

KRONOS WORLDWIDE INC
Form 10-K
March 11, 2019

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 and Exchange Act of 1934:
For the fiscal year ended December 31, 2018

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	Name of each exchange on which registered
Common stock (\$.01 par value)	New York Stock Exchange

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 (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files). Yes No

If disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. Yes No

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

The aggregate market value of the 22.6 million shares of voting stock held by nonaffiliates of Kronos Worldwide, Inc. as of June 30, 2018 (the last business day of the Registrant's most recently-completed second fiscal quarter) approximated \$508.3 million.

As of February 28, 2019, 115,907,698 shares of the Registrant's common stock were outstanding.

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 that the expectations reflected in such 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 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 cyclicity 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 (such as changes in the level of gross domestic product in various regions of the world and the impact of such changes on demand for TiO₂)
- 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 new accounting and manufacturing software systems (such as our new enterprise resource planning system)
- The introduction of trade barriers
- Possible disruption of our business, or increases in our cost of doing business, resulting from terrorist activities or global conflicts
- 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), or possible disruptions to our business resulting from potential instability resulting from uncertainties associated with the euro or other currencies
- Operating interruptions (including, but not limited to, labor disputes, leaks, natural disasters, fires, explosions, unscheduled or unplanned downtime, transportation interruptions and cyber attacks)
- Our ability to renew or refinance credit facilities
- 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 regulations

• The ultimate resolution of pending litigation

• 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 sales in Europe, North America and Asia Pacific. 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, food and cosmetics. 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 3% since 1990. 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 account for approximately 20% and 17% of global TiO_2 consumption, respectively. Markets for TiO_2 are generally increasing in South America, Eastern Europe, the Asia Pacific region and China and we believe these are significant markets where we expect continued growth as economies in these regions continue to develop and quality-of-life products, including TiO_2 , experience greater demand.

At December 31, 2018, approximately 50% of our common stock was owned by Valhi, Inc. (NYSE: VHI) and approximately 30% 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 Serena Simmons Connelly may be deemed to control Contran, Valhi, NL and us.

Products and end-use markets

Including our predecessors, we have produced and marketed TiO₂ in North America and Europe, our primary markets, for over 100 years. We believe we are the largest producer of TiO₂ in Europe with 44% of our 2018 sales volumes attributable to markets in Europe. The table below shows our market share for our significant markets, Europe and North America, for the last three years.

	2016	2017	2018
Europe	17%	17%	13%
North America	16%	18%	17%

We believe we are the leading seller of TiO₂ in several countries, including Germany, with an estimated 8% share of worldwide TiO₂ sales volume in 2018. Overall, we are one of the top six producers of TiO₂ in the world.

We offer our customers a broad portfolio of products that include over 40 different TiO₂ 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 TiO₂ to our customers in either a powder or slurry form via rail, truck and/or ocean carrier. Sales of our core TiO₂ pigments represented approximately 94% of our net sales in 2018. 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 TiO₂ sales volume by geographic region and end use for the year ended December 31, 2018:

	Sales volume percentages		Sales volume percentages
		by geographic region	by end-use
Europe	44%	Coatings	56%
North America	37%	Plastics	27%
Asia Pacific	10%	Paper	7%
Rest of World	9%	Other	10%

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

TiO₂ for coatings – Our TiO₂ 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 TiO₂ 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 TiO₂ content.

TiO₂ for plastics – We produce TiO₂ pigments that improve the optical and physical properties of plastics, including whiteness and opacity. TiO₂ 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. Our TiO_2 is also found in food products, such as candy and confectionaries, and in pet foods where it is used to obtain uniformity of color and appearance. 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 6% of our net sales in 2018:

• We own and operate two ilmenite mines 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, and we sell an ilmenite-based specialty product to the oil and gas industry. The mines have 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 titanium oxychloride and titanyl sulfate, which are side-stream specialty products from the production of TiO_2 . Titanium oxychloride is used in specialty applications in the formulation of pearlescent pigments, production of electroceramic capacitors for cell phones and other electronic devices. Titanyl sulfate productions are used in pearlescent pigments, 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 increased relative to sulfate process pigments, and in 2018, chloride process production facilities represented approximately 50% of industry capacity. The sulfate process is preferred for use in selected paper products, ceramics, rubber tires, man-made fibers, food products, 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).

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Chloride process – The chloride process is a continuous process in which chlorine is used to extract rutile TiO₂. 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

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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 TiO₂ from ilmenite or titanium slag. After separation from the impurities in the ore (mainly iron), the TiO₂ is precipitated and calcined to form an intermediate base pigment ready for sale or can be upgraded through finishing treatments.

We produced 536,000 metric tons of TiO₂ in 2018, down from the record 576,000 metric tons we produced in 2017. Our production volumes include our share of the output produced by our TiO₂ manufacturing joint venture discussed below in “TiO₂ manufacturing joint venture.” Our average production capacity utilization rates were approximately 98% in 2016, at full practical capacity in 2017 and approximately 95% in 2018. Our production rates in 2018 were impacted by maintenance activities at certain facilities and by the first quarter implementation of a productivity-enhancing improvement project at our Belgian facility.

We operate facilities throughout North America and Europe, including the only sulfate process plant in North America and four TiO₂ plants in Europe (one in each of Leverkusen, Germany; Nordenham, Germany; Langerbrugge, Belgium; and Fredrikstad, Norway). In North America, we have a TiO₂ plant in Varennes, Quebec, Canada and, through the manufacturing joint venture described below in “TiO₂ manufacturing joint venture,” a 50% interest in a TiO₂ plant in Lake Charles, Louisiana.

Our production capacity has increased by approximately 6% over the past ten years due to debottlenecking programs, incurring only moderate capital expenditures. We expect to operate our TiO₂ plants at near full practical capacity levels in 2019.

The following table presents the division of our expected 2019 manufacturing capacity by plant location and type of manufacturing process:

Facility	Description	% of capacity by TiO ₂ manufacturing process	
		Chloride	Sulfate
Leverkusen, Germany			
(1)	TiO ₂ production, chloride and sulfate process, co-products	30 %	6 %
Nordenham, Germany	TiO ₂ production, sulfate process, co-products	-	10
Langerbrugge, Belgium	TiO ₂ production, chloride process, co-products, titanium chemicals products	16	-
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	15	3
Lake Charles, LA, US			
(3)	TiO ₂ production, chloride process	13	-
Total		74 %	26 %

(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 TiO₂ 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.

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(3) We operate the Lake Charles facility in a joint venture with Venator Investments LLC (Venator Investments) (formerly Huntsman P&A Investments LLC), 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 TiO₂ produced by the joint venture to which we are entitled. See Note 5 to our Consolidated Financial Statements and “TiQ 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 two ilmenite mines in Norway pursuant to a governmental concession with an unlimited term. In addition, we operate a rutile slurry manufacturing plant in Lake Charles, Louisiana, which converts dry pigment primarily manufactured for us at the Lake Charles TiO₂ facility into a slurry form that is then shipped to customers.

We have various corporate and administrative offices located in the U.S., Germany, Norway, Canada, Belgium, France and the United Kingdom and various sales offices located in North America.

TiO₂ 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., or LPC. LPC owns and operates a chloride-process TiO₂ plant located in 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.

The joint venture is not consolidated in our financial statements, 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 TiO₂ 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 slag) and packaging costs for the pigment grades produced. Our share of net costs is reported as cost of sales as the TiO₂ is sold. See Notes 5 and 15 to our Consolidated Financial Statements.

Raw materials

The primary raw materials used in chloride process TiO₂ are titanium-containing feedstock (purchased natural rutile ore or slag), chlorine and 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, Canada, India and the United States. We purchase chloride process grade slag from Rio Tinto Iron and Titanium Limited under a long-term supply contract which automatically renewed at the end of 2018 and extends through December 31, 2020. The contract automatically renews bi-annually, but can be terminated if written notice is given at least twelve months prior to the current contract end date. We also purchase upgraded slag from Rio Tinto Iron and Titanium Limited under a long-term supply contract that expires at the end of 2019. We purchase natural rutile ore primarily from Iluka Resources, Limited under a contract that expires in 2019. 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.

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 two rock ilmenite mines in Norway, which provided all of the feedstock for our European sulfate process TiO_2 plants in 2018. We expect ilmenite production from our mines 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 these contracts, 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 2018.

Production process/raw material	Raw materials
	procured or mined (In thousands of metric tons)
Chloride process plants -	
Purchased slag or rutile ore	430
Sulfate process plants:	
Ilmenite ore mined and used internally	328
Purchased slag	24

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 raw material 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 in-person meetings. We endeavor to extend these commercial and technical relationships to multiple levels within our customers' organization using our direct sales force and technical service group to accomplish this objective. We believe this has helped build customer loyalty to Kronos and strengthened 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.

Our marketing strategy is also aimed at working directly with customers to monitor the success of our products in their end-use applications, evaluate the need for improvements in 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 that 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 TiO₂ products other than KRONOS® brand products. In North America, our sales are made primarily through our direct sales force and supported by a network of distributors. In export markets, where we have increased our marketing efforts over the last several years, our sales are 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 and no single customer comprised 10% or more of our sales in 2018. Our largest ten customers accounted for approximately 33% of sales in 2018.

Neither our business as a whole nor any of our principal product groups is seasonal to any significant extent. However, TiO₂ 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, 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 will 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 TiO₂ 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 TiO₂ is not a traded commodity, 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 2018, we had an estimated 8% share of worldwide TiO₂ sales volume, and based on sales volume, we believe we are the leading seller of TiO₂ in several countries, including Germany.

Our principal competitors are The Chemours Company, Cristal Global, Venator Materials PLC, Tronox Incorporated and Lomon Billions. The top six TiO₂ producers (i.e. we and our five principal competitors) account for approximately 58% of the world's production capacity. In 2017, one of Venator's European sulfate plants, which has a capacity of 130,000 metric tons, operated at significantly reduced rates due to a fire at the facility. In 2018, Venator announced that the facility would be permanently closed and production of approximately 45,000 tons of specialty and differentiated operating capacity would be restored at other sites.

The following chart shows our estimate of worldwide production capacity in 2018:

Worldwide production capacity - 2018	
Chemours	16 %
Cristal	11 %
Venator	9 %
Lomon Billions	9 %
Kronos	7 %
Tronox	6 %
Other	42 %

Chemours has over one-half of total North American TiO₂ production capacity and is our principal North American competitor. In February 2017, Tronox announced a definitive agreement to acquire the TiO₂ assets of Cristal Global,

but this acquisition has been challenged by U.S. antitrust authorities and has not been completed, and it is uncertain whether it will be completed. In 2018, Lomon Billions announced construction plans for an additional 200,000 tons of chloride capacity which is scheduled to come on line in 2019 and 2020.

Over the past ten years, we and our competitors increased industry capacity through debottlenecking projects, which in part compensated for the shut-down of various TiO₂ plants throughout the world. Although overall industry demand is expected to increase in 2019, we do not expect any significant efforts, other than the Lomon Billions expansion mentioned above, will be undertaken by us or our principal competitors to further

increase capacity for the foreseeable future, other than through debottlenecking projects. If actual developments differ from our expectations, the TiO₂ industry's and our performance could be unfavorably affected.

The TiO₂ 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. We believe it is unlikely any new TiO₂ plants will be constructed in Europe or North America in the foreseeable future.

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 \$13 million in 2016, \$18 million in 2017 and \$16 million in 2018. We expect to spend approximately \$17 million on research and development in 2019.

We continually seek to improve the quality of our grades and have been successful at developing new grades for existing and new applications to meet the needs of our customers and increase product life cycles. Since the beginning of 2014, 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 five years to 18 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 that 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.

Employees

As of December 31, 2018, we employed the following number of people:

Europe	1,805
Canada	340
United States (1)	50
Total	2,195

(1)Excludes employees of our LPC joint venture.

Certain employees at each of our production facilities are organized by labor unions. In Europe, our union employees are covered by master collective bargaining agreements for the chemical industry that are generally renewed annually. In Canada, our union employees are covered by a collective bargaining agreement that expires in June 2021. At December 31, 2018, approximately 86% of our worldwide workforce is organized under collective bargaining agreements. 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.

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. 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.

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.

At our sulfate plant facilities in Germany, we recycle spent sulfuric acid either through contracts with third parties or at our own facilities. In addition, at our German locations we have a contract with a third-party to treat certain sulfate-process effluents. At our Norwegian plant, we ship spent acid to a third-party location where it is used as a neutralization agent. These contracts may be terminated by either party after giving three or four years advance notice, depending on the contract.

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 that 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 TiO₂. We believe that we are in substantial compliance with laws applicable to the regulation of TiO₂. However,

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increased regulatory scrutiny could affect consumer perception of TiO₂ or limit the marketability and demand for TiO₂ or products containing TiO₂ and increase our regulatory and compliance costs.

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 \$17.1 million in 2018 and are currently expected to be approximately \$25 million in 2019.

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 kronostio2.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.

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 is largely dependent on the TiO₂ industry. In 2018, 94% of our sales were attributable to sales of TiO₂. TiO₂ 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 TiO₂ 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 TiO₂ in advance of anticipated price increases or defer

purchases of TiO₂ in advance of anticipated price decreases. Our ability to further increase capacity without additional investment in greenfield or brownfield capacity increases may be limited and as a result, our profitability may become even more dependent upon the selling prices of our products.

The TiO₂ 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 six TiO₂ producers accounting for approximately 58% 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 a facility is located. For example, titanium-containing feedstocks suitable for use in our TiO₂ facilities are available from a limited number of suppliers around the world. Political and economic instability in the countries from which we purchase our raw material supplies could adversely affect their availability. If our worldwide vendors were unable to meet their contractual obligations and we were unable to obtain necessary raw materials, we could incur higher costs for raw materials or may be required to reduce production levels. We experienced significantly higher ore costs in 2012 which carried over into 2013. We saw moderation in the purchase cost of third-party feedstock ore since 2013 through the first half of 2017; however, the cost of third-party feedstock ore we procured in the last half of 2017 and full year of 2018 is higher as compared to the first half of 2017. 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 our earnings and decrease our liquidity.

We have long-term supply contracts that provide for our TiO₂ feedstock requirements that currently expire through 2020. While we believe we will be able to renew these contracts, there can be no assurance 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 January 2019) require us to purchase certain minimum quantities of feedstock with minimum purchase commitments aggregating approximately \$594 million in years subsequent to December 31, 2018. 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 \$156 million at December 31, 2018. Our commitments under these contracts could adversely affect our financial results if we significantly reduce our production and were unable to modify the contractual commitments.

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

As of December 31, 2018, our total consolidated debt was approximately \$456.6 million, substantially all of which relates to our Senior Secured Notes issued in September 2017. 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.

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

In addition to our indebtedness, at December 31, 2018 we are party to various lease and other agreements (including feedstock ore 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 \$495 million in 2019. Our ability to make payments on and refinance our debt and to fund planned capital expenditures depends on our future ability to generate cash flow. 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 facilities in the future will, in some instances, 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.

As a global business, we are subject to risks associated with doing business outside the United States.

We have global operations and derive a large portion of our sales from customers outside the United States. Accordingly, our international operations or those of our international customers could be substantially affected by a number of risks arising with operating an international business, including trade barriers, tariffs, exchange controls, economic and political conditions, compliance with a variety of non-United States laws and regulations (including environmental, health and safety and income tax laws and regulations) or compliance with United States law and regulations in respect to doing business internationally, limitations on restrictions on the repatriation of non-United States earnings to the United States, and difficulty in enforcing agreements or other legal rights. Our operations are also subject to the effects of global competition. These risks, individually or in the aggregate, could have an adverse effect on our results of operations and financial condition.

Changes in 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 2018, 44% 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.

If our intellectual property were to be declared invalid, or copied by or become known to by 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.

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 significant compliance costs or obligations or 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 TiO₂, or its use. Increased regulatory scrutiny could affect consumer perception of TiO₂ or limit the marketability and demand for TiO₂ or products containing TiO₂, and increase our regulatory compliance obligations and costs. Increased compliance obligations and costs or restrictions on certain TiO₂ 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.

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

We operate production facilities in several countries. In many of the countries in which we operate, legislation has been passed, or proposed legislation is being considered, to limit greenhouse gases through various means, including emissions permits and/or energy taxes. In several of our production facilities, we consume large amounts of energy, primarily electricity and natural gas. To date, the permit system in effect in the various countries in which we operate has not had a material adverse effect on our financial results. However, if further greenhouse gas legislation were to be enacted in one or more countries, it could negatively impact our future results from 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 onto our customers to

compensate for increased production costs, which may decrease our liquidity, operating income and results of operations.

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

We rely on information technology systems to manage, process and analyze data, as well as to facilitate the manufacture and distribution of our products to and from our plants. We receive, process and ship orders, manage the billing of and collections from our customers, and manage the accounting for and payment to our vendors. In this regard, in January 2017 we implemented a new enterprise resource planning system covering certain finance processes (principally general ledger, accounts receivable and accounts payable), and in January 2018 we implemented the remaining portion of such enterprise resource planning system covering sales, procurement, manufacturing and plant maintenance. Although we have systems and procedures in place to protect our information technology systems, there can be no assurance that such systems and procedures would be sufficiently effective. Therefore, any of our information technology systems may be susceptible to outages, disruptions or destruction as well as cyber security breaches or attacks, resulting 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. If any of these events were to occur, our results of operations and financial condition could be adversely affected.

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 Note 16 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 called for by this Item is incorporated by reference to Note 16 to our Consolidated Financial Statements.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable

PART II

ITEM 5. MARKET FOR COMMON EQUITY AND RELATED STOCKHOLDER MATTERS

Our common stock is listed and traded on the New York Stock Exchange (symbol: KRO). As of February 28, 2019, there were approximately 1,900 holders of record of our common stock.

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. We have 1,951,000 shares available for repurchase under the plan at December 31, 2018. See Note 14 to our Consolidated Financial Statements.

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. In 2018, as more of our peers have become publicly traded, we began using a peer group metric which we believe provides a more meaningful comparison to our performance. The peer group index is comprised of The Chemours Company, Venator Materials PLC and Tronox Ltd. The Chemours Company and Venator Materials PLC are included from the date each company began trading on the New York Stock Exchange in June 2015 and August 2017, respectively. The graph shows the value at December 31 of each year, assuming an original investment of \$100 at December 31, 2013 and reinvestment of cash dividends and other distributions to stockholders.

	2013	2014	2015	2016	2017	2018
Kronos common stock	\$100	\$71	\$33	\$77	\$170	\$79
S&P 500 Composite Stock Index	100	114	115	129	157	150
Peer Group	100	108	19	76	141	68

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, 2018, 149,900 shares are available for award under this plan. See Note 14 to our Consolidated Financial Statements.

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data should be read in conjunction with our Consolidated Financial Statements and Item 7 - "Management's Discussion and Analysis of Financial Condition and Results of Operations."

	Years ended December 31,				
	2014	2015	2016	2017	2018
	(In millions, except per share data and TiO ₂ operating statistics)				
STATEMENTS OF OPERATIONS DATA:					
Net sales	\$1,651.9	\$1,348.8	\$1,364.3	\$1,729.0	\$1,661.9
Gross margin (1)	357.1	200.0	264.7	569.7	562.2
Income from operations (1)	161.4	11.0	92.9	347.8	330.1
Net income (loss)	99.2	(173.6)	43.3	354.5	205.0
Net income (loss) per share	.86	(1.50)	.37	3.06	1.77
Cash dividends per share	.60	.60	.60	.60	.68
BALANCE SHEET DATA (at year end):					
Total assets	\$1,633.1	\$1,242.7	\$1,179.6	\$1,824.4	\$1,898.1
Notes payable and long-term debt					
including current maturities	343.6	341.0	339.0	474.5	456.6
Common stockholders' equity	781.1	461.9	395.0	754.3	839.8
STATEMENTS OF CASH FLOW DATA:					
Net cash provided by (used in):					
Operating activities	\$87.7	\$52.1	\$89.6	\$276.1	\$188.5
Investing activities	(61.2)	(47.1)	(53.0)	(77.9)	(42.7)
Financing activities	89.6	(72.1)	(73.3)	58.8	(80.4)
TiO₂ OPERATING STATISTICS:					
Sales volumes (2)	496	525	559	586	491
Production volumes (2)	511	528	546	576	536
Production capacity at beginning of year (2)	555	555	555	555	565
Production rate as a percentage of capacity	92	% 95	% 98	% 100	% 95

(1) Prior period amounts have been reclassified to reflect the adoption on January 1, 2018 of ASU 2017-07, Compensation – Retirement Benefits (Topic 715) Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. As a result, gross margin increased by \$7.4 million, \$7.7 million, \$7.7

million and \$10.8 million in 2014, 2015, 2016 and 2017, respectively. Income from operations increased by \$11.7 million, \$12.1 million, \$11.8 million and \$17.4 million in 2014, 2015, 2016 and 2017, respectively. There was no impact to net income (loss) in any period as a result of this reclassification. See Note 18 to our Consolidated Financial Statements.

(2) Metric tons in thousands

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 TiO₂. TiO₂ is used for a variety of manufacturing applications, including plastics, paints, paper and other industrial and specialty products. During 2018, 44% of our sales volumes were sold into European markets. We believe we are the largest producer of TiO₂ in Europe with an estimated 13% share of European TiO₂ sales volumes in 2018. In addition, we estimate we have a 17% share of North American TiO₂ sales volumes in 2018. Our production facilities are located in Europe and North America.

We consider TiO₂ 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 TiO₂ 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 TiO₂ 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 TiO₂ inventory levels of our customers. We believe that our customers' inventory levels are influenced in part by their expectation for future changes in market TiO₂ selling prices as well as their expectation for future availability of product. Although certain of our TiO₂ 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 quality and customer service.

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

- TiO₂ selling prices,
- Our TiO₂ sales and production volumes,
- Manufacturing costs, particularly raw materials such as third-party feedstock ore, 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).

Our key performance indicators are our TiO₂ average selling prices, our level of TiO₂ sales and production volumes and the cost of our third-party feedstock ore. TiO₂ selling prices generally follow industry trends and the selling prices will increase or decrease generally as a result of competitive market pressures.

In addition, our effective income tax rate in 2016, 2017 and 2018 was impacted by certain favorable and unfavorable developments discussed below.

Executive summary

We reported income from operations of \$330.1 million in 2018 as compared to \$347.8 million in 2017. Our income from operations was lower in 2018 compared to the same period in 2017 primarily as the favorable impact of higher average selling prices was more than offset by the unfavorable impact of lower sales and production volumes and higher raw materials and other production costs as discussed below. We reported net income of \$205.0 million, or \$1.77 per share for 2018 compared to net income of \$354.5 million, or \$3.06 per share for 2017. Our net income was lower in 2018 compared to 2017 primarily due to the 2017 recognition of an aggregate net income tax benefit of \$136.5 million as a result of the net effect of reversing our deferred income tax asset valuation allowances associated with our German and Belgian operations (\$186.7 million income tax benefit) and our deferred income tax asset valuation allowance related to certain U.S. deferred income tax assets of one of our non-U.S. subsidiaries (\$18.7

million income tax benefit), the one-time repatriation tax imposed on the post-1986 undistributed earnings of our non-U.S. subsidiaries imposed as a result of the Tax Cuts and Jobs Act (2017 Tax Act)

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enacted on December 22, 2017 (\$76.2 million income tax expense), an income tax benefit related to the execution and finalization of an Advance Pricing Agreement between Canada and Germany (\$11.8 million income tax benefit), and an income tax expense related to a change in our conclusions regarding our permanent reinvestment assertion with respect to the post-1986 undistributed earnings of our European subsidiaries (\$4.5 million income tax expense).

We reported net income of \$354.5 million, or \$3.06 per share for 2017 compared to net income of \$43.3 million, or \$.37 per share for 2016. We reported higher net income in 2017 compared to 2016 in part due to higher income from operations in 2017. Our income from operations improved in 2017 primarily due to the net impact of higher average selling prices, higher sales and production volumes, higher raw materials and other production costs, the recognition of an insurance settlement gain totaling \$4.3 million in 2016 from two separate business interruption claims and the net effect of changes in currency exchange rates. In addition, we recognized an aggregate net income tax benefit of \$136.5 million in 2017, as discussed above.

Our net income in 2018 includes:

- the fourth quarter recognition of a \$3.7 million (\$.03 per share) current cash income tax expense related to tax on global intangible low-tax income (GILTI), and
- the recognition of an aggregate \$2.1 million (\$.02 per share) non-cash income tax expense related to an increase in our reserve for uncertain tax positions, recognized in the first and fourth quarters.

Our net income in 2017 includes:

- the recognition of an aggregate \$186.7 million (\$1.61 per share) non-cash deferred income tax benefit as a result of the reversal of our deferred income tax asset valuation allowances associated with our German and Belgian operations, mostly recognized in the second quarter,
- the fourth quarter recognition of an \$18.7 million (\$.16 per share) non-cash deferred income tax benefit as a result of the reversal of our deferred income tax asset valuation allowance related to certain U.S. deferred income tax assets of one of our non-U.S. subsidiaries (which subsidiary is treated as a dual resident for U.S. income tax purposes),
- the fourth quarter recognition of a \$76.2 million (\$.66 per share) provisional current income tax expense as a result of the 2017 Tax Act for the one-time repatriation tax imposed on the post-1986 undistributed earnings of our non-U.S. subsidiaries,

- the recognition of an \$11.8 million (\$.10 per share) aggregate income tax benefit related to the execution and finalization of an Advance Pricing Agreement between Canada and Germany, mostly recognized in the third quarter (which includes an \$8.6 million non-cash income tax benefit as a result of a net decrease in our reserve for uncertain tax positions),

- the fourth quarter recognition of a \$4.5 million (\$.04 per share) provisional non-cash deferred income tax expense related to a change in our conclusions regarding our permanent reinvestment assertion with respect to the post-1986 undistributed earnings of our European subsidiaries, and

- a pre-tax aggregate charge of \$7.1 million (\$4.6 million, or \$.04 per share, net of income tax benefit) recognized in the third quarter related to the loss on prepayment of debt.

Our net income in 2016 includes:

- a pre-tax insurance settlement gain of \$4.3 million (\$3.2 million, or \$.03 per share, net of income tax expense) recognized in the first, second and fourth quarters,

the recognition of a net \$3.4 million (\$.03 per share) current income tax benefit related to the execution and finalization of an Advance Pricing Agreement between the U.S. and Canada,

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• the recognition of an aggregate \$2.2 million (\$.02 per share) non-cash deferred income tax benefit as a result of a net decrease in our deferred income tax asset valuation allowance related to our German and Belgian operations, recognized in the second, third and fourth quarters, and

• the recognition of a \$2.4 million (\$.02 per share) non-cash income tax expense related to an increase in our reserve for uncertain tax positions, mostly recognized in the fourth quarter.

Critical accounting policies and estimates

The accompanying “Management’s Discussion and Analysis of Financial Condition and Results of Operations” is based upon our Consolidated Financial Statements, which we have prepared in accordance with accounting principles generally accepted in the United States of America, or GAAP. The preparation of these financial statements requires us to make estimates and judgments 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 reported period. On an ongoing basis we evaluate our estimates, including those related to the recoverability of long-lived assets, pension benefit obligations and the underlying actuarial assumptions related thereto, the realization of deferred income tax assets and accruals for litigation, income tax and other contingencies. We base our estimates on historical experience and on various other assumptions which we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the reported amounts of assets, liabilities, revenues and expenses. Actual results may differ significantly from previously-estimated amounts under different assumptions or conditions.

The following critical accounting policies affect our more significant judgments and estimates used in the preparation of our Consolidated Financial Statements:

• **Long-lived assets** – 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 made in accordance with the applicable GAAP requirements of Accounting Standard Codification, or ASC, Topic 360-10-35 Property, Plant and Equipment and 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 specified in ASC Topic 360-10-35 are present. We did not evaluate any long-lived assets for impairment during 2018 because no such impairment indicators were present.

• **Defined benefit pension plans** – We maintain various defined benefit pension plans. The amounts recognized as defined benefit pension expenses and the reported amounts of pension asset and accrued pension costs are actuarially determined based on several assumptions, including discount rates, expected rates of return on plan assets and expected mortality. Variances from these actuarially assumed rates will result in increases or decreases, as applicable, in the recognized pension obligations, pension expenses and funding requirements. These assumptions are more fully described below under “Assumptions on Defined Benefit Pension Plans.”

• **Income taxes** – 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, 2018 we have substantial net operating loss (NOL) carryforwards in Germany (the equivalent of \$541 million for German corporate tax purposes) and in Belgium (the equivalent of \$16 million for Belgian corporate tax purposes), all of which have an indefinite carryforward period. As a result, we have net deferred income tax assets with respect to these two jurisdictions, primarily related to these NOL carryforwards. As more fully described below under “Comparison of 2018 to 2017 Results of Operations – Income tax expense (benefit)” and “Comparison of 2017 to 2016 Results of Operations – Income tax expense (benefit),” we had a deferred income tax asset valuation allowance recognized with respect to such net deferred income tax assets of our Belgian and German operations beginning June 30, 2015. At June 30, 2017 we concluded we had sufficient positive evidence under the more-likely-than-not recognition criteria to support reversal of the entire valuation allowance related to our German and Belgian operations.

In addition, at the end of each reporting period we evaluate whether or not some or all of the undistributed earnings of our non-U.S. subsidiaries are permanently reinvested (as that term is defined in GAAP). While we may have concluded in the past that some of such undistributed earnings are permanently reinvested, facts and circumstances can change in the future and it is possible that a change in facts and circumstances, such as a change in the expectation regarding the capital needs of our non-U.S. subsidiaries or a change in tax law, could result in a conclusion that some or all of such undistributed earnings are no longer permanently reinvested. Prior to enactment of the new tax legislation in December 2017 referred to below, 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). On December 22, 2017, H.R.1 formally known as the “Tax Cuts and Jobs Act” (2017 Tax Act) was enacted into law. Among other things, this new tax legislation, as discussed more fully below under “Comparison of 2018 to 2017 Results of Operations – Income tax expense (benefit)”, implemented a territorial tax system and imposed a one-time repatriation tax on the deemed repatriation of the post-1986 undistributed earnings of non-U.S. subsidiaries accumulated up through December 31, 2017, regardless of whether such earnings had been repatriated, and eliminated any U.S. federal income tax on future non-U.S. earnings after such date (subject to certain exceptions). Our provision for income taxes in the fourth quarter of 2017 included a provisional current income tax expense for the one-time repatriation tax imposed under the new tax law. In addition, and as a result of this significant change in tax law, effective December 31, 2017 we determined that all of the post-1986 undistributed earnings of our European subsidiaries are not permanently reinvested (we had previously concluded that all of the undistributed earnings of our Canadian subsidiary are not permanently reinvested), and accordingly our provision for income taxes in the fourth quarter of 2017 also includes a provisional deferred income tax expense for the estimated incremental U.S. state income tax, non-U.S. income tax and withholding tax liability attributable to all of such previously-considered permanently reinvested undistributed earnings. 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.

We recognize GILTI as a period expense in the period the tax is incurred. The GILTI regime was imposed under the 2017 Tax Act, as discussed more fully below under “Comparison of 2018 to 2017 Results of Operations – Income tax expense (benefit).” 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. It is possible that the tax imposed on such U.S. taxable income inclusions under GILTI may be material to our tax provision.

We record a reserve for uncertain tax positions where we believe it is more-likely-than-not our tax positions will not prevail with the applicable tax authorities. It is possible that in the future we may change our assessment regarding the probability that our tax positions will prevail that would require an adjustment to the amount of our reserve for uncertain tax positions that could either increase or decrease, as applicable, reported net income in the period the change in assessment was made.

Contingencies – We record accruals for legal and other contingencies when future expenditures associated with such contingencies and commitments become probable and the amounts can be reasonably estimated. However, new information may become available or circumstances (such as applicable laws and regulations) may change, thereby resulting in an increase or decrease in the amount required to be accrued for such matters (and therefore a decrease or increase in reported net income in the period of such change).

Results from operations are impacted by certain of these and other significant judgments and estimates, such as allowance for doubtful accounts, reserves for obsolete or unmarketable inventories, impairment of equity method investments and long-lived assets, defined benefit pension plans and loss accruals. In addition, net income is impacted by the significant judgments and estimates for deferred income tax asset valuation allowances.

Comparison of 2018 to 2017 Results of Operations

	Year ended December 31,			
	2017		2018	
	(Dollars in millions)			
Net sales	\$1,729.0	100%	\$1,661.9	100%
Cost of sales	1,159.3	67	1,099.7	66
Gross margin	569.7	33	562.2	34
Selling, general and administrative expense	200.6	12	228.3	14
Other operating income (expense):				
Currency transactions, net	(7.5)	-	10.1	1
Other operating expense, net	(13.8)	(1)	(13.9)	(1)
Income from operations	\$347.8	20 %	\$330.1	20 %
				% Change
TiO ₂ operating statistics:				
Sales volumes*	586		491	(16)%
Production volumes*	576		536	(7)%
Percentage change in net sales:				
TiO ₂ product pricing				13 %
TiO ₂ sales volumes				(16)
TiO ₂ product mix/other				(4)
Changes in currency exchange rates				3
Total				(4)%

* Thousands of metric tons

Industry conditions and 2018 overview – Due to the successful implementation of previously-announced price increases, average selling prices rose throughout 2017 and the first six months of 2018. We started 2018 with average selling prices 27% higher than at the beginning of 2017, and our average selling prices at the end of the second quarter of 2018 were 3% higher than at the end of 2017, with most of the increase occurring during the first quarter. Our average selling prices declined during the third and fourth quarters of 2018. Our average selling prices at the end of the fourth quarter of 2018 were 4% lower than at the end of the third quarter of 2018 and 3% lower than at the end of 2017. Lower prices in the European, Latin American and export markets were partially offset by higher prices in North America at the end of 2018 as compared to the end of 2017. We experienced lower sales volumes in all major

markets in 2018 as compared to the record sales volumes achieved in 2017, with the European and export markets having the most significant decreases.

The following table shows our capacity utilization rates during 2017 and 2018.

	2017	2018
First Quarter	100%	95%
Second Quarter	100%	97%
Third Quarter	100%	92%
Fourth Quarter	100%	95%
Overall	100%	95%

Due to a moderate rise in the cost of third-party feedstock ore we procured in 2017 and 2018, our cost of sales per metric ton of TiO₂ sold in 2018 was higher as compared to 2017 (excluding the effect of changes in currency exchange rates).

Net sales – Our net sales decreased 4% or \$67.1 million in 2018 compared to 2017, primarily due to the net effect of a 13% increase in average TiO₂ selling prices (which increased net sales by approximately \$225 million) and a 16% decrease in sales volumes (which decreased net sales by approximately \$277 million). TiO₂ 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 16% in 2018 as compared to the record sales volumes of 2017 primarily due to a combination of factors including (i) lower sales in all major markets resulting from a controlled ramp-up in January 2018 as we brought the second phase of our new global enterprise resource planning system online; (ii) inventory management to assure adequate supply to our customers during the spring and summer necessitated by the lower production volumes in the first three months of the year (as discussed below); (iii) product availability in the second quarter; and (iv) customer inventory level changes in the second, third and fourth quarters as customer inventory levels returned to more normal levels. In addition to the impact of changes in average TiO₂ selling prices and sales volumes, we estimate that changes in currency exchange rates increased our net sales by approximately \$49 million, or 3%, as compared to 2017.

Cost of sales and gross margin – Cost of sales decreased \$59.6 million or 5% in 2018 compared to 2017 due to the net impact of a 16% decrease in sales volumes, a 7% decrease in TiO₂ production volumes, higher raw materials and other production costs of approximately \$103 million (primarily caused by higher third-party feedstock ore costs) and currency fluctuations (primarily the euro). The decrease in TiO₂ production volumes in 2018 compared to the production volumes in 2017 was primarily due to increased maintenance activities at certain facilities in 2018, and the implementation of a productivity-enhancing improvement project at our Belgian facility in the first quarter of 2018. Our cost of sales as a percentage of net sales decreased to 66% in 2018 compared to 67% in 2017 as the favorable effects of higher average selling prices more than offset the unfavorable effects related to lower production volumes and higher raw materials and other production costs, as discussed above.

Gross margin as a percentage of net sales increased to 34% in 2018 compared to 33% in 2017. As discussed and quantified above, our gross margin increased primarily due to the net effect of higher average selling prices, lower sales and production volumes and higher raw materials and other production costs.

Selling, general and administrative expense – Selling, general and administrative expense in 2018 was \$228.3 million, an increase of \$27.7 million compared to 2017 in part due to higher general and administrative costs related to the

implementation of a new accounting and manufacturing software system of \$11 million, higher shipping and handling costs of \$4 million and higher sales support costs of \$3 million to better serve our customers. Selling, general and administrative expenses were approximately 14% of net sales in 2018 and 12% of net sales in 2017.

Income from operations – Income from operations decreased by \$17.7 million, from \$347.8 million in 2017 to \$330.1 million in 2018. This decrease was due in part to the decrease in gross margin and the increase in selling, general and administrative expense noted above for the comparable periods. Income from operations as a percentage of net sales was 20% in each of 2018 and 2017. We estimate that changes in currency exchange rates increased income from operations by approximately \$33 million in 2018 as compared to 2017.

Other non-operating income (expense) – Beginning on January 1, 2018 with the adoption of ASU 2016-01, all of our marketable equity securities continue to be carried at fair value, but any unrealized gains or losses on the securities are now recognized in Marketable equity securities on our Consolidated Statements of Income. See Notes 6 and 17 to our Consolidated Financial Statements. Other components of net periodic pension and postretirement benefits other than pensions, or OPEB, cost decreased \$2.4 million in 2018 compared to 2017 primarily due to a higher expected return on plan assets for certain non-U.S. defined benefit plans in 2018. See Notes 10 and 18 to our Consolidated Financial Statements. Interest expense in 2018 was comparable to 2017, as higher average debt levels in 2018 resulting from the September 2017 issuance of our Senior Secured Notes were offset by lower average interest rates on outstanding indebtedness. We also recognized a loss on prepayment of debt in the third quarter of 2017 aggregating \$7.1 million, associated with the prepayment and termination of our term loan indebtedness. See Note 8 to our Consolidated Financial Statements.

Income tax expense (benefit) – We recognized income tax expense of \$88.8 million in 2018 compared to an income tax benefit of \$48.8 million in 2017. As discussed below, our income tax benefit in 2017 includes a net income tax benefit of \$136.5 million, consisting of the following:

- a \$186.7 million non-cash deferred income tax benefit as a result of the reversal of our deferred income tax asset valuation allowances associated with our German and Belgian operations, mostly recognized in the second quarter,
- an \$18.7 million non-cash deferred income tax benefit as a result of the reversal of our deferred income tax asset valuation allowance related to certain U.S. deferred income tax assets of one of our non-U.S. subsidiaries (which subsidiary is treated as a dual resident for U.S. income tax purposes),
 - a \$76.2 million provisional current income tax expense as a result of the 2017 Tax Act for the one-time repatriation tax imposed on the post-1986 undistributed earnings of our non-U.S. subsidiaries,
- a \$4.5 million provisional non-cash deferred income tax expense related to a change in our conclusions regarding our permanent reinvestment assertion with respect to the post-1986 undistributed earnings of our European subsidiaries, and
- an \$11.8 million aggregate income tax benefit related to the execution and finalization of an Advance Pricing Agreement between Canada and Germany, mostly recognized in the third quarter (which includes an \$8.6 million non-cash income tax benefit as a result of a net decrease in our reserve for uncertain tax positions).

Our earnings are subject to income tax in various U.S. and non-U.S. jurisdictions. Beginning in 2018 (following enactment of the 2017 Tax Act discussed below), the income tax rates applicable to our pre-tax earnings (losses) of our non-U.S. operations are generally higher than the income tax rates applicable to our U.S. operations. Excluding the effect of any increase or decrease in our deferred income tax asset valuation allowance or changes in our reserve for uncertain tax positions, we would generally expect our overall effective tax rate to be higher than the U.S. federal statutory tax rate of 21% primarily because of our non-U.S. operations. Prior to 2018, the income tax rates applicable to our pre-tax earnings (losses) of our non-U.S. operations were generally lower than the U.S. federal statutory tax rate of 35%. See Note 13 to our Consolidated Financial Statements for a tabular reconciliation of our statutory income tax provision to our actual tax provision.

We have substantial net operating loss (NOL) carryforwards in Germany (the equivalent of \$541 million for German corporate tax purposes at December 31, 2018) and in Belgium (the equivalent of \$16 million for Belgian corporate tax purposes at December 31, 2018), all of which have an indefinite carryforward period. As a result, we have net deferred income tax assets with respect to these two jurisdictions, primarily related to these NOL carryforwards. The German corporate tax is similar to the U.S. federal income tax, and the German trade tax is similar to the U.S. state income tax (our German trade tax NOLs were fully utilized as of December 31, 2018). Prior to 2017, we concluded that we were required to recognize a non-cash deferred income tax asset valuation allowance under the more-likely-than-not recognition criteria with respect to our German and Belgian net deferred income tax assets. At December 31, 2016 such valuation allowance aggregated \$173 million (\$153 million with respect to

Germany and \$20 million with respect to Belgium). During the first six months of 2017, we recognized an aggregate non-cash deferred income tax benefit of \$12.7 million as a result of a net decrease in such deferred income tax asset valuation allowance, due to utilizing a portion of both the German and Belgian NOL during the period. At June 30, 2017, we concluded we had sufficient positive evidence under the more-likely-than-not recognition criteria to support reversal of the entire valuation allowance related to our German and Belgian operations. In accordance with the ASC 740-270 guidance regarding accounting for income taxes at interim dates, the amount of the valuation allowance reversed at June 30, 2017 (\$149.9 million, of which \$141.9 million related to Germany and \$8.0 million related to Belgium) associated with our change in judgment at that date regarding the realizability of the related deferred income tax asset as it relates to future years (i.e. 2018 and after). A change in judgment regarding the realizability of deferred tax assets as it relates to the current year is considered in determining the estimated annual effective tax rate for the year and is recognized throughout the year, including interim periods subsequent to the date of the change in judgment. Accordingly, our income tax benefit in calendar year 2017 includes an aggregate non-cash deferred income tax benefit of \$186.7 million associated with the reversal of the German and Belgian valuation allowance, comprised of \$12.7 million recognized in the first half of 2017 (noted above) associated with the utilization of a portion of both the German and Belgian NOLs during such period, \$149.9 million related to the portion of the valuation allowance reversed as of June 30, 2017 and \$24.1 million recognized in the second half of 2017 associated with the utilization of a portion of both the German and Belgian NOLs during such period. Our deferred income tax asset valuation allowance increased \$13.7 million in 2017 as a result of changes in currency exchange rates, which increase was recognized as part of other comprehensive income (loss).

On December 22, 2017, the 2017 Tax Act was enacted into law. This new tax legislation, among other changes, (i) reduced the U.S. Federal corporate income tax rate from 35% to 21% effective January 1, 2018; (ii) implemented a territorial tax system and imposed a one-time repatriation tax (Transition Tax) on the deemed repatriation of the post-1986 undistributed earnings of non-U.S. subsidiaries accumulated up through December 31, 2017, regardless of whether such earnings are repatriated; (iii) eliminated U.S. tax on future non-U.S. earnings (subject to certain exceptions); (iv) eliminated the domestic production activities deduction beginning in 2018; (v) eliminated the net operating loss carryback and provides for an indefinite carryforward period subject to an 80% annual usage limitation; (vi) allows for the expensing of certain capital expenditures; (vii) imposed GILTI beginning in 2018; (viii) imposed a base erosion anti-abuse tax (BEAT) beginning in 2018; and (ix) amended the rules limiting the deduction for business interest expense beginning in 2018. Following the enactment of the 2017 Tax Act, the Securities and Exchange Commission issued Staff Accounting Bulletin (SAB) 118 to provide guidance on the accounting and reporting impacts of the 2017 Tax Act. SAB 118 states that companies should account for changes related to the 2017 Tax Act in the period of enactment if all information is available and the accounting can be completed. In situations where companies do not have enough information to complete the accounting in the period of enactment, a company must either 1) record an estimated provisional amount if the impact of the change can be reasonably estimated; or 2) continue to apply the accounting guidance that was in effect immediately prior to the 2017 Tax Act if the impact of the change cannot be reasonably estimated. If estimated provisional amounts are recorded, SAB 118 provides a measurement period of no longer than one year during which companies should adjust those amounts as additional information becomes available in the reporting period within the measurement period in which such adjustment is determined.

Under GAAP, we were required to revalue our net deferred tax asset associated with our U.S. net deductible temporary differences in the period in which the new tax legislation is enacted based on deferred tax balances as of the enactment date, to reflect the effect of such reduction in the corporate income tax rate. Our temporary differences as of December 31, 2017 were not materially different from our temporary differences as of the enactment date, accordingly revaluation of our net deductible temporary differences was based on our net deferred tax asset as of December 31, 2017. Such revaluation was recognized in continuing operations and was not material to us.

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 Transition Tax provisions imposing a one-time repatriation tax on post-1986 undistributed earnings, we recognized a provisional current income tax expense of \$76.2 million in the fourth quarter of 2017. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information available at that date. We elected to pay such tax over an eight year

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period beginning in 2018, including approximately \$6.1 million which was paid in April 2018 (for the 2017 tax year) and \$5.8 million which was paid in 2018 (for the 2018 tax year). During the third quarter of 2018, in conjunction with finalizing our federal income tax return and based on additional information that became available (including proposed regulations issued by the IRS in August 2018 with respect to the Transition Tax), we recognized a provisional income tax benefit of \$1.7 million which amount is recorded as a measurement-period adjustment, reducing the provisional income tax expense of \$76.2 million recognized in the fourth quarter of 2017. As a result, at December 31, 2018, taking into account the prior Transition Tax installments payments of \$11.9 million (noted above), the balance of our unpaid Transition Tax aggregates \$62.6 million, which will be paid in quarterly installments over the remainder of the eight year period. Of such \$62.6 million, \$56.6 million is recorded as a noncurrent payable to affiliate (income taxes payable to Valhi) classified as a noncurrent liability in our Consolidated Balance Sheet at December 31, 2018, and \$6.0 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 2019 Transition Tax installment due within the next twelve months). We have completed our analysis of the Transition Tax provisions within the prescribed measurement period ending December 22, 2018 pursuant to the guidance under SAB 118.

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). As a result of the implementation of a territorial tax system under the 2017 Tax Act, effective January 1, 2018, and the Transition Tax which in effect taxes the post-1986 undistributed earnings of our non-U.S. subsidiaries accumulated up through December 31, 2017, we determined effective December 31, 2017 that all of the post-1986 undistributed earnings of our European subsidiaries are not permanently reinvested. Accordingly, in the fourth quarter of 2017 we recognized an aggregate provisional non-cash deferred income tax expense of \$4.5 million based on our reasonable estimates of the U.S. state and non-U.S. income tax and withholding tax liability attributable to all of such previously-considered permanently reinvested undistributed earnings through December 31, 2017. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information currently available. We have not made any measurement-period adjustments to the provisional amounts recorded at December 31, 2017 for this item during 2018 because no new information became available during the period that required an adjustment. However, we recorded a non-cash deferred income tax expense of \$2.4 million for the U.S. state and non-U.S. income tax and withholding tax liability attributable to the 2018 undistributed earnings of our non-U.S. subsidiaries in 2018, including withholding taxes related to the undistributed earnings of our Canadian subsidiary. We have completed our analysis as it relates to the implementation of a territorial tax system under the 2017 Tax Act within the prescribed measurement period ending December 22, 2018 pursuant to the guidance under SAB 118.

Under U.S. GAAP, as it relates to the new GILTI tax rules, we are allowed to make an accounting policy choice of either (1) treating taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (the “period cost method”) or (2) factoring such amounts into the measurement of our deferred taxes (the “deferred 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 did not record any adjustment related to GILTI during the first nine months of 2018 based on our determination that the impact was not material, and based on the guidance available to us at the time. During the fourth quarter of 2018, and taking into consideration proposed regulations issued by the IRS in November 2018 with respect to various related non-U.S. tax credit provisions, we recognized a current cash income tax expense of \$3.7 million for GILTI. In conjunction with the issuance of the proposed regulations, taking into consideration the complexities related to an election to recognize deferred taxes for basis differences that are expected to have a GILTI impact in future years, we have concluded that the appropriate accounting policy election for Kronos is to record GILTI tax as a current-period expense when incurred under the period cost method. As such, we have completed our policy election within the prescribed measurement period ended December 22, 2018 pursuant to the guidance under SAB 118. Similarly, we have evaluated the tax impact of BEAT,

taking into consideration proposed regulations issued by the IRS in December 2018 with respect to BEAT, and determined that the tax imposed under BEAT has no material impact to us as we have historically not entered into international payments between related parties that are unrelated to cost of goods sold. Our determinations under the GILTI, BEAT and related U.S. tax credit provisions are based on the relevant statutes and guidance provided under the proposed regulations. Given the complexity of the international provisions, it is possible that final regulations could differ from the proposed regulations and materially impact our

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determinations with respect to such items. Any material change will be recognized in the period in which the final regulations are published.

Certain U.S. deferred tax attributes of one of our non-U.S. subsidiaries, which subsidiary is treated as a dual resident for U.S. income tax purposes, were subject to various limitations. As a result, we had previously concluded that a deferred income tax asset valuation allowance was required to be recognized with respect to such subsidiary's U.S. net deferred income tax asset because such assets did not meet the more-likely-than-not recognition criteria primarily due to (i) the various limitations regarding use of such attributes due to the dual residency; (ii) the dual resident subsidiary had a history of losses and absent distributions from our non-U.S. subsidiaries, which were previously not determinable, such subsidiary was expected to continue to generate losses; and (iii) a limited NOL carryforward period for U.S. tax purposes. Because we had concluded the likelihood of realization of such subsidiary's net deferred income tax asset was remote, we had not previously disclosed such valuation allowance or the associated amount of the subsidiary's net deferred income tax assets (exclusive of such valuation allowance). Primarily due to changes enacted under the 2017 Tax Act, we have concluded we now have sufficient positive evidence under the more-likely-than-not recognition criteria to support reversal of the entire valuation allowance related to such subsidiary's net deferred income tax asset, which evidence included, among other things, (i) the inclusion under Transition Tax provisions of significant earnings for U.S. income tax purposes which significantly and positively impacts the ability of such deferred tax attributes to be utilized by us; (ii) the indefinite carryforward period for U.S. net operating losses incurred after December 31, 2017; (iii) an expectation of continued future profitability for our U.S. operations; and (iv) a positive taxable income basket for U.S. tax purposes in excess of the U.S. deferred tax asset related to the U.S. attributes of such subsidiary. Accordingly, in the fourth quarter of 2017 we recognized an \$18.7 million non-cash deferred income tax benefit as a result of the reversal of such valuation allowance.

Our consolidated effective income tax rate in 2019 is expected to be higher than the U.S. federal statutory rate of 21% because the income tax rates applicable to our earnings (losses) of our non-U.S. operations will be higher than the income tax rates applicable to our U.S. operations. In addition, our consolidated effective income tax rate in 2019 is expected to be lower than our effective tax rate in 2018 primarily due to the mix of earnings and a decrease in the statutory income tax rate in certain non-U.S. jurisdictions in which we operate.

Comparison of 2017 to 2016 Results of Operations

	Year ended December 31,				
	2016		2017		
	(Dollars in millions)				
Net sales	\$1,364.3	100%	\$1,729.0	100	%
Cost of sales	1,099.6	80	1,159.3	67	
Gross margin	264.7	20	569.7	33	
Selling, general and administrative expense	168.5	12	200.6	12	
Other operating income (expense):					
Currency transactions, net	5.5	-	(7.5)	-	
Other operating expense, net	(8.8)	(1)	(13.8)	(1)	
Income from operations	\$92.9	7 %	\$347.8	20	%
				%	Change
TiO ₂ operating statistics:					
Sales volumes*	559		586	5	%
Production volumes*	546		576	5	%
Percentage change in net sales:					
TiO ₂ product pricing				22	%
TiO ₂ sales volumes				5	
TiO ₂ product mix/other				(1)	
Changes in currency exchange rates				1	
Total				27	%

* Thousands of metric tons

Net sales – Our net sales increased 27% or \$364.7 million in 2017 compared to 2016, primarily due to the favorable effects of a 22% increase in average TiO₂ selling prices (which increased net sales by approximately \$300 million) and a 5% increase in sales volumes (which increased net sales by approximately \$68 million). TiO₂ 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 in 2017 primarily due to strength in the North American and European markets as compared to 2016. Our sales volumes in 2017 set a new overall record for a full-year period. We estimate that changes in currency exchange rates increased our net sales by approximately \$16 million, or 1%, as compared to 2016.

Cost of sales and gross margin – Cost of sales increased \$59.7 million or 5% in 2017 compared to 2016 due to the net impact of a 5% increase in sales volumes, efficiencies related to a 5% increase in TiO₂ production volumes, higher raw materials and other production costs of approximately \$13 million and currency fluctuations (primarily the euro). Our production volumes in 2017 set a new overall record for a full-year period. Our cost of sales as a percentage of net sales decreased to 67% in 2017 compared to 80% in 2016 as the favorable effects of higher average selling prices and efficiencies related to higher production volumes more than offset the higher raw materials and other production costs, as discussed above.

Gross margin as a percentage of net sales increased to 33% in 2017 compared to 20% in 2016. As discussed and quantified above, our gross margin increased primarily due to the net effect of higher average selling prices, higher sales and production volumes and higher raw materials and other production costs.

Selling, general and administrative expense – Selling, general and administrative expense in 2017 was \$200.6 million, an increase of \$32.1 million compared to 2016. Selling, general and administrative expense increased in 2017 in part due to higher shipping and handling costs of \$11 million, higher general and administrative costs related to the implementation of a new accounting and manufacturing software system of \$8 million and higher

research, development and certain sales technical support costs of \$7 million. Selling, general and administrative expenses were approximately 12% of net sales in each of 2017 and 2016.

Other operating income and expense, net – Other operating income and expense, net in 2016 includes income aggregating \$4.3 million related to insurance settlement gains from two separate business interruption claims.

Income from operations – Income from operations increased by \$254.9 million, from \$92.9 million in 2016 to \$347.8 million in 2017. Income from operations as a percentage of net sales increased to 20% in 2017 from 7% in 2016. This increase was driven by the increase in gross margin, discussed above, partially offset by income aggregating \$4.3 million related to insurance settlement gains from two separate business interruption claims in 2016. We estimate that changes in currency exchange rates decreased income from operations by approximately \$18 million in 2017 as compared to 2016.

Other non-operating income (expense) – We recognized a loss on prepayment of debt in the third quarter of 2017 aggregating \$7.1 million, associated with the prepayment and termination of our term loan indebtedness. See Note 8 to our Consolidated Financial Statements. Interest expense decreased \$1.5 million from \$20.5 million in 2016 to \$19.0 million in 2017 primarily due to higher capitalized interest in 2017. See Notes 1 and 8 to our Consolidated Financial Statements.

Income tax expense (benefit) – We recognized an income tax benefit of \$48.8 million in 2017 compared to income tax expense of \$17.9 million in 2016. Our income tax expense in 2016 includes a \$3.4 million current income tax benefit related to the execution and finalization of an Advance Pricing Agreement between the U.S. and Canada, an aggregate \$2.2 million non-cash tax benefit as the result of a net decrease in our deferred income tax valuation allowance and a \$2.4 increase to our reserve for uncertain tax positions. Our income tax benefit in 2017 includes a net income tax benefit of \$136.5 million, as discussed above.

Our effective income tax rate in 2016, excluding the impact of the reduction in our deferred income tax asset valuation allowances we recognized and the change to our reserve for uncertain tax positions, was lower than the U.S. federal statutory rate of 35% primarily due to the change to prior year tax discussed above. Our effective income tax rate in 2017, excluding the impact of the reversal of the deferred income tax asset valuation allowances, the one-time repatriation tax, the impact of the change in our permanent reinvestment assertion with respect to the undistributed earnings of our European subsidiaries and the change to our reserve for uncertain tax positions, was lower than the U.S. federal statutory rate of 35% primarily due to the impact of the earnings of our non-U.S. subsidiaries. See Note 13 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 worldwide, primarily titanium-containing feedstocks, are purchased primarily in U.S. dollars, while labor and other production costs are purchased 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, (ii) changes in currency exchange rates during time periods when our non-U.S. operations are holding non-local currency (primarily U.S. dollars), and (iii) relative changes in the aggregate fair value of currency forward contracts held from time to time. As discussed in Note 17 to our Consolidated Financial Statements, we periodically use currency forward contracts to manage a portion of our currency exchange risk, and relative changes in the aggregate fair value of any currency forward contracts we hold from time to time

serves in part to mitigate the currency transaction gains or losses we would otherwise recognize from the first two items described above.

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 - 2018 vs. 2017					
			Translation		Total
			gains	currency	
Transaction gains/(losses) recognized			impact of rate changes	impact 2018 vs. 2017	
2017	2018	Change			
		(In millions)			
Impact on:					
Net sales	\$-	\$ -	\$ -	\$ 49	\$ 49
Income from operations	(8)	10	18	15	33

The \$49 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 2018 as compared to 2017. The weakening of the U.S. dollar relative to the Canadian dollar and the Norwegian krone in 2018 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 \$33 million increase in income from operations was comprised of the following:

- Approximately \$18 million from net currency transaction gains 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, 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
- Approximately \$15 million from 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 2018 as compared to 2017, partially offset by the weakening of the U.S. dollar relative to the Canadian dollar, as its local currency-denominated operating costs were translated into more U.S. dollars in 2018 as compared to 2017.

Impact of changes in currency exchange rates - 2017 vs. 2016					
			Translation		Total
			gain/loss-	currency	
Transaction gains/(losses) recognized			impact of rate changes	impact 2017 vs. 2016	
2016	2017	Change			
		(In millions)			

(In
millions)

Impact on:					
Net sales	\$-	\$ -	\$ -	\$ 16	\$ 16
Income from operations	6	(8)	(14)	(4)	(18)

The \$16 million increase in net sales (translation gain) was caused primarily by a weakening of the U.S. dollar relative to the euro (mostly in the fourth quarter), as our euro-denominated sales were translated into more U.S. dollars in 2017 as compared to 2016. The weakening of the U.S. dollar relative to the Canadian dollar and the Norwegian krone in 2017 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 \$18 million decrease in income from operations was comprised of the following:

- Approximately \$14 million from net currency transaction losses 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, 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
- Approximately \$4 million from net currency translation losses primarily caused by a weakening of the U.S. dollar relative to the Canadian dollar, as its local currency-denominated operating costs were translated into more U.S. dollars in 2017 as compared to 2016, and such translation, as it related to the U.S. dollar relative to the euro, had a nominal effect on income from operations in 2017 as compared to 2016.

Outlook

During 2018 we operated our production facilities at 95% of practical capacity compared to full practical capacity in 2017. We expect our production volumes in 2019 to be slightly higher as compared to the 2018 production volumes. Assuming current global economic conditions continue and based on anticipated production levels, we also expect our 2019 sales volumes to be higher as compared to 2018 sales volumes. We will continue to monitor current and anticipated near-term customer demand levels and align our production and inventories accordingly.

The cost of third-party feedstock ore we purchased in 2018 was higher as compared to 2017 and such higher cost feedstock ore was reflected in our results of operations beginning in the second quarter of 2018. Consequently, our cost of sales per metric ton of TiO₂ sold in 2018 was moderately higher than our per-metric ton cost in 2017 (excluding the effect of changes in currency exchange rates) primarily due to higher third-party feedstock ore costs along with the unfavorable effects of lower production volumes. We expect our cost of sales per metric ton of TiO₂ sold in 2019 to be higher than our per-metric ton cost in 2018 primarily due to higher feedstock costs.

We started 2018 with average selling prices 27% higher than the beginning of 2017. Average selling prices increased by an additional 3% in the first six months of 2018 (most of which occurred in the first quarter) and average selling prices decreased by 6% during the last six months of 2018. Industry data indicates that overall TiO₂ inventory held by producers stood at adequate-to-low levels in the last half of 2018. We expect changes in customer inventory levels to continue to decrease through the first quarter of 2019 which could lead to some selling price decreases during the first quarter of 2019.

Overall, we expect our sales in 2019 will be higher as compared to 2018, principally as a result of the favorable impact of higher expected sales volumes partially offset by the unfavorable impact of lower expected average selling prices. In addition, we expect our income from operations in 2019 will be lower as compared to 2018, as the favorable impact of higher expected sales volumes would be more than offset by the unfavorable impact of lower expected average selling prices and higher raw material costs (principally feedstock ore) in 2019.

Due to the constraints of high capital costs and extended lead time associated with adding significant new TiO₂ production capacity, especially for premium grades of TiO₂ products produced from the chloride process, we believe increased and sustained profit margins will be necessary to financially justify major expansions of TiO₂ production capacity required to meet expected future growth in demand. Any major expansion of TiO₂ production capacity, if announced, would take several years before such production would become available to meet future growth in demand.

Our expectations for our future operating results are based upon a number of factors beyond our control, including worldwide growth of gross domestic product, competition in the marketplace, continued operation of competitors, unexpected or earlier-than-expected capacity additions or reductions and technological advances. If actual developments differ from our expectations, our results of operations could be unfavorably affected.

Assumptions on 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.

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 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) in our Consolidated Balance Sheet.

We recognized consolidated defined benefit pension plan expense of \$22.0 million in 2016, \$28.9 million in 2017 and \$26.6 million in 2018. Certain non-U.S. employees are covered by plans in their respective countries, principally in Germany, Canada and Norway. Participation in the defined benefit pension plan in Germany was closed to new participants effective in 2005. German employees hired beginning in 2005 participate in a new plan in which the retirement benefit is based upon the amount of employee and employer contributions to the plan, but for which in accordance with German law the employer guarantees a minimum rate of return on invested assets and a guaranteed indexed lifetime benefit payment after retirement based on the participant's account balance at the time of retirement. In accordance with GAAP, the new pension plan is accounted for as a defined benefit plan, principally because of such guaranteed minimum rate of return and guaranteed lifetime benefit payment. Participation in the defined benefit plan in Canada with respect to hourly and salaried workers was closed to new participants in December 2013 and 2014, respectively, and existing hourly and salaried plan participants no longer accrue additional defined pension benefits after December 2013 and 2014, respectively. Our U.S. plan was closed to new participants in 1996, and existing participants no longer accrue any additional benefits after that date. The amount of funding requirements for these defined benefit pension plans is 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 \$15.5 million in 2016, \$16.2 million in 2017 and \$17.1 million in 2018.

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, 2018, approximately 71%, 15%, 8% and 2% 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	Obligations	Obligations
	at December 31, 2016	at December 31, 2017	at December 31, 2018
	and expense in 2017	and expense in 2018	and expense in 2019
Germany	1.8%	1.8%	1.8%
Canada	3.7%	3.3%	3.5%
Norway	2.5%	2.5%	2.5%
U.S.	3.9%	3.5%	4.1%

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, 2018, approximately 58%, 23%, 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. At December 31, 2017, all of the assets of our U.S. plan were invested in the Combined Master Retirement Trust (CMRT), a collective investment trust sponsored by Contran to permit the collective investment by certain master trusts which fund certain employee benefit plans sponsored by Contran and certain of its affiliates, including us. During 2018, Contran and the other employer-sponsors (including us) implemented a restructuring of the CMRT, in which a substantial part of each plan's units in the CMRT were redeemed in exchange for a pro-rata portion of a substantial part of the CMRT's investments. Following such restructuring, the plans held directly in the aggregate the investments previously held directly by the CMRT which had been exchanged for CMRT units as part of the restructuring. Certain investments held directly by the CMRT were not part of such restructuring and remain investments of the CMRT. Such restructuring was implemented in part so each plan could more easily align the composition of their plan asset portfolio with the plan's benefit obligations. Such assumed asset mixes and the CMRT restructuring are discussed in Note 10 to our Consolidated Financial Statements.

Our pension plan weighted average asset allocations by asset category were as follows:

	December 31, 2018
	GermanCanada Norway U.S.

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Equity securities and limited partnerships	22 %	21 %	12 %	38 %
Fixed income securities	68	79	52	46
Real estate	9	-	9	-
Other	1	-	27	16
Total	100%	100%	100%	100%

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	December 31, 2017			
	Germany	Canada	Norway	U.S.
Equity securities and limited partnerships	20 %	23 %	12 %	62 %
Fixed income securities	69	77	51	31
Real estate	9	-	9	-
Other	2	-	28	7
Total	100 %	100 %	100 %	100 %

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 2016, 2017 and 2018 were as follows:

	2016	2017	2018
Germany	3.5 %	1.3 %	2.0 %
Canada	5.2 %	4.3 %	4.2 %
Norway	3.3 %	3.5 %	4.0 %
U.S.	7.5 %	7.5 %	7.5 %

Our long-term rate of return on plan asset assumptions in 2019 used for purposes of determining our 2019 defined benefit pension plan expense for Germany, Canada, Norway and the U.S. are 2.3%, 4.0%, 4.0% and 5.5%, respectively.

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.

A reduction in the assumed discount rate generally results in an actuarial loss, as the actuarially-determined present value of estimated future benefit payments will increase. Conversely, an increase in the assumed discount rate generally results in an actuarial gain. In addition, an actual return on plan assets for a given year that is greater than the assumed return on plan assets results in an actuarial gain, while an actual return on plan assets that is less than the assumed return results in an actuarial loss. Other actual outcomes that differ from previous assumptions, such as individuals living longer or shorter than assumed in mortality tables, which are also used to determine the actuarially-determined present value of estimated future benefit payments, changes in such mortality tables themselves or plan amendments, will also result in actuarial losses or gains. These amounts are recognized in other comprehensive income. In addition, any actuarial gains generated in future periods would reduce the negative amortization effect of any cumulative unrecognized actuarial losses, while any actuarial losses generated in future periods would reduce the favorable amortization effect of any cumulative unrecognized actuarial gains.

During 2018, all of our defined benefit pension plans generated a combined net actuarial loss of approximately \$24.3 million. This actuarial loss resulted primarily from an actual return on plan assets during 2018 less than the expected return, partially offset by an increase in discount rates from December 31, 2017 to December 31, 2018.

Based on the actuarial assumptions described above and our current expectation for what actual average currency exchange rates will be during 2019, we expect our defined benefit pension expense will approximate

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\$28 million in 2019. In comparison, we expect to be required to contribute approximately \$17 million to such plans during 2019.

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, 2018, our aggregate projected benefit obligations would have increased by approximately \$29.9 million at that date and our defined benefit pension expense would be expected to increase by approximately \$2.5 million during 2019. 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 2019.

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, 2018, we had substantial net assets denominated in the euro, Canadian dollar and Norwegian krone.

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 2018, relative changes in currency exchange rates resulted in a \$14.4 million decrease in the reported amount of our cash, cash equivalents and restricted cash compared to a \$14.4 million increase in 2017 and a \$5.3 million decrease in 2016.

Cash provided by operating activities was \$188.5 million in 2018 compared to \$276.1 million in 2017. This \$87.6 million decrease in the amount of cash provided was primarily due to the net effect of the following:

- lower income from operations in 2018 of \$17.7 million,
- higher amount of net cash used associated with relative changes in our inventories, receivables, payables and accruals in 2018 of \$58.2 million as compared to 2017,
- higher cash paid for taxes in 2018 of \$30.8 million due to the timing of tax payments as well as the aggregate \$11.9 million we paid in 2018 related to the Transition Tax provisions of 2017 Tax Act, and
- higher distributions from our TiO₂ manufacturing joint venture in 2018 of \$10.0 million, primarily due to the timing of the joint venture's working capital needs.

Cash provided by operating activities was \$276.1 million in 2017 compared to \$89.6 million in 2016. This \$186.5 million increase in the amount of cash provided was primarily due to the net effect of the following:

- higher income from operations in 2017 of \$254.9 million,
-

higher amount of net cash used associated with relative changes in our inventories, receivables, payables and accruals in 2017 of \$37.6 million as compared to 2016,
higher cash paid for taxes of \$30.5 million due to our increased profitability, and

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higher contributions to our TiO₂ manufacturing joint venture in 2017 of \$9.6 million, primarily due to the timing of the joint venture's working capital needs.

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

Our average days sales outstanding, or DSO, increased from December 31, 2017 to December 31, 2018, primarily due to the effects of lower sales volumes and relative changes in the timing of collections, and

Our average days sales in inventory, or DSI, increased from December 31, 2017 to December 31, 2018, primarily due to higher inventory volumes attributable in part to lower overall sales volumes and production volumes exceeding sales volumes.

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

	December 31, 2016	December 31, 2017	December 31, 2018
Days sales outstanding	65 days	63 days	76 days
Days sales in inventory	71 days	62 days	113 days

Investing activities

Our capital expenditures were \$53.0 million in 2016, \$64.3 million in 2017 and \$56.3 million in 2018. Capital expenditures are primarily incurred to maintain and improve the cost effectiveness of our manufacturing facilities. In addition, approximately \$39.2 million (including \$1.7 million in 2018) of our capital expenditures during the past three years relates to the implementation of a new accounting and manufacturing software system. Our capital expenditures during the past three years include an aggregate of approximately \$44.9 million (including \$17.1 million in 2018) for our ongoing environmental protection and compliance programs.

In addition, under the terms of our unsecured revolving demand promissory note with Valhi, we loaned \$18.2 million and subsequently collected \$4.6 million during 2017 and we loaned \$2.6 million and subsequently collected \$16.2 million during 2018.

Financing activities

During 2018, we paid quarterly dividends aggregating \$.68 per share (\$78.8 million).

During 2017, we:

- issued €400 million (\$477.6 million) aggregate principal amount of 3.75% Senior Secured Notes on September 13, 2017,

- repaid the remaining balance of \$340.4 million on our term loan,

- borrowed \$253.9 million under our North American revolving credit facility and subsequently repaid \$253.9 million, and

- paid quarterly dividends to stockholders aggregating \$.60 per share (\$69.5 million).

During 2016, we:

- borrowed \$266.2 million under our revolving North American credit facility and subsequently repaid \$266.2 million,

- repaid \$3.5 million on our term loan,

- and

- paid quarterly dividends to stockholders aggregating \$.60 per share (\$69.5 million).

In February 2019, our board of directors declared a first quarter 2019 regular quarterly dividend of \$.18 per share, payable March 14, 2019 to stockholders of record as of March 5, 2019.

Outstanding debt obligations and borrowing availability

At December 31, 2018, our consolidated debt comprised:

€400 million aggregate outstanding on our KII 3.75% Senior Secured Notes (\$452.4 million carrying amount, net of unamortized debt issuance costs) due in September 2025, and approximately \$4.2 million of other indebtedness.

Our North American and European revolvers and our Senior Secured Notes 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. Certain of 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, certain 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, certain 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. Our European revolving credit facility also requires the maintenance of certain financial ratios, and one of such requirements is based on the ratio of net debt to the last twelve months EBITDA of the borrowers. The terms of all of our debt instruments (including revolving lines of credit for which we have no outstanding borrowings at December 31, 2018) are discussed in Note 8 to our Consolidated Financial Statements. We are in compliance with all of our debt covenants at December 31, 2018. We believe that we will be able to continue to comply with the financial covenants contained in our credit facilities through their maturity.

In addition to the outstanding indebtedness indicated above, at December 31, 2018 we had \$101.3 million available for borrowing under our North American revolving credit facility. At December 31, 2018, based upon the last twelve months EBITDA and the net debt to EBITDA financial test for our European revolving credit facility, the full €90 million amount of the credit facility (\$103.2 million) was available for borrowing. We could borrow all available amounts under each of our credit facilities without violating our existing debt covenants.

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 North American revolving credit facility is collateralized by, among other things, a first priority lien on the borrower's trade receivables and inventories. Our European revolving credit facility is collateralized by, among other things, the accounts receivable and inventories of the borrowers plus a limited pledge of all the other assets of the Belgian borrower. 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 and (iii) provide for the payment of dividends. 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 TiO₂ industry is cyclical, and changes in industry economic conditions significantly impact earnings and operating cash flows. Changes in TiO₂ 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 TiO₂ 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 TiO₂ 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, 2019) and our long-term obligations (defined as the five-year period ending December 31, 2023, 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, 2018 we had:

	Held by		
	U.S.	Non-U.S.	
	entities	entities	Total
	(In millions)		
Cash and cash equivalents	\$254.8	\$ 118.5	\$373.3
Restricted cash	-	1.4	1.4
Noncurrent marketable securities	3.4	-	3.4

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, 2018, we have 1,951,000 shares available for repurchase under a stock repurchase program authorized by our board of directors. See Note 14 to our Consolidated Financial Statements.

Capital expenditures

We intend to spend approximately \$85 million on capital expenditures during 2019, primarily to maintain and improve our existing facilities, including approximately \$25 million in the area of 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 2019 is expected to be funded through cash on hand or borrowing under existing credit facilities.

Off-balance sheet financing

Other than operating lease commitments disclosed in Note 16 to our Consolidated Financial Statements, we are not party to any material off-balance sheet financing arrangements.

Commitments and contingencies

See Notes 13 and 16 to our Consolidated Financial Statements for a description of certain income tax contingencies, certain legal proceedings and other commitments.

As more fully described in the Notes to the Consolidated Financial Statements, we are a party to various debt, lease and other agreements which contractually and unconditionally commit us to pay certain amounts in the future. See Notes 8, 15 and 16 to our Consolidated Financial Statements. The timing and amount shown for our commitments in the table below are based upon the contractual payment amount and the contractual payment date for such commitments. The following table summarizes such contractual commitments of ours and our consolidated subsidiaries as of December 31, 2018.

Contractual commitment	Payment due date				Total
	2019	2020/ 2021	2022/ 2023	2024 and after	
(In millions)					
Indebtedness:					
Principal (1)	\$1.5	\$2.1	\$.6	\$458.7	\$462.9
Interest payments (2)	17.2	34.4	34.4	29.5	115.5
Operating leases	6.2	9.2	5.6	21.5	42.5
Long-term supply contracts for the purchase					
of TiO ₂ feedstock (3)	379.4	214.1	-	-	593.5
Long-term service and other supply contracts (4)	56.0	82.8	11.9	5.7	156.4
Fixed asset acquisitions	15.5	-	-	-	15.5
Estimated tax obligations (5)	19.4	12.0	26.0	18.6	76.0
	\$495.2	\$354.6	\$78.5	\$534.0	\$1,462.3

- (1) At December 31, 2018, a significant portion of the amount shown for indebtedness relates to our 3.75% Senior Secured Notes due 2025 (\$458.7 million at December 31, 2018 exclusive of \$6.3 million unamortized debt issuance costs). Such indebtedness is denominated in the euro. See Item 7A - "Quantitative and Qualitative Disclosures About Market Risk" and Note 8 to the Consolidated Financial Statements.
- (2) The amounts shown for interest payments relate to outstanding fixed-rate indebtedness. Interest payments assume that fixed-rate indebtedness remains outstanding until maturity.
- (3) Our contracts for the purchase of TiO₂ feedstock contain fixed quantities of ore that we are required to purchase, or specify a range of quantities within which we are required to purchase based on our feedstock requirements. The pricing under these agreements is generally negotiated quarterly or semi-annually. The timing and amount shown for our commitments related to the supply contracts for TiO₂ feedstock are based upon our current estimate of the quantity of material that will be purchased in each time period shown, the payment that would be due based upon such estimated purchased quantity and an estimate of the prices for the various suppliers which is primarily based on first half 2019 pricing. The actual amount of material purchased and the actual amount that would be payable by us, may vary from such estimated amounts. Our obligation for the purchase of TiO₂ feedstock is more fully described in Note 16 to our Consolidated Financial Statements and above in "Business – Raw materials." The

amounts shown in the table above include the feedstock requirements from contracts we entered into through January 2019.

- (4) The amounts shown for the long-term service and other supply contracts primarily pertain to agreements we have entered into with various providers of products or services which help to run our plant facilities (electricity, natural gas, etc.), utilizing December 31, 2018 exchange rates. See Note 16 to our Consolidated Financial Statements.

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(5) The amount shown for estimated tax obligations in 2019 is the consolidated amount of income taxes payable at December 31, 2018, including an amount related to the Transition Tax which is assumed to be paid during 2019. The amounts shown for estimated tax obligations in 2020 and thereafter relate to the Transition Tax which will be paid in the years indicated above. See Note 13 to our Consolidated Financial Statements.

The above table does not reflect:

• Any amounts we might pay to fund our defined benefit pension plans, as the timing and amount of any such future fundings are unknown and dependent on, among other things, the future performance of defined benefit pension plan assets, interest rate assumptions and actual future retiree medical costs. We expect to be required to contribute an aggregate of approximately \$17 million to our defined benefit pension plans during 2019. Such defined benefit pension plans are discussed above in greater detail and in Note 10 to our Consolidated Financial Statements.

• Any amounts we might pay to settle any of our uncertain tax positions classified as a noncurrent liability, as the timing and amount of any such future settlements are unknown and dependent on, among other things, the timing of tax audits. See Note 13 to our Consolidated Financial Statements.

• Any amounts we might pay to acquire TiO₂ from our TiO₂ manufacturing joint venture, as the timing and amount of such purchases are unknown and dependent on, among other things, the amount of TiO₂ produced by the joint venture in the future and the joint venture's future cost of producing such TiO₂. However, the table does include amounts related to our share of the joint venture's ore requirements necessary to produce TiO₂ for us. See Item 1, "Business" and Note 5 to our Consolidated Financial Statements.

We occasionally enter into raw material supply arrangements to mitigate the short-term impact of future increases in raw material costs. While these arrangements do not necessarily commit us to a minimum volume of purchase, they generally provide for stated unit prices based upon achievement of specified volume purchase levels. This allows us to stabilize raw material purchase prices to a certain extent, provided the specified minimum monthly purchase quantities are met.

Recent accounting pronouncements

See Note 18 to our Consolidated Financial Statements.

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 materials prices.

Interest rates

At December 31, 2017 and 2018, 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. The following table presents principal amounts and weighted average interest rates for our aggregate outstanding indebtedness at December 31, 2017 and 2018. Information shown below for our euro-denominated Senior Secured Notes is presented in its U.S. dollar equivalent at December 31, 2017 and 2018 (net of unamortized debt issuance costs of \$7.5 million and \$6.3 million, respectively) using an exchange rate of U.S. \$1.197 per euro and \$1.147 per euro, respectively. See Note 8 to our Consolidated Financial Statements.

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	Indebtedness		Year-end interest	Maturity
	Amount Carrying	Fair value		
	amount	value	rate	date
	(In millions)			
December 31, 2018				
Fixed-rate Senior Secured Notes	\$452.4	\$412.9	3.75	% 2025
December 31, 2017				
Fixed-rate Senior Secured Notes	\$471.1	\$495.1	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 the United Kingdom pound sterling.

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 worldwide, primarily titanium-containing feedstocks, are purchased primarily in U.S. dollars, while labor and other production costs are purchased 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, (ii) changes in currency exchange rates during time periods when our non-U.S. operations are holding non-local currency (primarily U.S. dollars), and (iii) relative changes in the aggregate fair value of currency forward contracts held from time to time.

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, nor do we currently anticipate entering into such contracts for trading or speculative purposes in the future. We are not party to any currency forward contracts at December 31, 2018. See Note 17 to our Consolidated Financial Statements.

Also, we are subject to currency exchange rate risk associated with our Senior Secured Notes, as such indebtedness is denominated in the euro. At December 31, 2017 and 2018, we had the equivalent of \$478.6 million and \$458.7 million, respectively, 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 such dates would be approximately \$48 million and \$46 million, respectively.

Marketable security prices

We are exposed to market risk due to changes in prices of the marketable securities which we own. See Note 6 to our Consolidated Financial Statements. The fair value of securities which includes investments in publicly-traded shares of related parties was \$10.7 million and \$3.4 million at December 31, 2017 and December 31, 2018, respectively. The

potential change in the aggregate fair value of these investments, assuming a 10% change in prices, would be approximately \$1.1 million and \$.3 million at December 31, 2017 and December 31, 2018, respectively.

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 Robert D. Graham, our Vice Chairman of the Board, President and Chief Executive Officer and Gregory M. Swalwell, our Executive Vice President and Chief Financial Officer, have evaluated the design and effectiveness of our disclosure controls and procedures as of December 31, 2018. 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, 2018.

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, 2018, 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, 2018 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 2018, our chief executive officer filed such annual certification with the NYSE. The 2018 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, 2018 have been filed as Exhibits 31.1 and 31.2 to this Annual Report on Form 10-K.

ITEM 9B. OTHER INFORMATION

Not applicable

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PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this Item is incorporated by reference to our 2019 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 2019 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 2019 proxy statement.

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

The information required by this Item is incorporated by reference to our 2019 proxy statement. See also Note 15 to our Consolidated Financial Statements.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by the Item is incorporated by reference to our 2019 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, 2018 will be furnished to the Commission upon request.

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|-------------|---------------|
| Item
No. | Exhibit Index |
|-------------|---------------|
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- | | |
|-------|--|
| 3.1+ | <u>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.</u> |
| 3.2 | <u>Amended and Restated Bylaws of Kronos Worldwide, Inc. as of October 25, 2007 – 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 October 31, 2007.</u> |
| 10.1 | <u>Amended and Restated Tax Agreement between Valhi, Inc. and Kronos Worldwide, Inc. dated as of December 1, 2012 – 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, 2012.</u> |
| 10.2 | <u>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.</u> |
| 10.3* | <u>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).</u> |
| 10.4 | Lease Contract, dated June 21, 1952, between Farbenfabriken Bayer Aktiengesellschaft and Titangesellschaft mit beschränkter 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)

Item No.	Exhibit Index
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**	<u>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.</u>
10.17**	<u>Unsecured Revolving Demand Promissory Note dated December 31, 2018 in the principal amount of \$60.0 million executed by Valhi, Inc. and payable to the order of Kronos Worldwide, Inc.</u>
10.18	<u>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.</u>
10.19	<u>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.</u>
10.20	<u>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,</u>

2017 and filed by the registrant on September 13, 2017.

21.1** Subsidiaries.

23.1** Consent of PricewaterhouseCoopers LLP.

31.1** Certification.

31.2** Certification.

32.1** Certification.

101.INS** XBRL Instance Document

101.SCH** XBRL Taxonomy Extension Schema

101.CAL** XBRL Taxonomy Extension Calculation Linkbase

101.DEF** XBRL Taxonomy Extension Definition Linkbase

101.LAB** XBRL Taxonomy Extension Label Linkbase

101.PRE** XBRL Taxonomy Extension Presentation Linkbase

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+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/ Robert D. Graham
Robert D. Graham, March 11, 2019
(Vice Chairman, 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 11, 2019
(Chair of the Board (non-executive))

/s/ Robert D. Graham
Robert D. Graham, March 11, 2019
(Vice Chairman, President and Chief Executive Officer)

/s/ C. H. Moore, Jr.
C. H. Moore, Jr., March 11, 2019
(Director)

/s/ Thomas P. Stafford
Thomas P. Stafford, March 11, 2019
(Director)

/s/ Meredith W. Mendes
Meredith W. Mendes, March 11, 2019
(Director)

/s/ Keith R. Coogan
Keith R. Coogan, March 11, 2019
(Director)

/s/ John E. Harper
John E. Harper, March 11, 2019
(Director)

/s/ R. Gerald Turner
R. Gerald Turner, March 11, 2019
(Director)
/s/ Gregory M. Swalwell

/s/ Tim C. Hafer

Tim C. Hafer, March 11, 2019
(Vice President, Controller,
Principal Accounting Officer)

Gregory M. Swalwell, March 11, 2019
(Executive Vice President and
Chief Financial Officer, Principal Financial Officer)

KRONOS WORLDWIDE, INC.

Annual Report on Form 10-K

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

Index of Financial Statements

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<u>Consolidated Statements of Income – Years ended December 31, 2016, 2017 and 2018</u>	F-6
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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, 2018 and 2017, and the related consolidated statements of income, comprehensive income, stockholders’ equity and cash flows for each of the three years in the period ended December 31, 2018, 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, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 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, 2018, 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.

/s/ PricewaterhouseCoopers LLP

Dallas, Texas

March 11, 2019

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,	
	2017	2018
Current assets:		
Cash and cash equivalents	\$322.0	\$373.3
Restricted cash	1.7	1.4
Accounts and other receivables	319.1	299.5
Receivables from affiliates	27.4	13.0
Inventories, net	382.3	497.9
Prepaid expenses and other	10.0	16.3
Total current assets	1,062.5	1,201.4
Other assets:		
Investment in TiO ₂ manufacturing joint venture	86.5	81.3
Marketable securities	10.7	3.4
Note receivable from Valhi	13.6	-
Deferred income taxes	139.2	122.0
Other	5.5	3.6
Total other assets	255.5	210.3
Property and equipment:		
Land	42.0	41.0
Buildings	221.6	211.7
Equipment	1,103.2	1,102.6
Mining properties	115.7	114.0
Construction in progress	52.6	38.0
	1,535.1	1,507.3
Less accumulated depreciation and amortization	1,028.7	1,020.9
Net property and equipment	506.4	486.4
Total assets	\$1,824.4	\$1,898.1

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS (CONTINUED)

(In millions, except per share data)

LIABILITIES AND STOCKHOLDERS' EQUITY	December 31,	
	2017	2018
Current liabilities:		
Current maturities of long-term debt	\$.7	\$ 1.5
Accounts payable and accrued liabilities	189.6	195.8
Payables to affiliates	16.2	27.1
Income taxes	25.0	9.0
Total current liabilities	231.5	233.4
Noncurrent liabilities:		
Long-term debt	473.8	455.1
Accrued pension costs	254.2	262.9
Payable to affiliate - income taxes	70.1	56.6
Deferred income taxes	11.3	21.5
Other	29.2	28.8
Total noncurrent liabilities	838.6	824.9
Stockholders' equity:		
Common stock, \$.01 par value; 240.0 shares authorized;		
115.9 shares issued	1.2	1.2
Additional paid-in capital	1,399.0	1,399.1
Retained deficit	(267.2)	(136.2)
Accumulated other comprehensive loss	(378.7)	(424.3)
Total stockholders' equity	754.3	839.8
Total liabilities and stockholders' equity	\$ 1,824.4	\$ 1,898.1

Commitments and contingencies (Notes 13 and 16)

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,		
	2016	2017	2018
Net sales	\$1,364.3	\$1,729.0	\$1,661.9
Cost of sales	1,099.6	1,159.3	1,099.7
Gross margin	264.7	569.7	562.2
Selling, general and administrative expense	168.5	200.6	228.3
Other operating income (expense):			
Currency transactions, net	5.5	(7.5)	10.1
Disposition of property and equipment	(.3)	(.4)	(.2)
Other income, net	4.2	.5	.8
Corporate expense	(12.7)	(13.9)	(14.5)
Income from operations	92.9	347.8	330.1
Other income (expense):			
Interest and dividend income	.6	1.4	5.5
Marketable equity securities	-	-	(7.3)
Other components of net periodic pension and OPEB cost	(11.8)	(17.4)	(15.0)
Loss on prepayment of debt, net	-	(7.1)	-
Interest expense	(20.5)	(19.0)	(19.5)
Income before income taxes	61.2	305.7	293.8
Income tax expense (benefit)	17.9	(48.8)	88.8
Net income	\$43.3	\$354.5	\$205.0
Net income per basic and diluted share	\$.37	\$3.06	\$1.77
Cash dividends per share	\$.60	\$.60	\$.68
Weighted average shares used in the calculation of net			
income per share	115.9	115.9	115.9

See accompanying Notes to Consolidated Financial Statements.

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KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

(In millions)

	Years ended December		
	31,		
	2016	2017	2018
Net income	\$43.3	\$354.5	\$205.0
Other comprehensive income (loss), net of tax:			
Currency translation	(17.6)	57.7	(33.1)
Defined benefit pension plans	(25.6)	12.0	(7.2)
Other postretirement benefit plans	(.3)	(.6)	(.5)
Marketable securities	2.4	3.0	-
Interest rate swap	.3	2.0	-
Total other comprehensive income (loss), net	(40.8)	74.1	(40.8)
Comprehensive income	\$2.5	\$428.6	\$164.2

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

Years ended December 31, 2016, 2017 and 2018

(In millions)

	Common stock	Additional paid-in capital	Retained earnings (deficit)	Accumulated other comprehensive loss	Total
Balance at December 31, 2015	\$ 1.2	\$ 1,398.7	\$ (526.0)	\$ (412.0)	\$ 461.9
Net income	-	-	43.3	-	43.3
Other comprehensive loss, net of tax	-	-	-	(40.8)	(40.8)
Issuance of common stock	-	.1	-	-	.1
Dividends paid - \$.60 per share	-	-	(69.5)	-	(69.5)
Balance at December 31, 2016	1.2	1,398.8	(552.2)	(452.8)	395.0
Net income	-	-	354.5	-	354.5
Other comprehensive income, net of tax	-	-	-	74.1	74.1
Issuance of common stock	-	.2	-	-	.2
Dividends paid - \$.60 per share	-	-	(69.5)	-	(69.5)
Balance at December 31, 2017	1.2	1,399.0	(267.2)	(378.7)	754.3
Change in accounting principle - ASU 2016-01	-	-	4.8	(4.8)	-
Balance at January 1, 2018, as adjusted	1.2	1,399.0	(262.4)	(383.5)	754.3
Net income	-	-	205.0	-	205.0
Other comprehensive loss, net of tax	-	-	-	(40.8)	(40.8)
Issuance of common stock	-	.1	-	-	.1
Dividends paid - \$.68 per share	-	-	(78.8)	-	(78.8)
Balance at December 31, 2018	\$ 1.2	\$ 1,399.1	\$ (136.2)	\$ (424.3)	\$ 839.8

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In millions)

	Years ended December 31,		
	2016	2017	2018
Cash flows from operating activities:			
Net income	\$43.3	\$354.5	\$205.0
Depreciation and amortization	40.5	41.2	49.7
Deferred income taxes	7.7	(151.6)	27.3
Benefit plan expense greater than cash funding	5.8	12.0	8.4
Marketable equity securities	-	-	7.3
Distributions from (contributions to) TiO ₂ manufacturing			
joint venture, net	3.6	(6.0)	4.0
Loss on prepayment of debt	-	7.1	-
Payment for termination of interest rate swap contract	-	(3.3)	-
Other, net	3.0	2.4	2.8
Change in assets and liabilities:			
Accounts and other receivables	(37.4)	(52.7)	8.7
Inventories	38.8	(4.9)	(135.5)
Prepaid expenses	(1.5)	.9	(5.3)
Accounts payable and accrued liabilities	(12.9)	20.7	16.4
Income taxes	3.8	19.2	(16.4)
Accounts with affiliates	(5.8)	41.3	15.4
Other noncurrent assets	.3	(1.6)	1.5
Other noncurrent liabilities	.4	(3.1)	(.8)
Net cash provided by operating activities	89.6	276.1	188.5
Cash flows from investing activities:			
Capital expenditures	(53.0)	(64.3)	(56.3)
Loan to Valhi:			
Loans	-	(18.2)	(2.6)
Collections	-	4.6	16.2
Net cash used in investing activities	(53.0)	(77.9)	(42.7)
Cash flows from financing activities:			
Indebtedness:			
Borrowings	266.2	731.5	-

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Principal payments	(270.0)	(594.3)	(1.5)
Deferred financing fees	-	(8.9)	(.1)
Dividends paid	(69.5)	(69.5)	(78.8)
Net cash provided by (used in) financing activities	(73.3)	58.8	(80.4)

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KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS (CONTINUED)

(In millions)

	Years ended December		
	31,		
	2016	2017	2018
Cash, cash equivalents and restricted cash - net change from:			
Operating, investing and financing activities	\$(36.7)	\$257.0	\$65.4
Effect of exchange rate changes	(5.3)	14.4	(14.4)
Net change for the year	(42.0)	271.4	51.0
Balance at beginning of year	94.3	52.3	323.7
Balance at end of year	\$52.3	\$323.7	\$374.7
Supplemental disclosures:			
Cash paid for:			
Interest, net of amounts capitalized	\$18.4	\$15.2	\$18.5
Income taxes	6.6	37.1	67.9
Accrual for capital expenditures	8.0	8.7	6.3

See accompanying Notes to Consolidated Financial Statements.

KRONOS WORLDWIDE, INC. AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2018

Note 1 – Summary of significant accounting policies:

Organization and basis of presentation – At December 31, 2018, 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 30% 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. All of Contran's outstanding voting stock is held by a family trust established for the benefit of Lisa K. Simmons and Serena Simmons Connelly and their children, for which Ms. Simmons and Ms. Connelly are co-trustees, or is held directly by Ms. Simmons and Ms. Connelly or entities related to them. Consequently, Ms. Simmons and Ms. Connelly may be deemed to control 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. See Note 17.

Cash and cash equivalents – We classify bank time deposits and U.S. Treasury securities purchased under short-term agreements to resell 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 to 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. All of our restricted cash is classified as a current asset and is separately presented on the face of the statement of financial position.

Marketable securities and securities transactions – We carry marketable securities at fair value. Accounting Standard 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;

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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. Prior to 2018, any unrealized gains or losses on the securities were recognized through other comprehensive income, net of deferred income taxes. Beginning on January 1, 2018 with the adoption of ASU 2016-01, Financial Instruments – Overall (Subtopic 825-10): Recognition of Financial Assets and Financial Liabilities, all of our marketable equity securities continue to be carried at fair value as noted above, but any unrealized gains or losses on the securities are now recognized in Marketable equity securities on our Consolidated Statements of Income. See Note 18. We base realized gains and losses upon the specific identification of the securities sold.

See Notes 6, 10 and 17.

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 overheads 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 TiO₂ 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.

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 \$.9 million in 2016, \$2.0 million in 2017 and \$.8 million in 2018. 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.

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We have a governmental concession with an unlimited term to operate our ilmenite mines 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 or discounted cash flow 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 16. 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 \$.8 million in 2016 and \$16.8 million in 2017 and received net refunds of income taxes from Valhi of \$1.9 million in 2018.

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, 2018, 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 currently 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) enacted on December 22, 2017, 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.

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

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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 13.

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. Effective January 1, 2018 with the adoption of ASU 2014-09, Revenue from Contracts with Customers (Topic 606), see Note 18, 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 such payment is probable of occurring. 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. Prior to the adoption of ASU 2014-09, we recorded sales when our products were shipped and title and other risks and rewards of ownership had passed to the customer, which was generally at the time of shipment (although in some instances shipping terms were FOB destination point, for which we did not recognize revenue until the product was received by our customer).

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 ASU 2014-09 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).

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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 ASU 2014-09, we do not disclose sales allocated to future shipments of partially completed contracts.

ASU 2014-09 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; shipping and handling 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 shipping and handling costs in selling, general and administrative expense and these costs were \$90 million in 2016, \$101 million in 2017 and \$105 million in 2018. We expense research and development costs as incurred, and these costs were \$13 million in 2016, \$18 million in 2017 and \$16 million in 2018. 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 (TiO₂). TiO₂ is used to impart whiteness, brightness, opacity and durability to a wide variety of products, including paints, plastics, paper, fibers and ceramics. Additionally, TiO₂ 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, 2017 and 2018, the net assets of non-U.S. subsidiaries included in consolidated net assets approximated \$381 million and \$384 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,		
	2016	2017	2018
	(In millions)		
Net sales - point of origin:			
Germany	\$699.8	\$918.6	\$886.1
United States	664.2	841.8	839.4
Canada	257.7	309.2	307.2
Belgium	187.4	279.9	272.2
Norway	164.8	216.4	209.6
Eliminations	(609.6)	(836.9)	(852.6)
Total	\$1,364.3	\$1,729.0	\$1,661.9

Net sales - point of destination:

Europe	\$697.6	\$898.8	\$817.2
North America	413.2	519.4	542.0
Other	253.5	310.8	302.7
Total	\$1,364.3	\$1,729.0	\$1,661.9

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	December 31,	
	2017	2018
	(In millions)	
Identifiable assets - net property and equipment:		
Germany	\$243.2	\$232.1
Belgium	96.5	94.8
Norway	79.6	79.3
Canada	67.9	65.2
Other	19.2	15.0
Total	\$506.4	\$486.4

Note 3 – Accounts and other receivables:

	December 31,	
	2017	2018
	(In millions)	
Trade receivables	\$301.4	\$273.3
Recoverable VAT and other receivables	19.0	23.8
Refundable income taxes	.1	3.6
Allowance for doubtful accounts	(1.4)	(1.2)
Total	\$319.1	\$299.5

Note 4 – Inventories, net:

	December 31,	
	2017	2018
	(In millions)	
Raw materials	\$106.9	\$93.1
Work in process	20.8	23.5
Finished products	191.5	316.8
Supplies	63.1	64.5
Total	\$382.3	\$497.9

Note 5 – Investment in TiQ 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) (formerly Huntsman P&A Investments LLC). 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 TiO₂ plant in Lake Charles, Louisiana.

We and Venator Investments are both required to purchase one-half of the TiO₂ 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 TiO₂ 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 TiO₂ 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.

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	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Distributions from LPC	\$35.0	\$44.0	\$34.3
Contributions to LPC	(31.4)	(50.0)	(30.3)
Net distributions (contributions)	\$3.6	\$(6.0)	\$4.0

At December 31, 2017, we recorded \$1.4 million as a payable to LPC related to contributions due to LPC, and we paid such contribution on January 2, 2018. See Note 15.

Summary balance sheets of LPC are shown below:

	December 31,	
	2017	2018
	(In millions)	
ASSETS		
Current assets	\$104.1	\$87.0
Property and equipment, net	116.1	119.6
Total assets	\$220.2	\$206.6
LIABILITIES AND PARTNERS' EQUITY		
Other liabilities, primarily current	\$44.4	\$41.1
Partners' equity	175.8	165.5
Total liabilities and partners' equity	\$220.2	\$206.6

Summary income statements of LPC are shown below:

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Revenues and other income:			
Kronos	\$157.5	\$157.5	\$165.9
Venator Investments	157.9	158.3	167.0
Total revenues and other income	315.4	315.8	332.9
Cost and expenses:			
Cost of sales	314.9	315.4	332.5
General and administrative	.5	.4	.4
Total costs and expenses	315.4	315.8	332.9
Net income	\$-	\$-	\$-

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. See Note 17. Prior to 2018, any unrealized gains or losses on the securities were recognized through other comprehensive income, net of deferred income taxes. Beginning on January 1, 2018 with the adoption of ASU 2016-01, all of our marketable equity securities continue to be carried at fair value as noted above, but we began recognizing any unrealized gains or losses on the securities in Marketable equity securities on our Consolidated Statements of Income.

Marketable security	Fair value measurement level	Market Cost Unrealized		
		value	basis	gain
(In millions)				
December 31, 2017:				
Valhi common stock	1	\$10.6	\$3.2	\$ 7.4
NL and CompX common stocks	1	.1	.1	-
Total		\$10.7	\$3.3	\$ 7.4
December 31, 2018:				
Valhi common stock	1	\$3.3	\$3.2	\$.1
NL and CompX common stocks	1	.1	.1	-
Total		\$3.4	\$3.3	\$.1

At December 31, 2017 and 2018, we held approximately 1.7 million shares of Valhi's common stock. We also held a nominal number of shares of CompX and NL common stocks. At December 31, 2017 and 2018, the quoted per share market price of Valhi's common stock was \$6.17 and \$1.93, respectively.

The Valhi, CompX and NL common stocks we own are 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 – Other noncurrent assets:

December
31,
2017 2018
(In
millions)

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Pension asset	\$1.6	\$.8
Deferred financing costs, net	1.1	.9
Other	2.8	1.9
Total	\$5.5	\$3.6

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Note 8 – Long-term debt:

	December 31,	
	2017	2018
	(In millions)	
Kronos International, Inc. 3.75% Senior Secured Notes	\$471.1	\$452.4
Other	3.4	4.2
Total debt	474.5	456.6
Less current maturities	.7	1.5
Total long-term debt	\$473.8	\$455.1

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). We used \$338.6 million of the net proceeds of the Senior Notes to prepay in full the outstanding principal balance of our term loan (along with accrued and unpaid interest through the prepayment date) and \$21.0 million to repay the then-outstanding balance under our North American revolving credit facility. The remaining net proceeds of the Senior Notes were available for our general corporate purposes. 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. Prior to September 15, 2020, we may redeem some or all of the Senior Notes at a price equal to 100% of the principal amount thereof, plus a “make-whole” premium (as defined in the indenture governing the Senior Notes). On or after September 15, 2020, we may redeem the Senior Notes at redemption prices ranging from 102.813% of the principal amount, declining to 100% on or after September 15, 2023. In addition, on or before September 15, 2020, we may redeem up to 40% of the Senior Notes with the net proceeds of certain public or private equity offerings at 103.75% of the principal amount. 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, 2018 is stated net of unamortized debt issuance costs of \$6.3 million (December 31, 2017 - \$7.5 million).

Term loan – During 2016 and the first six months of 2017, we made our required quarterly term loan principal payments aggregating \$3.5 million and \$1.8 million, respectively, on our prior term loan indebtedness.

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Concurrent with the issuance of our Senior Notes, in September 2017, we voluntarily prepaid in full the outstanding \$338.6 million principal balance of such term loan (and such term loan facility was terminated). As a result of such prepayment, we recognized a loss on prepayment of debt aggregating \$7.1 million in the third quarter of 2017 consisting principally of the write-off of unamortized debt issuance costs and original issue discount associated with the term loan of \$2.7 million and \$.7 million, respectively, and \$3.3 million in expense related to the early termination of our interest rate swap contract discussed in Note 17. Funds for the aggregate prepayment were provided by the net proceeds from the Senior Notes discussed above.

The average interest rate on the term loan borrowings for the year-to-date period ended September 13, 2017 (the pay-off date) was 4.1%.

Revolving credit facilities

Revolving North American credit facility – We have a \$125 million revolving bank credit facility that, as amended, matures in January 2022. Borrowings under the revolving credit facility are available for our general corporate purposes. Available borrowings on this facility are based on formula-determined amounts of eligible trade receivables and inventories, as defined in the agreement, of certain of our North American subsidiaries less any outstanding letters of credit up to \$15 million issued under the facility (with revolving borrowings by our Canadian subsidiary limited to \$25 million). Any amounts outstanding under the revolving credit facility bear interest, at our option, at LIBOR 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 1.0%. The credit facility 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 which, among other things, restricts the borrowers' ability to incur additional debt, incur liens, pay dividends or merge or consolidate with, or sell or transfer all or substantially all of their assets to, another entity, contains other provisions and restrictive covenants customary in lending transactions of this type and under certain conditions requires the maintenance of a specified financial covenant (fixed charge coverage ratio, as defined) to be at least 1.0 to 1.0.

During 2017, we had gross borrowings and repayments of \$253.9 million. The average interest rate on outstanding borrowings for the year-to-date period ended September 13, 2017 when the outstanding balance was repaid was 4.8%. As discussed above, in September 2017 we used a portion of the net proceeds from the Senior Notes to repay our then-outstanding principal balance of \$21.0 million. We had no borrowings or repayments under this facility in 2018. At December 31, 2018, there were no outstanding borrowings under this facility and we had approximately \$101.3 million available for borrowing under this revolving facility.

Revolving European credit facility – Our operating subsidiaries in Germany, Belgium, Norway and Denmark have a €90 million secured revolving bank credit facility that, as amended, matures in September 2022. Outstanding borrowings bear interest at the Euro Interbank Offered Rate (EURIBOR) plus 1.60% per annum. The facility is collateralized by the accounts receivable and inventories of the borrowers, plus a limited pledge of all of the other assets of the Belgian borrower. The facility contains certain restrictive covenants that, among other things, restricts the ability of the borrowers to incur debt, incur liens, pay dividends or merge or consolidate with, or sell or transfer all or substantially all of the assets to, another entity, and requires the maintenance of certain financial ratios. In addition, the credit facility contains customary cross-default provisions with respect to other debt and obligations of the borrowers, KII and its other subsidiaries.

We had no borrowings or repayments under this facility during 2017 and 2018 and at December 31, 2018, there were no outstanding borrowings under this facility. Our European revolving credit facility requires the maintenance of certain financial ratios, and one of such requirements is based on the ratio of net debt to last twelve months earnings before income tax, interest, depreciation and amortization expense (EBITDA) of the borrowers. Based upon the borrowers' last twelve months EBITDA as of December 31, 2018 and the net debt to EBITDA financial test, the full €90 million amount of this facility (\$103.2 million) was available for borrowing at December 31, 2018.

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Aggregate maturities and other – Aggregate maturities of debt at December 31, 2018 are presented in the table below.

Year ending December 31,	Amount (In millions)
2019	\$ 1.5
2020	1.5
2021	.6
2022	.6
2023	-
2024 and thereafter	458.7
Gross maturities	462.9
Less debt issuance costs	6.3
Total	\$ 456.6

We are in compliance with all of our debt covenants at December 31, 2018.

Note 9 – Accounts payable and accrued liabilities:

	December 31,	
	2017	2018
	(In millions)	
Accounts payable	\$ 107.9	\$ 103.2
Accrued sales discounts and rebates	11.7	29.7
Employee benefits	27.0	27.9
Other	43.0	35.0
Total	\$ 189.6	\$ 195.8

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 \$2.8 million in 2016, \$2.7 million in 2017 and \$3.3 million in 2018.

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 accrued any additional benefits after that date. The benefits under our 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 2019. Benefit payments to plan participants out of plan assets are expected to be the equivalent of:

Years ending December 31,	Amount (In millions)
2019	\$ 23.2
2020	24.4
2021	24.5
2022	25.7
2023	25.6
Next 5 years	149.0

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

	December 31, 2017 2018 (In millions)	
Change in projected benefit obligations (PBO):		
Benefit obligations at beginning of the year	\$594.1	\$681.9
Service cost	11.4	11.6
Interest cost	13.2	13.5
Participant contributions	1.5	1.6
Actuarial losses	9.9	5.8
Change in currency exchange rates	72.6	(33.7)
Benefits paid	(20.8)	(22.0)
Benefit obligations at end of the year	681.9	658.7
Change in plan assets:		
Fair value of plan assets at beginning of the year	371.5	433.3
Actual return on plan assets	23.1	(5.6)
Employer contributions	15.9	16.3
Participant contributions	1.5	1.6
Change in currency exchange rates	42.1	(23.3)
Benefits paid	(20.8)	(22.0)
Fair value of plan assets at end of year	433.3	400.3
Funded status	\$(248.6)	\$(258.4)
Amounts recognized in the balance sheet:		
Noncurrent pension asset	\$1.6	\$.8
Noncurrent accrued pension costs	(250.2)	(259.2)
Total	\$(248.6)	\$(258.4)
Amounts recognized in accumulated other comprehensive loss:		
Actuarial losses	\$240.2	\$250.3
Prior service cost	1.4	1.2

Total	\$241.6	\$251.5
Accumulated benefit obligations (ABO)	\$655.4	\$633.5

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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 2016, 2017 and 2018 were recognized as components of our accumulated other comprehensive loss at December 31, 2015, 2016 and 2017, respectively, net of deferred income taxes.

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Net periodic pension cost (income):			
Service cost benefits	\$9.9	\$11.4	\$11.6
Interest cost on PBO	14.7	13.2	13.5
Expected return on plan assets	(14.4)	(9.2)	(12.0)
Recognized actuarial losses	11.3	13.0	13.1
Amortization of prior service cost	.2	.2	.2
Total	\$21.7	\$28.6	\$26.4

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,	
	2017	2018
	(In millions)	
Plans for which the ABO exceeds plan assets:		
PBO	\$625.1	\$605.0
ABO	603.8	585.0
Fair value of plan assets	375.0	346.3

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, 2017 and 2018 are presented in the table below.

	December 31,	
Rate	2017	2018
Discount rate	2.1%	2.1%
Increase in future compensation levels	2.6%	2.6%

The weighted-average rate assumptions used in determining the net periodic pension cost for our non-U.S. defined benefit pension plans for 2016, 2017 and 2018 are presented in the table below.

	Years ended December 31,		
Rate	2016	2017	2018

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Discount rate	2.6%	2.1%	2.1%
Increase in future compensation levels	2.9%	2.6%	2.6%
Long-term return on plan assets	3.9%	2.4%	2.9%

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

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

	December 31,	
	2017	2018
	(In millions)	
Change in PBO:		
Benefit obligations at beginning of the year	\$17.8	\$18.2
Interest cost	.7	.6
Actuarial losses (gains)	.7	(.9)
Benefits paid	(1.0)	(1.0)
Benefit obligations at end of the year	18.2	16.9
Change in plan assets:		
Fair value of plan assets at beginning of the year	13.6	14.1
Actual return on plan assets	1.2	(.8)
Employer contributions	.3	.8
Benefits paid	(1.0)	(1.0)
Fair value of plan assets at end of year	14.1	13.1
Funded status	\$(4.1)	\$(3.8)
Amounts recognized in the balance sheet:		
Accrued pension costs:		
Current	\$(.1)	\$(.1)
Noncurrent	(4.0)	(3.7)
Total	\$(4.1)	\$(3.8)
Amounts recognized in accumulated other comprehensive		
loss - actuarial losses	\$10.9	\$11.2
ABO	\$18.2	\$16.9

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 2016, 2017 and 2018 were recognized as components of our accumulated other comprehensive loss at December 31, 2015, 2016 and 2017 respectively, net of deferred income taxes.

	Years ended		
	December 31,		
	2016	2017	2018
	(In millions)		
Net periodic pension cost (income):			
Interest cost on PBO	\$.8	\$.7	\$.6
Expected return on plan assets	(1.0)	(1.0)	(1.0)

Recognized actuarial losses	.5	.6	.6
Total	\$.3	\$.3	\$.2

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, 2017 and 2018 are 3.5% and 4.1%, 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.

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The weighted-average rate assumptions used in determining the net periodic pension cost for our U.S. defined benefit pension plan for 2016, 2017 and 2018 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,		
	2016	2017	2018
Discount rate	4.1%	3.9%	3.5%
Long-term return on plan assets	7.5%	7.5%	7.5%

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

The amounts shown in the tables above for actuarial losses and prior service cost at December 31, 2017 and 2018 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 2017 and 2018. We expect approximately \$14.0 million and \$.2 million of the unrecognized actuarial losses and prior service costs, respectively, will be recognized as components of our consolidated net periodic defined benefit pension cost in 2019.

The table below details the changes in our consolidated other comprehensive income (loss) during 2016, 2017 and 2018.

	Years ended December 31,		
	2016	2017	2018
Changes in plan assets and benefit obligations			
recognized in other comprehensive income (loss):			
Current year:			
Net actuarial gain (loss)	\$(38.0)	\$3.5	\$(24.3)
Amortization of unrecognized:			
Net actuarial losses	11.8	13.6	13.7
Prior service cost	.2	.2	.2
Total	\$(26.0)	\$17.3	\$(10.4)

At December 31, 2017, substantially all of the assets attributable to our U.S. plan were invested in the Combined Master Retirement Trust (CMRT), a collective investment trust sponsored by Contran to permit the collective investment by certain master trusts that fund certain employee benefit plans sponsored by Contran and certain of its affiliates, including us. For 2016, 2017 and 2018, the long-term rate of return assumption for our U.S. plan assets was 7.5%, based on the long-term asset mix of the assets of the CMRT and the expected long-term rates of return for such

asset components as well as advice from Contran's actuaries. During 2018, Contran and the other employer-sponsors (including us) implemented a restructuring of the CMRT, in which a substantial part of each plan's units in the CMRT were redeemed in exchange for a pro-rata portion of a substantial part of the CMRT's investments. Following such restructuring, the plans held directly in the aggregate the investments previously held directly by the CMRT which had been exchanged for CMRT units as part of the restructuring. Certain investments held directly by the CMRT were not part of such restructuring and remain investments of the CMRT. Such restructuring was implemented in part so each plan could more easily align the composition of their plan asset portfolio with the plan's benefit obligations.

The CMRT unit value is determined semi-monthly, and prior to the 2018 restructuring, the plans had the ability to redeem all or any portion of their investment in the CMRT at any time based on the most recent semi-monthly valuation. However, the plans do not have the right to individual assets held by the CMRT and the CMRT has the sole discretion in determining how to meet any redemption request. For purposes of our plan asset

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disclosure, we consider the investment in the CMRT at December 31, 2017 as a Level 2 input because (i) the CMRT value is established semi-monthly and the plans have the right to redeem their investment in the CMRT, in part or in whole, at any time based on the most recent value and (ii) observable inputs from Level 1 or Level 2 (or assets not subject to classification in the fair value hierarchy) were used to value approximately 93% of the assets of the CMRT at December 31, 2017 as noted below. CMRT assets not subject to classification in the fair value hierarchy consist principally of certain investments measured at net asset value (NAV) per share in accordance with ASC 820-10. The aggregate fair value of all of the CMRT assets at December 31, 2017, including funds of Contran and its other affiliates that also invest in the CMRT, and supplemental asset mix details of the CMRT are as follows:

	December 31, 2017 (In millions)	
CMRT asset value	\$672.4	
CMRT assets comprised of:		
Assets not subject to fair value hierarchy	31	%
Assets subject to fair value hierarchy:		
Level 1	54	
Level 2	8	
Level 3	7	
	100	%
CMRT asset mix:		
Domestic equities, principally publicly traded	33	%
International equities, principally publicly traded	25	
Fixed income securities, principally publicly traded	31	
Privately managed limited partnerships	4	
Hedge funds	5	
Other, primarily cash	2	
	100	%

The assets which remain in the CMRT are principally common stocks and limited partnerships which are not publicly traded, most of which are categorized within Level 3 of the fair value hierarchy. As monetizing events occur for these investments, we and the other plans which hold units in the CMRT will redeem a portion of our CMRT units for the cash generated from such events. For purposes of our plan asset disclosure, we consider the investment in the CMRT at December 31, 2018 as a Level 3 input because (i) most of the remaining assets in the CMRT are categorized within Level 3 of the fair value hierarchy, and (ii) we do not expect to be able to redeem our remaining CMRT units until monetizing events occur with respect to the remaining CMRT assets.

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 input 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 plan. These periodic reports are subject to audit by the German pension regulator.

In Canada, we currently have a plan asset target allocation of 20-30% to equity securities and 70-80% to fixed income securities. We expect the long-term rate of return for such investments to average

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approximately 125 basis points above the applicable 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 11% to equity securities, 79% to fixed income securities, 7% 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%, 3%, 5% and 8%, respectively. The majority of Norwegian plan assets are Level 1 inputs because they are traded in active markets; however approximately 10% 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 40% to equity securities, 45% to fixed income securities, and the remainder is allocated to multi-asset strategies and the CMRT. The expected long-term rate of return for such investments is approximately 9%, 5% and 3%, respectively (before plan administrative expenses). The majority of U.S. plan assets are Level 1 inputs because they are traded in active markets, approximately 29% of our U.S. plan assets are invested in funds that are valued at NAV and not subject to classification in the fair value hierarchy, and approximately 6% are invested in the CMRT which as noted above is a Level 3 input.

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 consist of marketable securities which are Level 1 inputs because they trade in active markets.

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, 2017 and 2018 is shown in the table below.

	Fair Value Measurements at December 31, 2017			
	Total (In millions)	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Germany	\$257.9	\$ -	\$ -	\$ 257.9
Canada:				
Local currency equities	8.4	8.4	-	-
Non local currency equities	16.4	16.4	-	-
Local currency fixed income	81.8	81.8	-	-
Cash and other	.3	.3	-	-

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Norway:

Local currency equities	1.8	1.8	-	-
Non local currency equities	4.6	4.6	-	-
Local currency fixed income	21.0	21.0	-	-
Non local currency fixed income	6.8	6.8	-	-
Real estate	4.7	-	-	4.7
Cash and other	15.4	14.5	-	.9
U.S.				
CMRT	14.1	-	14.1	-
Other	14.2	4.1	-	10.1
Total	\$447.4	\$ 159.7	\$ 14.1	\$ 273.6

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Fair Value Measurements at December 31, 2018					
	Quoted prices in active markets (Level 1) (In millions)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Assets measured at NAV	
	Total				
Germany	\$241.5	\$-	\$ -	\$ 241.5	\$ -
Canada:					
Local currency equities	6.5	6.5	-	-	-
Non local currency equities	13.3	13.3	-	-	-
Local currency fixed income	74.1	74.1	-	-	-
Cash and other	.5	.5	-	-	-
Norway:					
Local currency equities	1.7	1.7	-	-	-
Non local currency equities	4.3	4.3	-	-	-
Local currency fixed income	20.4	14.9	5.5	-	-
Non local currency fixed income	6.1	6.1	-	-	-
Real estate	4.5	-	-	4.5	-
Cash and other	13.5	12.7	-	.8	-
U.S.					
Equities	4.9	1.5	-	-	3.4
Fixed income	6.0	6.0	-	-	-
Cash and other	1.5	1.1	-	-	.4
CMRT	.7	-	-	.7	-
Other	13.9	3.4	-	10.5	-
Total	\$413.4	\$ 146.1	\$ 5.5	\$ 258.0	\$ 3.8

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

	December 31, 2017 2018 (In millions)	
Fair value at beginning of year	\$230.5	\$273.6
Gain (loss) on assets held at end of year	11.0	(4.6)
Gain on assets sold during the year	.2	-
Assets purchased	13.4	14.1

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Assets sold	(13.8)	(14.5)
Transfers in	-	.7
Currency exchange rate fluctuations	32.3	(11.3)
Fair value at end of year	\$273.6	\$258.0

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Note 11 – Other noncurrent liabilities:

	December 31, 2017 2018 (In millions)	
Employee benefits	\$8.5	\$7.3
Accrued postretirement benefits	7.7	7.4
Other	13.0	14.1
Total	\$29.2	\$28.8

Note 12 – Other operating income (expense), net:

Other operating income (expense), net in 2016 includes income of \$3.4 million, recognized in the first and second quarters, related to cash received from settlement of a business interruption insurance claim arising in 2014 and income of \$.9 million recognized in the fourth quarter of 2016 related to cash received from settlement of another business interruption insurance claim arising in 2015. No additional material amounts are expected to be received with respect to such insurance claims.

Note 13 – Income taxes:

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Pre-tax income:			
U.S.	\$11.5	\$38.6	\$32.8
Non-U.S.	49.7	267.1	261.0
Total	\$61.2	\$305.7	\$293.8
Expected tax expense, at U.S. federal statutory income			
tax rate of 35% in 2016 and 2017 and 21% in 2018	\$21.4	\$107.0	\$61.7
Non-U.S. tax rates	(4.3)	(13.2)	21.0
Incremental net tax expense (benefit) on earnings and losses			
of U.S. and non-U.S. companies	2.2	(8.4)	1.3
Valuation allowance	(2.2)	(205.4)	-
Transition Tax	-	76.2	(1.7)
Global intangible low-tax income, net	-	-	3.7
Tax rate changes	(.1)	(.2)	(.2)
U.S. - Canada APA	(3.4)	-	-
Canada - Germany APA	-	-	(1.4)
Adjustment to the reserve for uncertain tax positions, net	2.4	(8.6)	2.1
Nondeductible expenses	1.5	1.7	1.6
U.S. state income taxes and other, net	.4	2.1	.7
Income tax expense (benefit)	\$17.9	\$(48.8)	\$88.8
Components of income tax expense (benefit):			
Current payable:			
U.S. federal and state	\$-	\$3.0	\$12.0
Non-U.S.	9.5	37.5	51.1
	9.5	40.5	63.1
Noncurrent payable - U.S. federal	-	70.1	(1.6)
Deferred income taxes (benefit):			
U.S. federal and state	4.3	(13.7)	(1.8)
Non-U.S.	4.1	(145.7)	29.1
	8.4	(159.4)	27.3
Income tax expense (benefit)	\$17.9	\$(48.8)	\$88.8
Comprehensive provision for income taxes (benefit) allocable to:			
Net income	\$17.9	\$(48.8)	\$88.8

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Other comprehensive income (loss):			
Currency translation	-	19.8	-
Pension plans	(.8)	5.6	(3.6)
OPEB plans	(.2)	(.2)	(.2)
Marketable securities	1.3	1.6	-
Interest rate swap	.2	1.1	-
Total	\$18.4	\$(20.9)	\$85.0

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The amount shown in the above 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 of 35% in 2016 and 2017 and 21% in 2018. The amount shown on such table for incremental net tax expense 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 change in the aggregate amount of undistributed earnings of our Canadian subsidiary and, beginning in 2018, deferred income taxes (or deferred income tax benefits) associated with the current-year earnings of all of our non-U.S. subsidiaries (the undistributed earnings of our European subsidiaries were subject to a permanent reinvestment plan until December 31, 2017) 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, 2017 and 2018 are summarized in the following table.

	December 31, 2017		2018	
	Assets	Liabilities	Assets	Liabilities
	(In millions)			
Tax effect of temporary differences related to:				
Inventories	\$3.0	\$ (.6)	\$4.3	\$ (3.1)
Property and equipment	-	(57.2)	-	(56.9)
Accrued OPEB costs	2.2	-	2.1	-
Accrued pension costs	69.1	-	73.7	-
Other accrued liabilities and deductible differences	10.2	-	10.4	-
Other taxable differences	-	(2.6)	-	(2.4)
Tax on unremitted earnings of non-U.S. subsidiaries	-	(9.5)	-	(11.3)
Tax loss and tax credit carryforwards	116.2	-	86.6	-
Valuation allowance	(2.9)	-	(2.9)	-
Adjusted gross deferred tax assets (liabilities)	197.8	(69.9)	174.2	(73.7)
Netting by tax jurisdiction	(58.6)	58.6	(52.2)	52.2
Net noncurrent deferred tax asset (liability)	\$139.2	\$ (11.3)	\$122.0	\$ (21.5)

We have substantial net operating loss (NOL) carryforwards in Germany (the equivalent of \$541 million for German corporate tax purposes at December 31, 2018) and in Belgium (the equivalent of \$16 million for Belgian corporate tax purposes at December 31, 2018), all of which have an indefinite carryforward period. As a result, we have net deferred income tax assets with respect to these two jurisdictions, primarily related to these NOL carryforwards. The German corporate tax is similar to the U.S. federal income tax, and the German trade tax is similar to the U.S. state income tax (our German trade tax NOLs were fully utilized as of December 31, 2018). Prior to 2017, we concluded that we were required to recognize a non-cash deferred income tax asset valuation allowance under the more-likely-than-not recognition criteria with respect to our German and Belgian net deferred income tax assets. At December 31, 2016 such valuation allowance aggregated \$173 million (\$153 million with respect to Germany and \$20

million with respect to Belgium). During the first six months of 2017, we recognized an aggregate non-cash deferred income tax benefit of \$12.7 million as a result of a net decrease in such deferred income tax asset valuation allowance, due to utilizing a portion of both the German and Belgian NOL during the period. At June 30, 2017, we concluded we had sufficient positive evidence under the more-likely-than-not recognition criteria to support reversal of the entire valuation allowance related to our German and Belgian operations. In accordance with the ASC 740-270 guidance regarding accounting for income taxes at interim dates, the amount of the valuation allowance reversed at June 30, 2017 (\$149.9 million, of which \$141.9 million related to Germany and \$8.0 million related to Belgium) associated with our change in judgment at that date regarding the realizability of the related deferred income tax asset as it relates to future years (i.e. 2018 and after). A change in

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judgment regarding the realizability of deferred tax assets as it relates to the current year is considered in determining the estimated annual effective tax rate for the year and is recognized throughout the year, including interim periods subsequent to the date of the change in judgment. Accordingly, our income tax benefit in calendar year 2017 includes an aggregate non-cash deferred income tax benefit of \$186.7 million associated with the reversal of the German and Belgian valuation allowance, comprised of \$12.7 million recognized in the first half of 2017 (noted above) associated with the utilization of a portion of both the German and Belgian NOLs during such period, \$149.9 million related to the portion of the valuation allowance reversed as of June 30, 2017 and \$24.1 million recognized in the second half of 2017 associated with the utilization of a portion of both the German and Belgian NOLs during such period. Our deferred income tax asset valuation allowance increased \$13.7 million in 2017 as a result of changes in currency exchange rates, which increase was recognized as part of other comprehensive income (loss).

On December 22, 2017, the 2017 Tax Act was enacted into law. This new tax legislation, among other changes, (i) reduced the U.S. Federal corporate income tax rate from 35% to 21% effective January 1, 2018; (ii) implemented a territorial tax system and imposed a one-time repatriation tax (Transition Tax) on the deemed repatriation of the post-1986 undistributed earnings of non-U.S. subsidiaries accumulated up through December 31, 2017, regardless of whether such earnings are repatriated; (iii) eliminated U.S. tax on future non-U.S. earnings (subject to certain exceptions); (iv) eliminated the domestic production activities deduction beginning in 2018; (v) eliminated the net operating loss carryback and provides for an indefinite carryforward period subject to an 80% annual usage limitation; (vi) allows for the expensing of certain capital expenditures; (vii) imposed a tax on global intangible low-tax income (GILTI) beginning in 2018; (viii) imposed a base erosion anti-abuse tax (BEAT) beginning in 2018; and (ix) amended the rules limiting the deduction for business interest expense beginning in 2018. Following the enactment of the 2017 Tax Act, the Securities and Exchange Commission issued Staff Accounting Bulletin (SAB) 118 to provide guidance on the accounting and reporting impacts of the 2017 Tax Act. SAB 118 states that companies should account for changes related to the 2017 Tax Act in the period of enactment if all information is available and the accounting can be completed. In situations where companies do not have enough information to complete the accounting in the period of enactment, a company must either 1) record an estimated provisional amount if the impact of the change can be reasonably estimated; or 2) continue to apply the accounting guidance that was in effect immediately prior to the 2017 Tax Act if the impact of the change cannot be reasonably estimated. If estimated provisional amounts are recorded, SAB 118 provides a measurement period of no longer than one year during which companies should adjust those amounts as additional information becomes available in the reporting period within the measurement period in which such adjustment is determined.

Under GAAP, we were required to revalue our net deferred tax asset associated with our U.S. net deductible temporary differences in the period in which the new tax legislation is enacted based on deferred tax balances as of the enactment date, to reflect the effect of such reduction in the corporate income tax rate. Our temporary differences as of December 31, 2017 were not materially different from our temporary differences as of the enactment date, accordingly revaluation of our net deductible temporary differences was based on our net deferred tax asset as of December 31, 2017. Such revaluation was recognized in continuing operations and was not material to us.

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 Transition Tax provisions imposing a one-time repatriation tax on post-1986 undistributed earnings, we recognized a provisional current income tax expense of \$76.2 million in the fourth quarter of 2017. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information available at that date. We elected to pay such tax over an eight year period beginning in 2018,

including approximately \$6.1 million which was paid in April 2018 (for the 2017 tax year) and \$5.8 million which was paid in 2018 (for the 2018 tax year). During the third quarter of 2018, in conjunction with finalizing our federal income tax return and based on additional information that became available (including proposed regulations issued by the IRS in August 2018 with respect to the Transition Tax), we recognized a provisional income tax benefit of \$1.7 million which amount is recorded as a measurement-period adjustment, reducing the provisional income tax expense of \$76.2 million recognized in the fourth quarter of 2017. As a result, at December 31, 2018, taking into account the prior Transition Tax installments payments of \$11.9 million (noted above), the balance of our unpaid Transition Tax aggregates \$62.6 million, which will be paid in quarterly installments over the remainder of the eight year period. Of such \$62.6 million, \$56.6 million is recorded

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as a noncurrent payable to affiliate (income taxes payable to Valhi) classified as a noncurrent liability in our Consolidated Balance Sheet at December 31, 2018, and \$6.0 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 2019 Transition Tax installment due within the next twelve months). We have completed our analysis of the Transition Tax provisions within the prescribed measurement period ending December 22, 2018 pursuant to the guidance under SAB 118.

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). As a result of the implementation of a territorial tax system under the 2017 Tax Act, effective January 1, 2018, and the Transition Tax which in effect taxes the post-1986 undistributed earnings of our non-U.S. subsidiaries accumulated up through December 31, 2017, we determined effective December 31, 2017 that all of the post-1986 undistributed earnings of our European subsidiaries are not permanently reinvested. Accordingly, in the fourth quarter of 2017 we recognized an aggregate provisional non-cash deferred income tax expense of \$4.5 million based on our reasonable estimates of the U.S. state and non-U.S. income tax and withholding tax liability attributable to all of such previously-considered permanently reinvested undistributed earnings through December 31, 2017. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information currently available. We have not made any measurement-period adjustments to the provisional amounts recorded at December 31, 2017 for this item during 2018 because no new information became available during the period that required an adjustment. However, we recorded a non-cash deferred income tax expense of \$2.4 million for the U.S. state and non-U.S. income tax and withholding tax liability attributable to the 2018 undistributed earnings of our non-U.S. subsidiaries in 2018, including withholding taxes related to the undistributed earnings of our Canadian subsidiary. We have completed our analysis as it relates to the implementation of a territorial tax system under the 2017 Tax Act within the prescribed measurement period ending December 22, 2018 pursuant to the guidance under SAB 118.

Under U.S. GAAP, as it relates to the new GILTI tax rules, we are allowed to make an accounting policy choice of either (1) treating taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (the “period cost method”) or (2) factoring such amounts into the measurement of our deferred taxes (the “deferred 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 did not record any adjustment related to GILTI during the first nine months of 2018 based on our determination that the impact was not material, and based on the guidance available to us at the time. During the fourth quarter of 2018, and taking into consideration proposed regulations issued by the IRS in November 2018 with respect to various related non-U.S. tax credit provisions, we recognized a current cash income tax expense of \$3.7 million for GILTI. In conjunction with the issuance of the proposed regulations, taking into consideration the complexities related to an election to recognize deferred taxes for basis differences that are expected to have a GILTI impact in future years, we have concluded that the appropriate accounting policy election for Kronos is to record GILTI tax as a current-period expense when incurred under the period cost method. As such, we have completed our policy election within the prescribed measurement period ended December 22, 2018 pursuant to the guidance under SAB 118. Similarly, we have evaluated the tax impact of BEAT, taking into consideration proposed regulations issued by the IRS in December 2018 with respect to BEAT, and determined that the tax imposed under BEAT has no material impact to us as we have historically not entered into international payments between related parties that are unrelated to cost of goods sold. Our determinations under the GILTI, BEAT and related U.S. tax credit provisions are based on the relevant statutes and guidance provided under the proposed regulations. Given the complexity of the international provisions, it is possible that final regulations

could differ from the proposed regulations and materially impact our determinations with respect to such items. Any material change will be recognized in the period in which the final regulations are published.

Certain U.S. deferred tax attributes of one of our non-U.S. subsidiaries, which subsidiary is treated as a dual resident for U.S. income tax purposes, were subject to various limitations. As a result, we had previously concluded that a deferred income tax asset valuation allowance was required to be recognized with respect to such subsidiary's U.S. net deferred income tax asset because such assets did not meet the more-likely-than-not recognition criteria primarily due to (i) the various limitations regarding use of such attributes due to the dual residency; (ii) the dual resident subsidiary had a history of losses and absent distributions from our non-U.S.

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subsidiaries, which were previously not determinable, such subsidiary was expected to continue to generate losses; and (iii) a limited NOL carryforward period for U.S. tax purposes. Because we had concluded the likelihood of realization of such subsidiary's net deferred income tax asset was remote, we had not previously disclosed such valuation allowance or the associated amount of the subsidiary's net deferred income tax assets (exclusive of such valuation allowance). Primarily due to changes enacted under the 2017 Tax Act, we have concluded we now have sufficient positive evidence under the more-likely-than-not recognition criteria to support reversal of the entire valuation allowance related to such subsidiary's net deferred income tax asset, which evidence included, among other things, (i) the inclusion under Transition Tax provisions of significant earnings for U.S. income tax purposes which significantly and positively impacts the ability of such deferred tax attributes to be utilized by us; (ii) the indefinite carryforward period for U.S. net operating losses incurred after December 31, 2017; (iii) an expectation of continued future profitability for our U.S. operations; and (iv) a positive taxable income basket for U.S. tax purposes in excess of the U.S. deferred tax asset related to the U.S. attributes of such subsidiary. Accordingly, in the fourth quarter of 2017 we recognized an \$18.7 million non-cash deferred income tax benefit as a result of the reversal of such valuation allowance.

None of our U.S. and non-U.S. tax returns are currently under examination. As a result of prior audits in certain jurisdictions, which are now settled, in 2008 we filed Advance Pricing Agreement Requests with the tax authorities in the U.S., Canada and Germany. These requests have been under review with the respective tax authorities since 2008 and prior to 2016, it was uncertain whether an agreement would be reached between the tax authorities and whether we would agree to execute and finalize such agreements.

During 2016, Contran, as the ultimate parent of our U.S. Consolidated income tax group, executed and finalized an Advance Pricing Agreement with the U.S. Internal Revenue Service and our Canadian subsidiary executed and finalized an Advance Pricing Agreement with the Competent Authority for Canada (collectively, the "U.S.-Canada APA") effective for tax years 2005 - 2015. Pursuant to the terms of the U.S.-Canada APA, the U.S. and Canadian tax authorities agreed to certain prior year changes to taxable income of our U.S. and Canadian subsidiaries. As a result of such agreed-upon changes, we recognized a \$3.4 million current U.S. income tax benefit in 2016. In addition, our Canadian subsidiary incurred a cash income tax payment of approximately CAD \$3 million (USD \$2.3 million) related to the U.S.-Canada APA, but such payment was fully offset by previously provided accruals, and such income tax was paid in the third quarter of 2017.

During the third quarter of 2017, our Canadian subsidiary executed and finalized an Advance Pricing Agreement with the Competent Authority for Canada (the "Canada-Germany APA") effective for tax years 2005 - 2017. Pursuant to the terms of the Canada-Germany APA, the Canadian and German tax authorities agreed to certain prior year changes to taxable income of our Canadian and German subsidiaries. As a result of such agreed-upon changes, we reversed a significant portion of our reserve for uncertain tax positions and recognized a non-cash income tax benefit of \$8.6 million related to such reversal (\$8.1 million recognized in the third quarter of 2017). In addition, we recognized a \$2.6 million non-cash income tax benefit related to an increase in our German NOLs and a \$.6 million German cash tax refund related to the Canada-Germany APA in the third quarter of 2017.

During the first quarter of 2018, our German subsidiary executed and finalized the related Advance Pricing Agreement with the Competent Authority for Germany (the "Germany-Canada APA") effective for tax years 2005 - 2017. In the first quarter of 2018, we recognized a net \$1.4 million non-cash income tax benefit related to an APA tax settlement payment between our German and Canadian subsidiaries.

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.

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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 2016, 2017 and 2018 was not material and at December 31, 2017 and 2018, we had no accrual for interest and penalties for our uncertain tax positions.

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 2016, 2017 and 2018:

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Changes in unrecognized tax benefits:			
Unrecognized tax benefits at beginning of year	\$9.7	\$9.9	\$2.1
Net increase (decrease):			
Tax positions taken in prior periods	(.1)	(6.3)	1.4
Tax positions taken in current period	2.5	.2	.7
Lapse due to applicable statute of limitations	(.2)	(.1)	-
Settlements with taxing authorities	(2.3)	(2.3)	-
Change in currency exchange rates	.3	.7	(.1)
Unrecognized tax benefits at end of year	\$9.9	\$2.1	\$4.1

Our uncertain tax position at December 31, 2018 is classified as a component of our noncurrent deferred tax asset. If our uncertain tax position at December 31, 2018 was recognized, a benefit of \$4.1 million would affect our effective income tax rate. We currently estimate that our unrecognized tax benefits will not change materially during the next twelve months.

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 2015 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 2014 for Germany, 2015 for Belgium, 2013 for Canada and 2009 for Norway.

Note 14 – Stockholders' equity:

Long-term incentive compensation plan – Prior to 2016, our board of directors adopted a plan that provides for the award of stock to our board of directors, and up to a maximum of 200,000 shares can be awarded under this plan. We awarded 13,500 shares in 2016, 8,000 shares in 2017 and 5,600 shares in 2018 under this plan. 149,900 shares are available for future award at December 31, 2018.

Stock repurchase program – Prior to 2016, 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 would use cash on hand or other sources of liquidity to acquire the shares. Repurchased shares will be added to our treasury and cancelled. At December 31, 2018, 1,951,000 shares are available for repurchase under this authorization.

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Accumulated other comprehensive loss – Changes in accumulated other comprehensive loss for 2016, 2017 and 2018 are presented in the table below.

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Accumulated other comprehensive loss, net of tax:			
Currency translation:			
Balance at beginning of year	\$(252.0)	\$(269.6)	\$(211.9)
Other comprehensive income (loss)	(17.6)	57.7	(33.1)
Balance at end of year	\$(269.6)	\$(211.9)	\$(245.0)
Defined benefit pension plans:			
Balance at beginning of year	\$(159.2)	\$(184.8)	\$(172.8)
Other comprehensive income (loss):			
Amortization of prior service cost and net			
losses included in net periodic pension cost	8.5	9.8	10.4
Net actuarial gain (loss) arising during year	(34.1)	2.2	(17.6)
Balance at end of year	\$(184.8)	\$(172.8)	\$(180.0)
OPEB plans:			
Balance at beginning of year	\$2.1	\$1.8	\$1.2
Other comprehensive (income) loss:			
Amortization of prior service credit and net			
losses included in net periodic OPEB cost	(.4)	(.3)	(.3)
Net actuarial gain (loss) arising during year	.1	(.3)	(.2)
Balance at end of year	\$1.8	\$1.2	\$.7
Marketable securities:			
Balance at beginning of year	\$(.6)	\$1.8	\$4.8
Change in accounting principle	-	-	(4.8)
Balance at beginning of period, as adjusted	(.6)	1.8	-
Other comprehensive income -			
Unrealized gains arising during the year	2.4	3.0	-
Balance at end of year	\$1.8	\$4.8	\$-
Interest rate swap:			
Balance at beginning of year	\$(2.3)	\$(2.0)	\$-
Other comprehensive income (loss):			
Unrealized losses arising during the year	(2.0)	(1.5)	-
Less reclassification adjustment			
for amounts included in earnings	2.3	3.5	-

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Balance at end of year	\$ (2.0)	\$ -	\$ -
Total accumulated other comprehensive loss:			
Balance at beginning of year	\$ (412.0)	\$ (452.8)	\$ (378.7)
Change in accounting principle	-	-	(4.8)
Balance at beginning of period, as adjusted	(412.0)	(452.8)	(383.5)
Other comprehensive income (loss)	(40.8)	74.1	(40.8)
Balance at end of year	\$ (452.8)	\$ (378.7)	\$ (424.3)

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See Note 6 for further discussion on our marketable securities, Note 10 for amounts related to our defined benefit pension plans, Note 11 for our OPEB plans and Note 17 for discussion on our interest rate swap contract.

Note 15 – Related party transactions:

We may be deemed to be controlled by Ms. Simmons and Ms. Connelly. 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, 2017 2018 (In millions)	
Current receivables from affiliates:		
LPC	\$8.9	\$10.2
Income taxes receivable from Valhi	15.3	-
Other	3.2	2.8
	\$27.4	\$13.0
Noncurrent note receivable from Valhi	\$13.6	\$-
Current payables to affiliates:		
LPC	\$16.2	\$16.7
Income taxes payable to Valhi	-	10.4
	\$16.2	\$27.1
Noncurrent payable to affiliate - income taxes		
Income taxes payable to Valhi (See Note 13)	\$70.1	\$56.6

Amounts payable to LPC are generally for the purchase of TiO₂, while amounts receivable from LPC are generally from the sale of TiO₂ feedstock. See Note 5. Purchases of TiO₂ from LPC were \$157.5 million in each of 2016 and 2017 and \$165.9 million in 2018. Sales of feedstock to LPC were \$68.8 million in 2016, \$79.4 million in 2017 and \$66.9 million in 2018.

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.

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In this regard, prior to 2016 we entered into an unsecured revolving demand promissory note with Valhi whereby, as amended, we agreed to loan Valhi up to \$60 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, 2020. The amount of our outstanding loans to Valhi at any time is at our discretion. At December 31, 2017, we had \$13.6 million of outstanding loans to Valhi and at December 31, 2018, we had no outstanding loans to Valhi under this promissory note.

Interest income (including unused commitment fees) on our loan to Valhi was \$.4 million in each of 2016 and 2017 and \$.3 million in 2018.

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 charges are based upon estimates of the time devoted by the employees of the provider of the services to the affairs of the recipient, and the compensation and associated expenses of 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. The net ISA fee charged to us is included in selling, general and administrative expense and corporate expense and was \$15.2 million in 2016, \$16.3 million in 2017 and \$21.1 million in 2018.

Contran and certain of its subsidiaries and affiliates, including us, purchase certain of their insurance policies as a group, with the costs of the jointly-owned policies being apportioned among the participating companies. Tall Pines Insurance Company and EWI RE, Inc., each subsidiaries of Valhi, provide for or broker certain insurance policies for Contran and certain of its subsidiaries and affiliates, including ourselves. Tall Pines purchases reinsurance from third-party insurance carriers with an A.M. Best Company rating of generally at least A-(excellent) for substantially all of the risks it underwrites. Consistent with insurance industry practices, Tall Pines and EWI receive commissions from insurance and reinsurance underwriters and/or assess fees for the policies that they provide or broker. The aggregate premiums paid to Tall Pines and EWI by us and our joint venture were \$9.2 million in 2016, \$9.3 million in 2017 and \$10.4 million in 2018. These amounts principally represent payments for insurance premiums, which include premiums or fees paid to Tall Pines or fees paid to EWI. These amounts also include payments to insurers or reinsurers through EWI for the reimbursement of claims within our applicable deductible or retention ranges that such insurers or 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 with Tall Pines and EWI will continue in 2019.

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 amongst 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 recovery program that Contran provides from a data recovery center that it established. Pursuant to the program, Contran and certain of its subsidiaries, including us, as a group share information technology data recovery services. The program apportions its costs among the participating companies. We paid Contran \$.1 million in each of 2016, 2017 and 2018 for such services. We expect that this relationship with Contran will continue in 2019.

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Note 16 – 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. 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 of 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 condition, results of operations or liquidity.

Concentrations of credit risk – Sales of TiO₂ accounted for 93% our net sales in 2016 and 94% in each of 2017 and 2018. 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 TiO₂ production processes). TiO₂ is generally sold to the paint, plastics and paper industries. Such markets are generally considered “quality-of-life” markets whose demand for TiO₂ is influenced by the relative economic well-being of the various geographic regions. We sell TiO₂ to approximately 4,000 customers, with the top ten customers approximating 33% of net sales in 2016, 34% in 2017 and 33% in 2018. One customer, Behr Process Corporation, accounted for approximately 10% of our net sales in 2016. We did not have sales to a single customer comprising 10% or more of our net sales in 2017 and 2018.

The table below shows the approximate percentage of our TiO₂ sales by volume for our significant markets, Europe and North America, for the last three years.

	2016	2017	2018
Europe	51%	50%	44%
North America	29%	31%	37%

Long-term contracts – We have long-term supply contracts that provide for certain of our TiO₂ feedstock requirements through 2020. The agreements require us to purchase certain minimum quantities of feedstock with minimum purchase commitments aggregating approximately \$594 million over the life of the contracts in years subsequent to

December 31, 2018. 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 \$156 million at December 31, 2018.

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Operating leases – Our principal German operating subsidiary leases the land under its Leverkusen TiQ 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 TiO₂ production capacity, is located within Bayer’s extensive manufacturing complex. We periodically establish the amount of rent for the land lease associated with the Leverkusen facility 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 for such land lease; rather, any change in the rent is subject solely to periodic negotiation between Bayer and us. We recognize any change in the rent based on such negotiations as part of lease expense starting from the time such change is agreed upon by both parties, as any such change in the rent is deemed “contingent rentals” under GAAP. Under the terms of various supply and services agreements, majority-owned subsidiaries of Bayer provide raw materials, including chlorine, auxiliary and operating materials, utilities and services necessary to operate the Leverkusen facility. These agreements, as amended, expire in 2019 through 2022. We expect to renew these agreements prior to expiration at similar terms and conditions.

We also lease various other manufacturing facilities and equipment. Some of the leases contain purchase and/or various term renewal options at fair market and fair rental values, respectively. In most cases we expect that, in the normal course of business, such leases will be renewed or replaced by other leases. Net rent expense approximated \$14 million in 2016, \$16 million in 2017 and \$15 million in 2018. At December 31, 2018, future minimum payments under non-cancellable operating leases having an initial or remaining term of more than one year were as follows:

Years ending December 31,	Amount (In millions)
2019	\$ 6.2
2020	5.0
2021	4.2
2022	3.2
2023	2.4
2024 and thereafter	21.5
Total	\$ 42.5

Approximately \$17 million of the \$42.5 million aggregate future minimum rental commitments at December 31, 2018 relates to our Leverkusen facility lease discussed above. The minimum commitment amounts for such lease included in the table above for each year through the 2050 expiration of the lease are based upon the current annual rental rate as of December 31, 2018. As discussed above, any change in the rent is based solely on negotiations between Bayer and us, and any such change in the rent is deemed “contingent rentals” under GAAP which is excluded from the future minimum lease payments disclosed above.

Income taxes – We and Valhi are a party to a tax sharing agreement 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 17 – Financial instruments:

The following table summarizes the valuation of our financial instruments recorded on a fair value basis as of December 31, 2017 and 2018:

	Fair value measurements			
	Total	Significant	Significant	Significant
	Quoted prices	other	Significant	Significant
	in active	observable	unobservable	unobservable
	markets	inputs	inputs	inputs
	(Level 1)	(Level 2)	(Level 3)	(Level 3)
	(In millions)			
Asset:				
December 31, 2017 -				
Noncurrent marketable securities				
(See Note 6)	\$10.7	\$ 10.7	\$ -	\$ -
December 31, 2018 -				
Noncurrent marketable securities				
(See Note 6)	\$3.4	\$ 3.4	\$ -	\$ -

Our earnings and cash flows are subject to fluctuations due to changes in currency exchange rates and interest rates. Our risk management policy allows for the use of derivative financial instruments to prudently manage exposure to currency exchange rates and interest rates. Derivatives that we use are primarily currency forward contracts and interest rate swaps. We have not entered into these contracts for trading or speculative purposes in the past, nor do we currently anticipate entering into such contracts for trading or speculative purposes in the future.

Currency forward contracts – Certain of our sales generated by our non-U.S. operations are denominated in 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. Derivatives used to hedge forecasted transactions and specific cash flows associated with financial assets and liabilities denominated in currencies other than the U.S. dollar and which meet the criteria for hedge accounting are designated as cash flow hedges. Consequently, the effective portion of gains and losses is deferred as a component of accumulated other comprehensive income and is recognized in earnings at the time the hedged item affects earnings. Contracts that do not meet the criteria for hedge accounting are marked-to-market at each balance sheet date with any resulting gain or loss recognized in income currently as part of net currency transaction gains and losses. The fair value of the currency forward contracts is determined using Level 1 inputs based on the currency spot forward rates quoted by banks or currency dealers.

At December 31, 2017 and 2018, we had no currency forward contracts outstanding. We did not use hedge accounting for any of our contracts to the extent we held such contracts during 2016, 2017 and 2018.

Interest rate swap contract – As part of our interest rate risk management strategy, in August 2015 we entered into a pay-fixed/receive-variable interest rate swap contract with Wells Fargo Bank, N.A. to minimize our exposure to volatility in LIBOR as it related to our forecasted outstanding variable-rate indebtedness. Under this interest rate swap, we paid a fixed rate of 2.016% per annum, payable quarterly, and received a variable rate of three-month LIBOR (subject to a 1.00% floor), also payable quarterly, in each case based on the notional amount of the swap then outstanding. The effective date of the swap contract was September 30, 2015. The notional amount of the swap started at \$344.8 million and declined by \$875,000 each quarter beginning December 31, 2015, with an original final maturity of the swap contract in February 2020. This swap contract was designated as a cash flow hedge and qualified as an effective hedge at inception under ASC Topic 815 in respect to our term loan indebtedness. The effective portion of changes in fair value on this interest rate swap was recorded as a component of other comprehensive income, net of deferred income taxes. Commencing in the fourth quarter of 2015, as interest

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expense accrued on LIBOR-based variable rate debt, we classified the amount we paid under the pay-fixed leg of the swap and the amount we received under the receive-variable leg of the swap as part of interest expense (as well as part of the amount we report as cash paid for interest in our Consolidated Statements of Cash Flows), with the net effect that the amount of interest expense we recognized on our LIBOR-based variable rate debt each quarter, as it relates to the notional amount of the swap outstanding each quarter, was based on a fixed rate of 2.016% per annum in lieu of the level of LIBOR prevailing during the quarter.

In September 2017, in connection with the voluntary prepayment and termination of our term loan discussed in Note 8, we voluntarily terminated this swap contract, as we no longer had any exposure to volatility in respect of LIBOR. The cost to us to early terminate the swap contract was \$3.3 million, which we paid to Wells Fargo concurrent with the termination. Such \$3.3 million expense is classified as part of our loss on prepayment of debt in our Consolidated Statement of Income for the year ended December 31, 2017 and discussed in Note 8. Such \$3.3 million amount is also classified as part of the cash paid for interest disclosed in our Consolidated Statement of Cash Flows for the year ended December 31, 2017.

During 2016 and 2017 (prior to the termination of the interest rate swap contract), a pretax unrealized loss arising during the periods of \$3.1 million and \$2.3 million, respectively, was recognized in other comprehensive loss related to the interest rate swap. During such periods, \$3.5 million and \$2.1 million, respectively, were reclassified from accumulated other comprehensive loss into earnings and are included in interest expense in our Consolidated Statements of Income. From the inception of the swap until the swap contract termination, there had been no gains or losses recognized in earnings representing hedge ineffectiveness with respect to the interest rate swap.

Other – The following table presents the financial instruments that are not carried at fair value but which require fair value disclosure as of December 31, 2017 and 2018.

	December 31, 2017		December 31, 2018	
	CarryingFair		CarryingFair	
	amount	value	amount	value
	(In millions)			
Cash, cash equivalents and restricted cash	\$323.7	\$323.7	\$374.7	\$374.7
Long-term debt - Fixed rate Senior Notes	471.1	495.1	452.4	412.9
Common stockholders' equity	754.3	2,986.8	839.8	1,335.3

At December 31, 2018, the estimated market price of our Senior Notes was €900 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. The fair value of our common stockholders' equity is based upon quoted market prices at each balance sheet date, which represent Level 1 inputs. 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 18 – Recent accounting pronouncements:

Adopted

On January 1, 2018, we adopted ASU 2014-09, Revenue from Contracts with Customers (Topic 606) for all contracts which were not completed as of January 1, 2018 using the modified retrospective method. Prior to adoption of this standard, we recorded sales when our products were shipped and title and other risks and rewards of ownership had passed to our customer, which was generally at the time of shipment (although in some instances shipping terms were FOB destination point, for which we did not recognize revenue until the product was received by our customer). Following adoption of this standard, we record sales when we satisfy our performance obligation to our customers by transferring control of our products to them, which we have determined is at the same point in time as when we would have recognized revenue prior to adoption of this new standard. Accordingly, the adoption of ASU 2014-09 as of January 1, 2018 did not have a material impact on our consolidated financial statements, and we believe adoption of this standard will have a minimal effect on our revenues on an ongoing basis. See Notes 1 and 2.

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On January 1, 2018, we adopted ASU 2016-01, Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities, which addresses certain aspects related to the recognition, measurement, presentation and disclosure of financial instruments. The ASU requires equity investments (except for those accounted for under the equity method of accounting or those that result in the consolidation of the investee) to generally be measured at fair value with changes in fair value recognized in net income (previously, changes in fair value of such securities were recognized in other comprehensive income). The amendment also requires a number of other changes, including among others: simplifying the impairment assessment for equity instruments without readily determinable fair values; eliminating the requirement for public business entities to disclose methods and assumptions used to determine fair value for financial instruments measured at amortized cost; requiring an exit price notion when measuring the fair value of financial instruments for disclosure purposes; and requiring separate presentation of financial assets and liabilities by measurement category and form of asset. We adopted the new standard prospectively. The most significant aspect of adopting this ASU is the requirement to recognize changes in fair value of our available-for-sale marketable equity securities in net income. At December 31, 2017, our entire portfolio of marketable securities consisted of marketable equity securities. Upon adoption of the ASU on January 1, 2018, the entire balance of our accumulated other comprehensive income related to marketable securities of \$4.8 million was reclassified to our beginning retained earnings pursuant to the transition requirements of the ASU.

In March 2017, the Financial Accounting Standards Board (FASB) issued ASU 2017-07, Compensation - Retirement Benefits (Topic 715) Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, which requires that the service cost component of net periodic defined benefit pension and OPEB cost be reported in the same line item as other compensation costs for applicable employees incurred during the period. Other components of such net benefit cost are required to be presented in the income statement separately from the service cost component, and below income from operations (if such a subtotal is presented). These other net benefit cost components must be disclosed either on the face of the financial statements or in the notes to the financial statements. In addition only the service cost component is eligible for capitalization in assets where applicable (inventory or internally constructed fixed assets for example). We adopted the amendments in ASU 2017-07 beginning in the first quarter of 2018, with retrospective presentation in our Consolidated Statements of Income. We began applying ASU 2017-07 prospectively beginning on January 1, 2018 as it relates to the capitalization of the service cost component of net benefit cost into assets (primarily inventory). We are availing ourselves of the practical expedient that permits us to use amounts we previously disclosed as components of our net periodic defined benefit pension and OPEB cost for periods prior to the adoption of this ASU as the estimation basis for applying the retrospective presentation requirements. As a result we have reclassified \$7.7 million and \$4.1 million, respectively, in 2016 and \$10.8 million and \$6.6 million, respectively, in 2017 previously classified as part of cost of sales and selling, general and administrative expenses to Other components of net periodic pension and OPEB cost in our Consolidated Statement of Income.

Pending Adoption

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842), which is a comprehensive rewriting of the lease accounting guidance which aims to increase comparability and transparency with regard to lease transactions. The primary change will be the recognition of lease assets for the right-of-use of the underlying asset and lease liabilities for the obligation to make payments by lessees on the balance sheet for leases currently classified as operating leases. The ASU, as amended, also requires increased qualitative disclosure about leases in addition to quantitative disclosures currently required. Upon adoption, companies are required to either apply a modified retrospective transition approach, or recognize a cumulative-effect adjustment to the opening balance of retained

earnings in the period of adoption with no restatement of prior period financial statement. We expect to elect the cumulative-effect adjustment method of transition. The ASU also provides a practical expedient which will allow companies to continue to account for existing leases under the prior guidance unless a lease is modified, other than the requirement to recognize the right-of-use asset and lease liability for all operating leases. The changes indicated above will be effective for us beginning in the first quarter of 2019. This ASU permits companies to elect certain practical expedients upon adoption, and at adoption we elected such practical expedients related to, among other things, lease classification (in which existing leases classified as operating leases under current GAAP would be classified as an operating lease under the new ASU, and existing leases classified as a capital lease under current GAAP would be classified as a finance lease under the new ASU), nonlease components (in which nonlease components associated with a lease and paid by us to the lessor, such as property taxes, insurance and maintenance,

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would be treated as a lease component and considered part of minimum lease rent payments), and short-term leases (in which leases with an original term of 12 months or less would be excluded from the recognition requirements of the new ASU). We are in the process of completing our evaluation of the effect this ASU will have on our Consolidated Financial Statements, but given the material amount of our future minimum payments under non-cancellable operating leases at December 31, 2018 discussed in Note 16, we expect to recognize a material right-of-use lease asset and lease liability upon adoption of the ASU.

Note 19 – Quarterly results of operations (unaudited):

	Quarter ended			
	March 31	June 30	September 30	December 31
(In millions, except per share data)				
Year ended December 31, 2017				
Net sales	\$369.8	\$441.4	\$464.5	\$453.3
Gross margin	106.0	132.4	155.0	176.3
Net income	36.8	196.5	73.8	47.4
Basic and diluted income per share	\$.32	\$1.70	\$.64	\$.41
Year ended December 31, 2018				
Net sales	\$430.4	\$471.8	\$410.3	\$349.4
Gross margin	174.8	171.8	119.1	96.5
Net income	70.7	77.7	32.6	24.0
Basic and diluted income per share	\$.61	\$.67	\$.28	\$.21

We recognized the following amounts during 2017:

- pre-tax charge of \$7.1 million in the third quarter related to the loss on prepayment of debt (see Note 8),
- non-cash deferred income tax benefit of \$5.0 million, \$157.6 million, \$7.8 million and \$16.3 million in the first, second, third and fourth quarters, respectively, as a result of the reversal of our deferred income tax asset valuation allowances associated with our German and Belgian operations (see Note 13),
- provisional current income tax expense of \$76.2 million in the fourth quarter as a result of the 2017 Tax Act for the one-time repatriation tax imposed on the post-1986 undistributed earnings of our non-U.S. subsidiaries (see Note 13),
- non-cash deferred income tax benefit of \$18.7 million as a result of the reversal of our deferred income tax asset valuation allowance related to certain U.S. deferred income tax assets of one of our non-U.S. subsidiaries (which subsidiary is treated as a dual resident for U.S. income tax purposes) (see Note 13),
- aggregate income tax benefit of \$11.8 million related to the execution and finalization of an Advance Pricing Agreement between Canada and Germany, mostly in the third quarter (see Note 13), and
- aggregate provisional non-cash deferred income tax expense of \$4.5 million in the fourth quarter related to a change in our conclusions regarding our permanent reinvestment assertion with respect to the post-1986 undistributed earnings of our European subsidiaries (see Note 13).

We recognized the following amounts during 2018:

- current cash income tax expense of \$3.7 million in the fourth quarter of 2018 related to GILTI (see Note 13),
-

non-cash income tax expense of \$1.4 million and \$.7 million in the first and fourth quarters, respectively, related to an increase in our reserve for uncertain tax positions (see Note 13).

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The sum of the quarterly per share amounts may not equal the annual per share amounts due to relative changes in the weighted average number of shares used in the per share computations.

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