material impact on our tax provision.

Tax authorities may in the future examine certain of our U.S. and non-U.S. tax returns and may propose tax deficiencies, including penalties and interest. Because of the inherent uncertainties involved in settlement initiatives and court and tax proceedings, we cannot guarantee that these tax matters, if any, will be resolved in our favor, and therefore our potential exposure, if any, is also uncertain. We believe we have adequate accruals for additional taxes and related interest expense which could ultimately result from tax examinations. We believe the ultimate disposition of tax examinations should not have a material adverse effect on our consolidated financial position, results of operations or liquidity.

We accrue interest and penalties on our uncertain tax positions as a component of our provision for income taxes. The amount of interest and penalties we accrued during 2020, 2021 and 2022 was not material.

The following table shows the changes in the amount of our uncertain tax positions (exclusive of the effect of interest and penalties discussed above) during 2020, 2021 and 2022:

	Years ended December 31,		
	2020	2021	2022
		(In millions)	
Changes in unrecognized tax benefits:			
Unrecognized tax benefits at beginning of year	$ 3.9	$ 4.1	**$ 3.8**
Net increase (decrease):			
Tax positions taken in prior periods	(.3)	-	-
Tax positions taken in current period	.6	.6	**.7**
Lapse due to applicable statute of limitations	(.5)	(.7)	**(1.1)**
Change in currency exchange rates	.4	(.2)	**(.2)**
Unrecognized tax benefits at end of year	$ 4.1	$ 3.8	**$ 3.2**

At December 31, 2022, all of our uncertain tax benefits are classified as a component of our noncurrent deferred tax asset. If our uncertain tax position at December 31, 2022 was recognized, a benefit of $3.2 million would affect our effective income tax rate. We currently estimate that our unrecognized tax benefits will decrease by approximately $1.0 million during the next twelve months due to the expiration of certain statutes of limitations.

We and Contran file income tax returns in U.S. federal and various state and local jurisdictions. We also file income tax returns in various non-U.S. jurisdictions, principally in Germany, Canada, Belgium and Norway. Our U.S. income tax returns prior to 2019 are generally considered closed to examination by applicable tax authorities. Our non-U.S. income tax returns are generally considered closed to examination for years prior to 2018 for Germany, 2019 for Belgium, 2017 for Canada and 2017 for Norway.

Note 13 – Stockholders' equity:

Long-term incentive compensation plan – Prior to 2020, our board of directors adopted a plan that provides for the award of stock to our board of directors, up to a maximum of 200,000 shares. We awarded 13,500 shares in 2020, 7,200 shares in 2021 and 8,400 shares in 2022 under this plan. At December 31, 2022, 111,800 shares are available for awards.

Stock repurchase program – Prior to 2020, our board of directors authorized the repurchase of up to 2.0 million shares of our common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. We may repurchase our common stock from time to time as market conditions permit. The stock repurchase program does not include specific price targets or timetables and may be suspended at any time. Depending on market conditions, we may terminate the program prior to its completion. We use cash on hand or other sources of liquidity to acquire the shares. Repurchased shares are added to our treasury and subsequently cancelled upon approval of the board of directors. In 2020, we acquired 122,489 shares of our common stock in market transactions for an aggregate purchase price of $1.0 million and subsequently cancelled all such shares. In 2021, we acquired 14,409 shares of common stock in market transactions for an aggregate purchase price of $.2 million and subsequently cancelled all such shares. In 2022, we acquired 217,778 shares of common stock in market transactions for an aggregate purchase price of $2.5 million. Of these shares, 73,881 were purchased in the first quarter and subsequently cancelled, and 143,897 shares were purchased in the fourth quarter and are accounted for as treasury stock at December 31, 2022. At December 31, 2022, 1,331,332 shares are available for repurchase under this stock repurchase program.

Accumulated other comprehensive loss – Changes in accumulated other comprehensive loss for 2020, 2021 and 2022 are presented in the table below.

	Years ended December 31,		
	2020	**2021**	**2022**
		(In millions)	
Accumulated other comprehensive loss, net of tax:			
Currency translation:			
Balance at beginning of period	$ (246.8)	$ (233.4)	**$ (240.4)**
Other comprehensive income (loss)	13.4	(7.0)	**(28.8)**
Balance at end of period	$ (233.4)	$ (240.4)	**$ (269.2)**
Defined benefit pension plans:			
Balance at beginning of period	$ (202.2)	$ (214.5)	**$ (163.3)**
Other comprehensive income - amortization of prior service cost and net losses included in net periodic pension cost	13.4	14.9	**9.9**
Net actuarial gain (loss) arising during year	(25.7)	36.3	**90.3**
Balance at end of period	$ (214.5)	$ (163.3)	**$ (63.1)**
OPEB plans:			
Balance at beginning of period	$ .2	$ (.3)	**$ (.4)**
Other comprehensive loss - amortization of prior service credit and net losses included in net periodic OPEB cost	(.2)	(.3)	**(.3)**
Net actuarial gain (loss) arising during year	(.3)	.2	**1.5**
Balance at end of period	$ (.3)	$ (.4)	**$ .8**
Total accumulated other comprehensive loss:			
Balance at beginning of period	$ (448.8)	$ (448.2)	**$ (404.1)**
Other comprehensive income	.6	44.1	**72.6**
Balance at end of period	$ (448.2)	$ (404.1)	**$ (331.5)**

See Note 6 for further discussion on our marketable securities, Note 10 for amounts related to our defined benefit pension plans and Note 11 for our OPEB plans.

Note 14 – Related party transactions:

We may be deemed to be controlled by Ms. Simmons and the Family Trust. See Note 1. Corporations that may be deemed to be controlled by or affiliated with such individuals sometimes engage in (a) intercorporate transactions such as guarantees, management and expense sharing arrangements, shared fee arrangements, joint ventures, partnerships, loans, options, advances of funds on open account, and sales, leases and exchanges of assets, including securities issued by both related and unrelated parties and (b) common investment and acquisition strategies, business combinations, reorganizations, recapitalizations, securities repurchases, and purchases and sales (and other acquisitions and dispositions) of subsidiaries, divisions or other business units, which transactions have involved both related and unrelated parties and have included transactions which resulted in the acquisition by one related party of a publicly-held noncontrolling interest in another related party. While no transactions of the type described above are planned or proposed with respect to us other than as set forth in these financial statements, we continuously consider, review and evaluate, and understand that Contran and related entities consider, review and evaluate such transactions. Depending upon the business, tax and other objectives then relevant, it is possible that we might be a party to one or more such transactions in the future.

Receivables from and payables to affiliates are summarized in the table below.

	December 31,	
	2021	2022
	(In millions)	
Current receivables from affiliates:		
LPC	$ 15.8	**$ -**
Other	2.6	**2.7**
	$ 18.4	**$ 2.7**
Current payables to affiliates:		
LPC	$ 17.3	**$ 17.1**
Income taxes payable to Valhi	.9	**5.8**
	$ 18.2	**$ 22.9**
Noncurrent payable to affiliate -		
Income taxes payable to Valhi (See Note 12)	$ 44.7	**$ 33.5**

Amounts payable to LPC are generally for the purchase of TiO_2, while amounts receivable from LPC are generally from the sale of TiO_2 feedstock. See Note 5. Purchases of TiO_2 from LPC were $167.8 million in 2020, $188.6 million in 2021 and $225.6 million in 2022. Sales of feedstock to LPC were $84.2 million in 2020, $85.4 million in 2021 and $106.9 million in 2022.

From time to time, we may have loans and advances outstanding between us and various related parties pursuant to term and demand notes. We generally enter into these loans and advances for cash management purposes. When we loan funds to related parties, we are generally able to earn a higher rate of return on the loan than we would earn if we invested the funds in other instruments, and when we borrow from related parties, we are generally able to pay a lower rate of interest than we would pay if we had incurred third-party indebtedness. While certain of these loans to affiliates may be of a lesser credit quality than cash equivalent instruments otherwise available to us, we believe we have considered the credit risks in the terms of the applicable loans.

In this regard, prior to 2020 we entered into an unsecured revolving demand promissory note with Valhi under which as amended, we have agreed to loan Valhi up to $25 million. Our loan to Valhi bears interest at prime plus 1.00%, payable quarterly, with all principal due on demand, but in any event no earlier than December 31, 2024. Loans made to Valhi at any time are at our discretion. At December 31, 2021 and December 31, 2022, we had no outstanding loans to Valhi under this promissory note.

Interest income (including unused commitment fees) on our loan to Valhi was $.3 million in 2020 and $.2 million in each of 2021 and 2022.

Under the terms of various intercorporate services agreements (ISAs) entered into between us and various related parties, including Contran, employees of one company will provide certain management, tax planning, financial and administrative services to the other company on a fee basis. Such fees are based upon the compensation of individual Contran employees providing services for us and/or estimates of the time devoted to our affairs by such persons. Because of the number of companies affiliated with Contran, we believe we benefit from cost savings and economies of scale gained by not having certain management, financial and administrative staffs duplicated at each entity, thus allowing certain individuals to provide services to multiple companies but only be compensated by one entity. We negotiate fees annually and agreements renew quarterly. The net ISA fee charged to us by Contran is included in selling, general and administrative expense and corporate expense and was $23.3 million in 2020, $24.0 million in 2021 and $24.5 million in 2022.

Contran and certain of its subsidiaries and affiliates, including us, purchase certain of their insurance policies and risk management services as a group, with the costs of the jointly-owned policies and services being apportioned among the participating companies. Tall Pines Insurance Company (Tall Pines), a subsidiary of Valhi, underwrites certain

insurance policies for Contran and certain of its subsidiaries and affiliates, including us. Tall Pines purchases reinsurance from highly rated (as determined by A. M. Best or another internationally recognized ratings agency) third-party insurance carriers for substantially all of the risks it underwrites. Consistent with insurance industry practices, Tall Pines receives commissions from the reinsurance underwriters and/or assesses fees for certain of the policies that it underwrites. During 2020, 2021 and 2022 we and our joint venture paid $19.1 million, $23.2 million and $20.8 million, respectively, under the group insurance program, which amounts principally represent insurance premiums, including $14.8 million, $18.6 million and $17.3 million, respectively, for policies written by Tall Pines. Amounts paid under the group insurance program also include payments to insurers or reinsurers for the reimbursement of claims within our applicable deductible or retention ranges that such insurers and reinsurers paid to third parties on our behalf, as well as amounts for claims and risk management services and various other third-party fees and expenses incurred by the program. We expect these relationships will continue in 2023.

With respect to certain of such jointly-owned policies, it is possible that unusually large losses incurred by one or more insureds during a given policy period could leave the other participating companies without adequate coverage under that policy for the balance of the policy period. As a result, and in the event that the available coverage under a particular policy would become exhausted by one or more claims, Contran and certain of its subsidiaries and affiliates, including us, have entered into a loss sharing agreement under which any uninsured loss arising because the available coverage had been exhausted by one or more claims will be shared ratably by those entities that had submitted claims under the relevant policy. We believe the benefits, in the form of reduced premiums and broader coverage associated with the group coverage for such policies, justifies the risk associated with the potential for any uninsured loss.

Contran and certain of its subsidiaries, including us, participate in a combined information technology data services program that Contran provides for primary data processing and failover. The program apportions its costs among the participating companies. The aggregate amount we paid Contran for such services was $.3 million in each of 2020, 2021 and 2022. Under the terms of a sublease agreement between Contran and us, we lease certain office space from Contran. We paid Contran $.4 million in both 2020 and 2021 and $.5 million in 2022 for such rent and related ancillary services. We expect that these relationships with Contran will continue in 2023.

Note 15 – Commitments and contingencies:

Environmental matters – Our operations are governed by various environmental laws and regulations. Certain of our operations are and have been engaged in the handling, manufacture or use of substances or compounds that may be considered toxic or hazardous within the meaning of applicable environmental laws and regulations. As with other companies engaged in similar businesses, certain of our past and current operations and products have the potential to cause environmental or other damage. We have implemented and continue to implement various policies and programs in an effort to minimize these risks. Our policy is to maintain compliance with applicable environmental laws and regulations at all of our facilities and to strive to improve our environmental performance and overall sustainability. We update our Kronos Environmental Social Governance Report biennially, which highlights our focus on sustainability of our manufacturing operations, as well as our environmental, social and governance strategy. From time to time, we may be subject to environmental regulatory enforcement under U.S. and non-U.S. statutes, the resolution of which typically involves the establishment of compliance programs. It is possible that future developments, such as stricter requirements of environmental laws and enforcement policies thereunder, could adversely affect our production, handling, use, storage, transportation, sale or disposal of such substances. We believe all our manufacturing facilities are in substantial compliance with applicable environmental laws.

Litigation matters – We are involved in various environmental, contractual, product liability, patent (or intellectual property), employment and other claims and disputes incidental to our business. At least quarterly our management discusses and evaluates the status of any pending litigation to which we are a party. The factors considered in such evaluation include, among other things, the nature of such pending cases, the status of such pending cases, the advice of legal counsel and our experience in similar cases (if any). Based on such evaluation, we make a determination as to whether we believe (i) it is probable a loss has been incurred, and if so if the amount of such loss (or a range of loss) is reasonably estimable, or (ii) it is reasonably possible but not probable a loss has been incurred, and if so if the amount of such loss (or a range of loss) is reasonably estimable, or (iii) the probability a loss has been incurred is remote. We have not accrued any amounts for litigation matters because it is not reasonably possible we have incurred a loss that would be material to our consolidated financial statements, results of operations or liquidity.

Concentrations of credit risk – Sales of TiO_2 accounted for 93% of our net sales in 2020 and 92% in 2021 and 2022. The remaining sales result from the mining and sale of ilmenite ore (a raw material used in the sulfate pigment production process), and the manufacture and sale of iron-based water treatment chemicals and certain titanium chemical products (derived from co-products of the TiO_2 production processes). TiO_2 is generally sold to the paint, plastics and paper industries. Such markets are generally considered "quality-of-life" markets whose demand for TiO_2 is influenced by the relative economic well-being of the various geographic regions. We sell TiO_2 to approximately 4,000 customers, with the top ten customers approximating 34% of net sales in 2020, 32% in 2021 and 33% in 2022. One customer accounted for approximately 10% of our net sales in both 2020 and in 2022. We did not have sales to a single customer comprising 10% or more of our net sales in 2021.

The table below shows the approximate percentage of our TiO_2 sales by volume for our significant markets, Europe and North America, for the last three years.

	2020	2021	2022
Europe	46%	46%	**45%**
North America	36%	37%	**39%**

Long-term contracts – We have long-term supply contracts that provide for certain of our TiO_2 feedstock requirements through 2026. The agreements require us to purchase certain minimum quantities of feedstock with minimum purchase commitments aggregating approximately $1.0 billion over the life of the contracts in years subsequent to December 31, 2022 (including approximately $600 million committed to be purchased in 2023). In addition, we have other long-term supply and service contracts that provide for various raw materials and services. These agreements require us to purchase certain minimum quantities or services with minimum purchase commitments aggregating approximately $84 million at December 31, 2022 (including approximately $42 million committed to be purchased in 2023).

Income taxes – We are a party to a tax sharing agreement with Contran and Valhi providing for the allocation of tax liabilities and tax payments as described in Note 1. Under applicable law, we, along with every other member of the Contran Tax Group, are each jointly and severally liable for the aggregate federal income tax liability of Contran and the other companies included in the Contran Tax Group for all periods in which we are included in the Contran Tax Group. Valhi has agreed, however, to indemnify us for any liability for income taxes of the Contran Tax Group in excess of our tax liability computed in accordance with the tax sharing agreement.

Note 16 – Financial instruments:

See Note 6 for information on how we determine fair value of our marketable securities.

The following table presents the financial instruments that are not carried at fair value but which require fair value disclosure as of December 31, 2021 and 2022.

	December 31, 2021		December 31, 2022	
	Carrying amount	Fair value	Carrying amount	Fair value
	(In millions)			
Cash, cash equivalents and restricted cash	$ 412.6	$ 412.6	**$ 334.6**	**$ 334.6**
Long-term debt - Fixed rate Senior Notes	448.8	460.2	**424.1**	**374.2**

At December 31, 2022, the estimated market price of our Senior Notes was €877 per €1,000 principal amount. The fair value of our Senior Notes was based on quoted market prices; however, these quoted market prices represented Level 2 inputs because the markets in which the Senior Notes trade were not active. Due to their near-term maturities, the carrying amounts of accounts receivable and accounts payable are considered equivalent to fair value. See Notes 3 and 9.

Note 17 - Other operating income (expense), net:

On August 24, 2020, LPC temporarily halted production due to Hurricane Laura. Although storm damage to core processing facilities was not extensive, a variety of factors, including loss of utilities and limited access and availability of employees and raw materials, prevented the resumption of operations until September 25, 2020. The majority of our losses from property damage and our share of LPC's lost production and other costs resulting from the disruption of operations, were covered by insurance. We recognized a gain of $2.7 million related to our business interruption claim in the third quarter of 2022, which is included in Other operating income (expense) – Other income, net on our Consolidated Statement of Income.

**UNSECURED REVOLVING
DEMAND PROMISSORY NOTE**

$25,000,000.00 **December 31, 2022**

Section 1. ***Promise to Pay***. For and in consideration of value received, the undersigned, VALHI, INC., a corporation duly organized under the laws of the state of Delaware ("*Borrower*"), promises to pay, in lawful money of the United States of America, to the order of KRONOS WORLDWIDE, INC., a corporation duly organized under the laws of the state of Delaware ("*Kronos Worldwide*"), or the holder hereof (as applicable, Kronos Worldwide or such holder shall be referred to as the "*Noteholder*"), the principal sum of TWENTY-FIVE MILLION and NO/100ths United States Dollars ($25,000,000.00) or such lesser amount as shall equal the unpaid principal amount of the loan made by the Noteholder to Borrower together with accrued and unpaid interest on the unpaid principal balance from time to time pursuant to the terms of this Unsecured Revolving Demand Promissory Note, as it may be amended from time to time (this "*Note*"). This Note shall be unsecured and will bear interest on the terms set forth in **Section 7** below. Capitalized terms not otherwise defined shall have the meanings given to such terms in **Section 19** of this Note.

Section 2.2. ***Amendment and Restatement.*** This Note renews, replaces, amends and restates in its entirety the Unsecured Revolving Demand Promissory Note dated December 31, 2021 in the original principal amount of $30,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Prior Note*"). As of the close of business on December 31, 2022, the unpaid principal balance of the Prior Note was nil, the accrued and unpaid interest thereon was nil and the accrued and unpaid commitment fee thereon was nil, which is the unpaid principal, accrued and unpaid interest and accrued and unpaid commitment fee owed under this Note as of the close of business on the date of this Note. This Note contains the entire understanding between the Noteholder and the Borrower with respect to the transactions contemplated hereby and supersedes all other instruments, agreements and understandings between the Noteholder and the Borrower with respect to the subject matter of this Note.

Section 3.2. ***Place of Payment***. All payments will be made at Noteholder's address at Three Lincoln Centre, 5430 LBJ Freeway, Suite 1700, Dallas, Texas 75240-2620, Attention: Treasurer, or such other place as the Noteholder may from time to time appoint in writing.

Section 4.3. ***Payments***. The unpaid principal balance of this Note and any accrued and unpaid interest thereon shall be due and payable on the Final Payment Date. Prior to the Final Payment Date, any accrued and unpaid interest on an unpaid principal balance shall be paid in arrears quarterly on the last day of each March, June, September and December, commencing March 31, 2023. All payments on this Note shall be applied first to accrued and unpaid interest, next to accrued interest not yet payable and then to principal. If any payment of principal or interest on this Note shall become due on a day that is not a Business Day, such payment shall be made on the next succeeding Business Day and the payment shall be the amount owed on the original payment date.

Section 5.3. ***Prepayments***. This Note may be prepaid in part or in full at any time without penalty.

Section 6.3. ***Borrowings***. Prior to the Final Payment Date, Noteholder expressly authorizes Borrower to borrow, repay and re-borrow principal under this Note in increments of $100,000 on a daily basis so long as:

- the aggregate outstanding principal balance does not exceed $25,000,000.00; and
- no Event of Default has occurred and is continuing.

Notwithstanding anything else in this Note, in no event will Noteholder be required to lend money to Borrower under this Note and loans under this Note shall be at the sole and absolute discretion of Noteholder.

Section 7.5. ***Interest***. The unpaid principal balance of this Note shall bear interest at the rate per annum of the Prime Rate plus one percent (1.00%). In the event that an Event of Default occurs and is continuing, the unpaid principal amount shall bear interest from the Event of Default at the rate per annum of the Prime Rate plus four percent (4.00%) until such time as the Event of Default is cured. Accrued interest on the unpaid principal of this Note shall be computed on the basis of a 365- or 366-day year for actual days (including the first, but excluding the last day) elapsed, but in no event shall such computation result in an amount of accrued interest that would exceed accrued interest on the unpaid principal balance during the same period at the Maximum Rate. Notwithstanding anything to the contrary, this Note is expressly limited so that in no contingency or event whatsoever shall the amount paid or agreed to be paid to the Noteholder exceed the Maximum Rate. If, from any circumstances whatsoever, the Noteholder shall ever receive as interest an amount that would exceed the Maximum Rate, such amount that would be excessive

interest shall be applied to the reduction of the unpaid principal balance and not to the payment of interest, and if the principal amount of this Note is paid in full, any remaining excess shall be paid to Borrower, and in such event, the Noteholder shall not be subject to any penalties provided by any laws for contracting for, charging, taking, reserving or receiving interest in excess of the highest lawful rate permissible under applicable law. All sums paid or agreed to be paid to Noteholder for the use, forbearance or detention of the indebtedness of the Borrower to Noteholder shall, to the extent permitted by applicable law, be amortized, prorated, allocated and spread throughout the full term of such indebtedness until payment in full of the principal (including the period of any renewal or extension thereof) so that the interest on account of such indebtedness shall not exceed the Maximum Rate. If at any time the Contract Rate is limited to the Maximum Rate, any subsequent reductions in the Contract Rate shall not reduce the rate of interest on this Note below the Maximum Rate until the total amount of interest accrued equals the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate. In the event that, upon the Final Payment Date, the total amount of interest paid or accrued on this Note is less than the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate, then at such time, to the extent permitted by law, in addition to the principal and any other amounts Borrower owes to the Noteholder, the Borrower shall pay to the Noteholder an amount equal to the difference between: (i) the lesser of the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate or the amount of interest that would have accrued if the Maximum Rate had at all times been in effect; and (ii) the amount of interest actually paid on this Note.

Section 8.5. **Fees and Expenses**. On the last day of each March, June, September and December, commencing March 31, 2023, and on the Final Payment Date, Borrower shall pay to Noteholder the Unused Commitment Fee for such period, *provided*, *however*, Borrower will not owe any Unused Commitment Fee for any part of such period (prorated as applicable) that the Noteholder is a net borrower of money from the Borrower. In addition, Borrower and any guarantor jointly and severally agree to pay on the Final Payment Date to Noteholder any other cost or expense reasonably incurred by Noteholder in connection with Noteholder's commitment to Borrower pursuant to the terms of this Note, including without limitation any other cost reasonably incurred by Noteholder pursuant to the terms of any credit facility of Noteholder.

Section 9.6. ***Remedy***. Upon the occurrence and during the continuation of an Event of Default, the Noteholder shall have all of the rights and remedies provided in the applicable Uniform Commercial Code, this Note or any other agreement among Borrower and in favor of the Noteholder, as well as those rights and remedies provided by any other applicable law, rule or regulation. In conjunction with and in addition to the foregoing rights and remedies of the Noteholder, the Noteholder may declare all indebtedness due under this Note, although otherwise unmatured, to be due and payable immediately without notice or demand whatsoever. All rights and remedies of the Noteholder are cumulative and may be exercised singly or concurrently. The failure to exercise any right or remedy will not be a waiver of such right or remedy.

Section 10.7. ***Right of Offset***. The Noteholder shall have the right of offset against amounts that may be due by the Noteholder now or in the future to Borrower against amounts due under this Note.

Section 11.8. ***Record of Outstanding Indebtedness***. The date and amount of each repayment of principal outstanding under this Note or interest thereon shall be recorded by Noteholder in its records. The principal balance outstanding and all accrued or accruing interest owed under this Note as recorded by Noteholder in its records shall be the best evidence of the principal balance outstanding and all accrued or accruing interest owed under this Note; *provided* that the failure of Noteholder to so record or any error in so recording or computing any such amount owed shall not limit or otherwise affect the obligations of the Borrower under this Note to repay the principal balance outstanding and all accrued or accruing interest.

Section 12.9. ***Waiver***. Borrower and each surety, endorser, guarantor, and other party now or subsequently liable for payment of this Note, severally waive demand, presentment for payment, notice of nonpayment, notice of dishonor, protest, notice of protest, notice of the intention to accelerate, notice of acceleration, diligence in collecting or bringing suit against any party liable on this Note, and further agree to any and all extensions, renewals, modifications, partial payments, substitutions of evidence of indebtedness, and the taking or release of any collateral with or without notice before or after demand by the Noteholder for payment under this Note.

Section 13.10. ***Costs and Attorneys' Fees***. In addition to any other amounts payable to Noteholder pursuant to the terms of this Note, in the event the Noteholder incurs costs in collecting on this Note, this Note is placed in the hands of any attorney for collection, suit is filed on this Note or if proceedings are had in bankruptcy, receivership,

reorganization, or other legal or judicial proceedings for the collection of this Note, Borrower and any guarantor jointly and severally agree to pay on demand to the Noteholder all expenses and costs of collection, including, but not limited to, reasonable attorneys' fees incurred in connection with any such collection, suit, or proceeding, in addition to the principal and interest then due.

Section 14.11. ***Time of Essence***. Time is of the essence with respect to all of Borrower's obligations and agreements under this Note.

Section 15.12. ***Jurisdiction and Venue***. THIS NOTE SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE DOMESTIC LAWS OF THE STATE OF TEXAS, WITHOUT GIVING EFFECT TO ANY CHOICE OF LAW OR CONFLICT OF LAW PROVISION OR RULE (WHETHER OF THE STATE OF TEXAS OR ANY OTHER JURISDICTION) THAT WOULD CAUSE THE APPLICATION OF THE LAWS OF ANY JURISDICTION OTHER THAN THE STATE OF TEXAS. BORROWER CONSENTS TO JURISDICTION IN THE COURTS LOCATED IN DALLAS, TEXAS.

Section 16.13. ***Notice***. Any notice or demand required by this Note shall be deemed to have been given and received on the earlier of **(i)** when the notice or demand is actually received by the recipient or **(ii)** 72 hours after the notice is deposited in the United States mail, certified or registered, with postage prepaid, and addressed to the recipient. The address for giving notice or demand under this Note **(i)** to the Noteholder shall be the place of payment specified in **Section 3** or such other place as the Noteholder may specify in writing to the Borrower and **(ii)** to Borrower shall be the address below the Borrower's signature or such other place as the Borrower may specify in writing to the Noteholder.

Section 17.14. ***Amendment or Waiver of Provisions of this Note***. No amendment or waiver of any provision of this Note shall in any event be effective unless the same shall be in a writing referring to this Note and signed by the Borrower and the Noteholder. Such amendment or waiver shall be effective only in the specific instance and for the specific purpose for which given. No waiver of any of the provisions of this Note shall be deemed or shall constitute a waiver of any other provisions, whether or not similar, nor shall any waiver constitute a continuing waiver.

Section 18.14. ***Successors and Assigns***. All of the covenants, obligations, promises and agreements contained in this Note made by Borrower shall be binding upon its successors and permitted assigns, as applicable. Notwithstanding the foregoing, Borrower shall not assign this Note or its performance under this Note without the prior written consent of the Noteholder. Noteholder at any time may assign this Note without the consent of Borrower.

Section 19 ***Definitions.*** For purposes of this Note, the following terms shall have the following meanings:

(a) "***Basis Point***" shall mean 1/100th of 1 percent.

(b) "***Business Day***" shall mean any day banks are open in the state of Texas.

(c)(a) "***Contract Rate***" means the amount of any interest (including fees, charges or expenses or any other amounts that, under applicable law, are deemed interest) contracted for, charged or received by or for the account of Noteholder.

(d)(b) "***Event of Default***" wherever used herein, means any one of the following events:

(i)(i) the Borrower fails to pay any amount due on this Note and/or any fees or sums due under or in connection with this Note after any such payment otherwise becomes due and payable and three Business Days after demand for such payment;

(ii)(ii) the Borrower otherwise fails to perform or observe any other provision contained in this Note and such breach or failure to perform shall continue for a period of thirty days after notice thereof shall have been given to the Borrower by the Noteholder;

(iii)(iii) a case shall be commenced against Borrower, or Borrower shall file a petition commencing a case, under any provision of the Federal Bankruptcy Code of 1978, as amended, or shall seek relief under any provision of any other bankruptcy, reorganization, arrangement,

insolvency, readjustment of debt, dissolution or liquidation law of any jurisdiction, whether now or hereafter in effect, or shall consent to the filing of any petition against it under such law, or Borrower shall make an assignment for the benefit of its creditors, or shall admit in writing its inability to pay its debts generally as they become due, or shall consent to the appointment of a receiver, trustee or liquidator of Borrower or all or any part of its property; or

(iv)(iv) an event occurs that, with notice or lapse of time, or both, would become any of the foregoing Events of Default.

(e)(d) "***Final Payment Date***" shall mean the earlier of:

- written demand by the Noteholder for payment of all or part of the unpaid principal, the accrued and unpaid interest thereon and the accrued and unpaid commitment fee thereon, but in any event no earlier than December 31, 2024; or
- acceleration as provided herein.

(f)(c) "***Maximum Rate***" shall mean the highest lawful rate permissible under applicable law for the use, forbearance or detention of money.

(g) "***Prime Rate***" shall mean the fluctuating interest rate per annum in effect from time to time equal to the base rate on corporate loans as reported as the Prime Rate in the Money Rates column of *The Wall Street Journal* or other reliable source.

(h) "***Unused Commitment Amount***" for any period on after the date of this Note shall mean the average on each day of such period of the difference between (A) $25,000,000.00 and (B) the amount of the unpaid principal balance of this Note.

(i) "***Unused Commitment Fee***" shall mean the product of (A) 50 Basis Points per annum (pro rated to take into account that the fee is payable quarterly, or such shorter period if applicable) and (B) the Unused Commitment Amount.

BORROWER:

VALHI, INC.

By: /s/ Amy A. Samford
Amy A. Samford
Executive Vice President and Chief Financial Officer

Address:

5430 LBJ Freeway, Suite 1700
Dallas, Texas 75240-2620

As of the date hereof, Kronos Worldwide, Inc., as the Noteholder, hereby agrees that this Note renews, replaces, amends and restates in its entirety the Prior Note, and that the unpaid principal of nil, the accrued and unpaid interest thereon of nil and the accrued and unpaid commitment fee thereon of nil that was owed under the Prior Note as of the close of business on December 31, 2022 are the unpaid principal, the accrued and unpaid interest thereon and the accrued and unpaid commitment fee thereon, respectively, owed under this Note as of the close of business on the date of this Note.

KRONOS WORLDWIDE, INC.

By: /s/ Tim C. Hafer
Tim C. Hafer
Executive Vice President and Chief Financial Officer

EXHIBIT 21.1

SUBSIDIARIES OF THE REGISTRANT

NAME OF CORPORATION	Jurisdiction of incorporation or organization	% of voting securities held at December 31, 2022(a)
Kronos Canada, Inc.	Canada	100
Kronos International, Inc.	Delaware	100
Kronos Titan GmbH	Germany	100
Société Industrielle du Titane, S.A.	France	99
Kronos Limited	United Kingdom	100
Kronos Denmark ApS	Denmark	100
Kronos Europe S.A./N.V.	Belgium	100
Kronos Norge A/S	Norway	100
Kronos Titan A/S	Norway	100
Titania A/S	Norway	100
Elkania DA	Norway	50
Kronos Louisiana, Inc.	Delaware	100
Kronos (US), Inc.	Delaware	100
Louisiana Pigment Company, L.P.	Delaware	50

(a) Held by the Registrant or the indicated subsidiary of the Registrant

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 (No. 333-181793) of Kronos Worldwide, Inc. of our report dated March 8, 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

Dallas, Texas
March 8, 2023

CERTIFICATION

I, James M. Buch, certify that:

1) I have reviewed this annual report on Form 10-K of Kronos Worldwide, Inc.;

2) Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3) Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4) The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5) The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 8, 2023

/s/ James M. Buch

James M. Buch
Chief Executive Officer

EXHIBIT 31.2

CERTIFICATION

I, Tim C. Hafer, certify that:

1) I have reviewed this annual report on Form 10-K of Kronos Worldwide, Inc.;

2) Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3) Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4) The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5) The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 8, 2023

/s/ Tim C. Hafer

Tim C. Hafer
Chief Financial Officer

EXHIBIT 32.1

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

In connection with the Annual Report of Kronos Worldwide, Inc. (the Company) on Form 10-K for the period ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the Report), I, James M. Buch, Chief Executive Officer of the Company, and I, Tim C. Hafer, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ James M. Buch
James M. Buch
Chief Executive Officer

/s/ Tim C. Hafer
Tim C. Hafer
Chief Financial Officer

March 8, 2023

Note: The certification the registrant furnishes in this exhibit is not deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liabilities of that Section. Registration Statements or other documents filed with the Securities and Exchange Commission shall not incorporate this exhibit by reference, except as otherwise expressly stated in such filing.