SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934—For the fiscal year ended December 31, 2018**

Commission file number 1-5467

VALHI, INC.

(Exact name of Registrant as specified in its charter)

Delaware **(State or other jurisdiction of Incorporation or organization)**	**87-0110150** **(IRS Employer Identification No.)**
5430 LBJ Freeway, Suite 1700, Dallas, Texas **(Address of principal executive offices)**	**75240-2697** **(Zip Code)**

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 per share)	New York Stock Exchange

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

None.

Indicate by check mark:

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

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 (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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 checkmark whether the Registrant is a large accelerated filer, an accelerated filer, non-accelerated filer, smaller reporting company or emerging growth company. See definitions of "large accelerated filer", "accelerated filer," smaller reporting company," and "emerging growth company" in Rule 12b-2 of the 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 28.8 million shares of voting common stock held by nonaffiliates of Valhi, Inc. as of June 30, 2018 (the last business day of the Registrant's most recently-completed second fiscal quarter) approximated $137.0 million.

As of March 1, 2019, 339,185,449 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.

PART I

ITEM 1. BUSINESS

Valhi, Inc. (NYSE: VHI) is primarily a holding company. We operate through our wholly-owned and majority-owned subsidiaries, including NL Industries, Inc., Kronos Worldwide, Inc., CompX International Inc., Basic Management, Inc. and The LandWell Company. Kronos (NYSE: KRO), NL (NYSE: NL) and CompX (NYSE American: CIX) each file periodic reports with the U.S. Securities and Exchange Commission ("SEC").

Our principal executive offices are located at Three Lincoln Center 5430 LBJ Freeway, Suite 1700, Dallas, Texas 75240. Our telephone number is (972) 233-1700. We maintain a website at www.valhi.net.

Brief History

LLC Corporation, our legal predecessor, was incorporated in Delaware in 1932. We are the successor company of the 1987 merger of LLC Corporation and another entity controlled by Contran Corporation. One of Contran's wholly-owned subsidiaries held approximately 92% of Valhi's outstanding common stock at December 31, 2018. As discussed in Note 1 to our Consolidated Financial Statements, Lisa K. Simmons and Serena Simmons Connelly may be deemed to control Contran and us.

Key events in our history include:

- 1979—Contran acquires control of LLC;
- 1981—Contran acquires control of our other predecessor company;
- 1982—Contran acquires control of Keystone Consolidated Industries, Inc., a predecessor to CompX;
- 1984—Keystone spins-off an entity that includes what is to become CompX; this entity subsequently merges with LLC;
- 1986—Contran acquires control of NL, which at the time owns 100% of Kronos;
- 1987—LLC and another Contran controlled company merge to form Valhi, our current corporate structure;
- 1995—WCS begins start-up operations;
- 2003—NL completes the spin-off of Kronos through the pro-rata distribution of Kronos shares to its shareholders including us;
- 2004 through 2005—NL distributes Kronos shares to its shareholders, including us, through quarterly dividends;
- 2008—WCS receives a license for the disposal of byproduct material and begins construction of the byproduct facility infrastructure;
- 2009—WCS receives a license for the disposal of Class A, B and C low-level radioactive waste ("LLRW") and completes construction of the byproduct facility;
- 2010—Kronos completes a secondary offering of its common stock lowering our ownership of Kronos to 80%;
- 2011—WCS begins construction on its Compact and Federal LLRW and mixed LLRW disposal facilities;
- 2012—WCS completes construction of its Compact and Federal LLRW disposal facilities and commences operations at the Compact facility;
- 2012—In December CompX completes the sale of its furniture components business;
- 2013—WCS commences operations at the Federal LLRW facility;
- 2013—In December we purchased an additional ownership interest in and became the majority owner of Basic Management, Inc. and The LandWell Company; both companies are now included in our Consolidated Financial Statements effective December 31, 2013;
- 2015—The first homes in our Cadence planned community were completed by third-party builders and sold to the public; and
- 2018—In January we completed the sale of WCS.

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

Forward-Looking Statements

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 cyclicality of certain of our businesses (such as Kronos' TiO_2 operations);
- Customer and producer inventory levels;
- Unexpected or earlier-than-expected industry capacity expansion (such as the TiO_2 industry);
- Changes in raw material and other operating costs (such as ore, zinc, brass, aluminum, steel and energy costs) and our ability to pass those costs on to our customers or offset them with reductions in other operating 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, among other things, TiO_2 and component products);
- Competitive products and prices and substitute products, including increased competition from low-cost manufacturing sources (such as China);
- Possible disruption of our business or increases in the cost of doing business resulting from terrorist activities or global conflicts;
- Customer and competitor strategies;
- Potential difficulties in integrating future acquisitions;
- Potential difficulties in upgrading or implementing new accounting and manufacturing software systems (such as the Chemicals Segment's new enterprise resource planning system);
- Potential consolidation of our competitors;
- Potential consolidation of our customers;
- The impact of pricing and production decisions;
- Competitive technology positions;
- Our ability to protect or defend intellectual property rights;
- The introduction of trade barriers;
- The ability of our subsidiaries to pay us dividends;
- The impact of current or future government regulations (including employee healthcare benefit related regulations);
- Uncertainties associated with new product development and the development of new product features;
- 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);
- Decisions to sell operating assets other than in the ordinary course of business;

- The timing and amounts of insurance recoveries;
- Our ability to renew, amend, refinance or establish 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 ultimate ability to utilize income tax attributes, the benefits of which may or may not presently 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, or new developments regarding environmental remediation at sites related to our former operations);
- Government laws and regulations and possible changes therein (such as changes in government regulations which might impose various obligations on former manufacturers of lead pigment and lead-based paint, including NL, with respect to asserted health concerns associated with the use of such products) including new environmental health and safety regulations;
- The ultimate resolution of pending litigation (such as NL's lead pigment litigation, environmental and other litigation);
- Our ability to comply with covenants contained in our revolving bank credit facilities;
- Our ability to complete and comply with the conditions of our licenses and permits;
- Changes in real estate values and construction costs in Henderson, Nevada;
- Water levels in Lake Mead; and
- Possible future litigation.

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

Segments

We currently have three consolidated reportable operating segments at December 31, 2018:

Chemicals Kronos Worldwide, Inc.	Our chemicals segment is operated through our majority control of Kronos. Kronos is a leading global producer and marketer of value-added titanium dioxide pigments ("TiO_2"). TiO_2 is used to impart whiteness, brightness, opacity and durability to a wide variety of products, including paints, plastics, paper, fibers and ceramics. Additionally, TiO_2 is a critical component of everyday applications, such as coatings, plastics and paper, as well as many specialty products such as inks, foods and cosmetics.
Component Products CompX International Inc.	We operate in the component products industry through our majority control of CompX. CompX is a leading manufacturer of security products used in the recreational transportation, postal, office and institutional furniture, cabinetry, tool storage, healthcare and a variety of other industries. CompX is also a leading manufacturer of stainless steel exhaust systems, gauges, throttle controls, wake enhancement systems and trim tabs for the recreational marine industry.
Real Estate Management and Development Basic Management, Inc. and The LandWell Company	We operate in real estate management and development through our majority control of BMI and LandWell. BMI provides utility services to certain industrial and municipal customers and owns real property in Henderson, Nevada. LandWell is engaged in efforts to develop certain land holdings for commercial, industrial and residential purposes in Henderson, Nevada.

For additional information about our segments and equity investments see "Part II—Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and Notes 2 and 7 to our Consolidated Financial Statements.

CHEMICALS SEGMENT—KRONOS WORLDWIDE, INC.

Business Overview

Through our majority-controlled subsidiary, Kronos, we are 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 and North America. 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.

Products and end-use markets

Including its predecessors, Kronos has produced and marketed TiO_2 in North America and Europe, our primary markets, for over 100 years. We believe we are the largest producer of TiO_2 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 TiO_2 in several countries, including Germany, with an estimated 8% share of worldwide TiO_2 sales volume in 2018. Overall, we are one of the top six producers of TiO_2 in the world.

We offer our customers a broad portfolio of products that include over 40 different TiO_2 pigment grades under the *KRONOS*® trademark, which provide a variety of performance properties to meet customers' specific requirements. Our major customers include domestic and international paint, plastics, decorative laminate and paper manufacturers. We ship TiO_2 to our customers in either a powder or slurry form via rail, truck and/or ocean carrier. Sales of our core TiO_2 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 TiO_2 sales volume by geographic region and end use for the year ended December 31, 2018:

Sales volume percentages by geographic region	
Europe	44%
North America	37%
Asia Pacific	10%
Rest of World	9%

Sales volume percentages by end-use	
Coatings	56%
Plastics	27%
Paper	7%
Other	10%

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

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

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

TiO_2 for paper – Our Chemicals Segment's 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 – Kronos produces 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.

Kronos produces 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 Chemicals Segment's TiO_2 business is enhanced by the following three complementary businesses, which comprised approximately 6% of our net sales in 2018:

- Kronos owns 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.
- Kronos manufactures and sells 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.
- Kronos manufactures and sells 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

Kronos produces 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).

- *Chloride process* – The chloride process is a continuous process in which chlorine is used to extract rutile TiO_2. The chloride process produces less waste than the sulfate process because much of the chlorine is recycled and feedstock bearing higher titanium content is used. The chloride process also has lower energy requirements and is less labor-intensive than the sulfate process, although the chloride process requires a higher-skilled labor force. The chloride process produces an intermediate base pigment with a wide range of properties.
- *Sulfate process* – The sulfate process is a batch process in which sulfuric acid is used to extract the TiO_2 from ilmenite or titanium slag. After separation from the impurities in the ore (mainly iron), the TiO_2 is precipitated and calcined to form an intermediate base pigment ready for sale or can be upgraded through finishing treatments.

Kronos produced 536,000 metric tons of TiO_2 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 TiO_2 manufacturing joint venture discussed below in "TiO_2 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.

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

Our Chemicals Segment's production capacity has increased by approximately 6% over the past ten years due to debottlenecking programs, incurring moderate capital expenditures. We expect to operate our TiO_2 plants at near full practical capacity levels in 2019.

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

		% of capacity by TiO_2 manufacturing process	
Facility	**Description**	**Chloride**	**Sulfate**
Leverkusen, Germany (1)	TiO_2 production, chloride 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. Kronos owns the Leverkusen facility, which represents about one-third of our current TiO_2 production capacity, but we lease the land under the facility from Bayer under a long-term agreement which expires in 2050. Lease payments are periodically negotiated with Bayer for periods of at least two years at a time. A majority-owned subsidiary of Bayer provides some raw materials including chlorine, auxiliary and operating materials, utilities and services necessary to operate the Leverkusen facility under separate supplies and services agreements.

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

(3) Kronos operates 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 TiO_2 produced by the joint venture to which we are entitled. See Note 5 to our Consolidated Financial Statements and "TiO_2 manufacturing joint venture." The joint venture owns the land and the facility.

Kronos owns the land underlying all of its principal production facilities unless otherwise indicated in the table above.

Kronos also operates 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 TiO_2 facility into a slurry form that is then shipped to customers.

Kronos has 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.

TiO_2 manufacturing joint venture

Kronos Louisiana, Inc., one of our subsidiaries, and Venator Investments each own a 50% interest in a manufacturing joint venture, Louisiana Pigment Company, L.P., or LPC. LPC owns and operates a chloride-process TiO_2 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 TiO_2 produced by the joint venture. All costs and capital expenditures are shared equally with Venator with the exception of feedstock (purchased natural rutile ore or slag) and packaging costs for the pigment grades produced. Our share of net costs is reported as cost of sales as the TiO_2 is sold. See Notes 5 and 15 to our Consolidated Financial Statements.

Raw materials

The primary raw materials used in chloride process TiO_2 are titanium-containing feedstock (purchased natural rutile ore or 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 Chemicals Segment's 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 Chemicals Segment's 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 Chemicals Segment's 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.

Kronos sells a majority of our products through our direct sales force operating in Europe and North America. We also utilize sales agents and distributors who are authorized to sell our products in specific geographic areas. In Europe, our sales efforts are conducted primarily through our direct sales force and our sales agents. Our agents do not sell any TiO_2 products other than KRONOS® 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.

Kronos sells 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 Chemicals Segment's business as a whole nor any of its principal product groups is seasonal to any significant extent. However, TiO_2 sales are generally higher in the second and third quarters of the year, due in part to the increase in coatings production in the spring to meet demand during the spring and summer painting seasons. With certain exceptions, 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 TiO_2 industry is highly competitive. We compete primarily on the basis of price, product quality, technical service and the availability of high performance pigment grades. Since TiO_2 is not 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 TiO_2 sales volume, and based on sales volume, we believe we are the leading seller of TiO_2 in several countries, including Germany.

Our Chemicals Segment's principal competitors are The Chemours Company, Cristal Global, Venator Materials PLC, Tronox Incorporated and Lomon Billions. The top six TiO_2 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 TiO_2 production capacity and is our principal North American competitor. In February 2017, Tronox announced a definitive agreement to acquire the TiO_2 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 TiO_2 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 TiO_2 industry's and our performance could be unfavorably affected.

The TiO_2 industry is characterized by high barriers to entry consisting of high capital costs, proprietary technology and significant lead times required to construct new facilities or to expand existing capacity. We believe it is unlikely any new TiO_2 plants will be constructed in Europe or North America in the foreseeable future.

Research and development

Kronos employs 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

Kronos has 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 – Kronos has obtained patents and has 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 Chemicals Segment's 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, Kronos 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 Chemicals Segment’s 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 Chemicals Segment’s 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 TiO_2. We believe we are in substantial compliance with laws applicable to the regulation of TiO_2. However, increased regulatory scrutiny could affect consumer perception of TiO_2 or limit the marketability and demand for TiO_2 or products containing TiO_2 and increase our regulatory and compliance costs.

Our Chemicals Segment’s 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.

COMPONENT PRODUCTS SEGMENT—COMPX INTERNATIONAL INC.

Business overview

Through our majority-controlled subsidiary, CompX, we are a leading manufacturer of security products including mechanical and electrical cabinet locks and other locking mechanisms used in recreational transportation, postal, office and institutional furniture, cabinetry, tool storage and healthcare applications. We are also a leading manufacturer of stainless steel exhaust systems, gauges, throttle controls, wake enhancement systems and trim tabs for the recreational marine industry. We also manufacture stainless steel exhaust systems, gauges, throttle controls and trim tabs for the recreational marine and other industries. Our products are principally designed for use in medium to high-end product applications, where design, quality and durability are valued by our customers. We continuously seek to diversify into new markets and identify new applications and features for our products, which we believe provide a greater potential for higher rates of earnings growth as well as diversification of risk.

Manufacturing, operations and products

Security Products. CompX's security products reporting unit manufactures mechanical and electrical cabinet locks and other locking mechanisms used in a variety of applications including ignition systems, mailboxes, file cabinets, desk drawers, tool storage cabinets, vending and cash containment machines, high security medical cabinetry, electronic circuit panels, storage compartments and gas station security. Our security products reporting unit has one manufacturing facility in Mauldin, South Carolina and one in Grayslake, Illinois which is shared with Marine Components. We believe we are a North American market leader in the manufacture and sale of cabinet locks and other locking mechanisms. These products include:

- disc tumbler locks which provide moderate security and generally represent the lowest cost lock to produce;
- pin tumbler locking mechanisms which are more costly to produce and are used in applications requiring higher levels of security, including *KeSet*® and *System 64*® (which each allow the user to change the keying on a single lock 64 times without removing the lock from its enclosure), *TuBar*® and *Turbine*™; and
- our innovative *CompX eLock*® and *StealthLock*® electronic locks which provide stand-alone or networked security and audit trail capability for drug storage and other valuables through the use of a proximity card, magnetic stripe, radio frequency or other keypad credential.

A substantial portion of our Security Products' sales consist of products with specialized adaptations to an individual customer's specifications, some of which are listed above. We also have a standardized product line suitable for many customers, which is offered through a North American distribution network to locksmith and smaller original equipment manufacturer distributors via our *STOCK LOCKS*® distribution program.

Marine Components. CompX's marine components reporting unit manufactures and distributes stainless steel exhaust components, gauges, throttle controls, wake enhancement systems, trim tabs and related hardware and accessories primarily for performance and ski/wakeboard boats. Our marine components reporting unit has a facility in Neenah, Wisconsin and a facility in Grayslake, Illinois which is shared with Security Products. Our specialty Marine Component products are high precision components designed to operate within tight tolerances in the highly demanding marine environment. These products include:

- original equipment and aftermarket stainless steel exhaust headers, exhaust pipes, mufflers and other exhaust components;
- high performance gauges such as GPS speedometers and tachometers;
- mechanical and electronic controls and throttles;
- wake enhancement devices, trim tabs, steering wheels, and billet aluminum accessories; and
- dash panels, LED indicators, wire harnesses and other accessories.

Our Component Products Segment operated three manufacturing and other facilities at December 31, 2018 as shown below. For additional information, see also "Item 2 – Properties", including information regarding leased and distribution-only facilities.

Facility Name	Reporting Unit	Location	Size (square feet)
Owned Facilities:			
National [1]	SP	Mauldin, SC	198,000
Grayslake[1]	SP/MC	Grayslake, IL	133,000
Custom[1]	MC	Neenah, WI	95,000
Leased Facilities:			
Distribution Center	SP/MC	Rancho Cucamonga, CA	11,500

(1) ISO-9001 registered facilities

Raw materials

Our Component Products Segment's primary raw materials are:

- Security Products - zinc and brass (for the manufacture of locking mechanisms).
- Marine Components - stainless steel (for the manufacture of exhaust headers and pipes and wake enhancement systems), aluminum (for the manufacture of throttles and trim tabs) and other components.

These raw materials are purchased from several suppliers, are readily available from numerous sources and accounted for approximately 12% of our total cost of sales for 2018. Total material costs, including purchased components, represented approximately 45% of our cost of sales in 2018.

Our Component Products Segment occasionally enters into short-term commodity-related raw material supply arrangements to mitigate the impact of future price increases in commodity-related raw materials, including zinc, brass and stainless steel. These arrangements generally provide for stated unit prices based upon specified purchase volumes, which help us to stabilize our commodity-related raw material costs to a certain extent. During 2017 and 2018, markets for the primary commodity-related raw materials used in the manufacture of our locking mechanisms, primarily zinc and brass, generally strengthened, but were moderating at the end of 2018. Over that same period, the market for stainless steel, the primary raw material used for the manufacture of marine exhaust headers and pipes and wake enhancement systems, remained relatively stable. While we expect the markets for our primary commodity-related raw materials to remain stable during 2019, we recognize that economic conditions could introduce renewed volatility on these and other manufacturing materials. When purchased on the spot market, each of these raw materials may be subject to sudden and unanticipated price increases. When possible, we seek to mitigate the impact of fluctuations in these raw material costs on our margins through improvements in production efficiencies or other operating cost reductions. In the event we are unable to offset raw material cost increases with other cost reductions, it may be difficult to recover those cost increases through increased product selling prices or raw material surcharges due to the competitive nature of the markets served by our products. Consequently, overall operating margins can be affected by commodity-related raw material cost pressures. Commodity market prices are cyclical, reflecting overall economic trends, specific developments in consuming industries and speculative investor activities.

Patents and trademarks

We hold a number of patents relating to our component products, certain of which we believe to be important to us and our continuing business activity. Patents generally have a term of 20 years, and our patents have remaining terms ranging from less than 1 year to 16 years at December 31, 2018. Our major trademarks and brand names in addition to *CompX®* include:

Security Products	Security Products	Marine Components
CompX® Security Products™	*Lockview®*	*CompX Marine®*
National Cabinet Lock®	*System 64®*	*Custom Marine®*
Fort Lock®	*SlamCAM®*	*Livorsi® Marine*
Timberline® Lock	*RegulatoR®*	*Livorsi II® Marine*
Chicago Lock®	*CompXpress®*	*CMI Industrial®*
STOCK LOCKS®	*GEM®*	*Custom Marine® Stainless Exhaust*
KeSet®		*The #1 Choice in Performance Boating®*
TuBar®		*Mega Rim®*
StealthLock®		*Race Rim®*
ACE®		*Vantage View®*
ACE® II		*GEN-X®*
CompX eLock®		

Sales, marketing and distribution

A majority of our Component Products Segment's sales are direct to large OEM customers through our factory-based sales and marketing professionals supported by engineers working in concert with field salespeople and independent manufacturer's representatives. We select manufacturer's representatives based on special skills in certain markets or relationships with current or potential customers.

In addition to sales to large OEM customers, a substantial portion of our security products sales are made through distributors. We have a significant North American market share of cabinet lock security product sales as a result of the locksmith distribution channel. We support our locksmith distributor sales with a line of standardized products used by the largest segments of the marketplace. These products are packaged and merchandised for easy availability and handling by distributors and end users.

Our Component Products Segment sells to a diverse customer base with only one customer representing 10% or more of our sales in 2018 (United States Postal Service representing 13%). Our largest ten customers accounted for approximately 44% of our sales in 2018.

Competition

The markets in which our Component Products Segment participates are highly competitive. We compete primarily on the basis of product design, including space utilization and aesthetic factors, product quality and durability, price, on-time delivery, service and technical support. We focus our efforts on the middle and high-end segments of the market, where product design, quality, durability and service are valued by the customer. Our security products reporting unit competes against a number of domestic and foreign manufacturers. Our marine components reporting unit competes with small domestic manufacturers and is minimally affected by foreign competitors.

Regulatory and environmental matters

Our Component Products Segment's operations are subject to federal, state and local laws and regulations relating to the use, storage, handling, generation, transportation, treatment, emission, discharge, disposal, remediation of and exposure to hazardous and non-hazardous substances, materials and wastes ("Environmental Laws"). Our operations also are subject to federal, state and local laws and regulations relating to worker health and safety. We believe we are in substantial compliance with all such laws and regulations. To date, the costs of maintaining compliance with such laws and regulations have not significantly impacted our results. We currently do not anticipate any significant costs or expenses relating to such matters; however, it is possible future laws and regulations may require us to incur significant additional expenditures.

Employees

As of December 31, 2018, our Component Products Segment employed 547 people, all in the United States. We believe our labor relations are good at all of our facilities.

REAL ESTATE MANAGEMENT AND DEVELOPMENT SEGMENT—BASIC MANAGEMENT, INC. AND THE LANDWELL COMPANY

Business overview

Our Real Estate Management and Development Segment consists of BMI and LandWell. BMI provides utility services, among other things, to an industrial park located in Henderson, Nevada and is responsible for the delivery of water to the city of Henderson and various other users through a water distribution system owned by BMI. LandWell is actively engaged in efforts to develop certain real estate in Henderson, Nevada including approximately 2,100 acres zoned for residential/planned community purposes and approximately 400 acres zoned for commercial and light industrial use.

Operations and services

Over the years, LandWell and BMI have focused on developing and selling the land transferred to LandWell as part of its formation in the early 1950's as well as additional land holdings acquired by LandWell in the surrounding area subsequent to LandWell's formation (although BMI and LandWell have not had significant real property acquisitions since 2004). Since LandWell's formation, LandWell and BMI have a history of successfully developing and selling over 1,200 acres of retail, light industrial, commercial and residential projects in the Henderson, Nevada area. However, a substantial portion of such projects, had been completed prior to the 2008 economic downturn which was particularly acute in the Las Vegas area real estate market that includes Henderson. Following such economic downturn, LandWell's land sales were substantially reduced as compared to prior years, and LandWell did not recognize any material amount of land sales in the 2008 to 2013 time period. During this time period, LandWell focused primarily on the remediation and development of a large tract of land in Henderson zoned for residential/planned community purposes (approximately 2,100 acres). Planning and zoning work on such project began in 2007, but LandWell delayed significant development efforts until economic conditions had improved. As general economic conditions improved in 2011 and 2012, LandWell began intensive development efforts of the residential/planned community in 2013 (with LandWell acting as the master developer for all such development efforts). We market and sell our residential/planned community to established home builders in tracts of land that are pre-zoned for a maximum number of home lots. We support the builders' efforts to market and sell specific residential homes within our residential/planned community through joint marketing campaign and community wide education efforts.

In addition, BMI delivers utility services to an industrial park located in Henderson, Nevada and also delivers water to the city of Henderson and various other users through a water delivery system owned by BMI.

Sales

Through December 31, 2018, LandWell has closed or entered into escrow on approximately 520 acres of the residential/planned community and approximately 65 acres zoned for commercial and light industrial use. Contracts for land sales are negotiated on an individual basis and sales terms and prices will vary based on such factors as location (including location within a planned community), expected development work, and individual buyer needs. Although land may be under contract, we do not recognize revenue until we have satisfied the criteria for revenue recognition set forth in ASC Topic 606. In some instances, we will receive cash proceeds at the time the contract closes and record deferred revenue for some or all of the cash amount received, with such deferred revenue being recognized in subsequent periods. Because land held for development was initially recognized at estimated fair value at the acquisition date as required by ASC Topic 805, we do not expect to recognize significant operating income on land sales for the land currently under contract. We expect the development work to continue for 10 to 15 years on the rest of the land held for development, especially the remainder of the residential/planned community.

Our Real Estate Management and Development Segment's sales consist principally of land sales and water and electric delivery fees. During 2018 we had sales to three customers that each exceeded 10% of our Real Estate Management and Development Segment's net sales: Richmond Homes of Nevada (29%), Woodside Homes of Nevada, LLC (20%) and Toll Henderson LLC (17%), all related to land sales.

Competition

There are multiple new construction residential communities in the greater Las Vegas, Nevada area. We compete with these communities on the basis of location; planned community amenities and features; proximity to major retail and recreational activities; and the perception of quality of life within the new community. We believe our residential/planned community is unique within the greater Las Vegas area due to its location and planned amenities which include: 490 acres of major and neighborhood parks and open space interconnected with major regional trails and parks; and features that no other new construction residential community currently offers including builder floorplans designed exclusively for our community. We are marketing our residential/planned community to builders who target a range of home buyers to maximize sales.

Regulatory and environmental matters

We and the subcontractors we use must comply with many federal, state and local laws and regulations, including zoning, density and development requirements, building, environmental, advertising, labor and real estate sales rules and regulations. These regulations and requirements affect substantially all aspects of our land development. Our operations are subject to federal, state and local laws and regulations relating to the use, storage, handling, generation, transportation, treatment, emission, discharge, disposal, remediation of and exposure to hazardous and non-hazardous substances, materials and wastes. Our operations also are subject to federal, state and local laws and regulations relating to worker health and safety. We believe we are in substantial compliance with all such laws and regulations. To date, the costs of maintaining compliance with such laws and regulations have not significantly impacted our results. We currently do not anticipate any significant costs or expenses relating to such matters; however, it is possible future laws and regulations may require us to incur significant additional expenditures.

Employees

At December 31, 2018, BMI had 24 employees. We believe our labor relations are good.

OTHER

***NL Industries, Inc*.—**At December 31, 2018, NL owned 87% of CompX and 30% of Kronos. NL also owns 100% of EWI RE, Inc., an insurance brokerage and risk management services company and also holds certain marketable securities and other investments. See Note 17 to our Consolidated Financial Statements for additional information.

***Tremont LLC*—**Tremont is primarily a holding company through which we hold our 63% ownership interest in BMI and our 77% ownership interest in LandWell. Such 77% ownership interest in LandWell includes 27% we hold through our ownership of Tremont and 50% held by a subsidiary of BMI. Tremont also owns 100% of Tall Pines Insurance Company, an insurance company that also holds certain marketable securities and other investments. See Note 17 to our Consolidated Financial Statements.

In addition, we also own real property related to certain of our former business units.

***Discontinued Operations*—**On January 26, 2018, we completed the sale of the Waste Management Segment to JFL-WCS Partners, LLC, an entity sponsored by certain investment affiliates of J.F. Lehman & Company, for consideration consisting of the assumption of all of the Waste Management Segment's third-party indebtedness and other liabilities. We recognized a pre-tax gain of approximately $58 million on the transaction in the first quarter of 2018 because the carrying value of the liabilities of the business assumed by the purchaser exceeded the carrying value of the assets sold at the time of sale in large part due to the long-lived asset impairment of $170.6 million recognized with respect to the Waste Management Segment in the second quarter of 2017. Such pre-tax gain is classified as part of discontinued operations. See Note 3 to our Consolidated Financial Statements for additional information.

Business Strategy—We routinely compare our liquidity requirements and alternative uses of capital against the estimated future cash flows to be received from our subsidiaries and unconsolidated affiliates, and the estimated sales value of those businesses. As a result, we have in the past, and may in the future, seek to raise additional capital, refinance or restructure indebtedness, repurchase indebtedness in the market or otherwise, modify our dividend policy, consider the sale of an interest in our subsidiaries, business units, marketable securities or other assets, or take a combination of these or other steps, to increase liquidity, reduce indebtedness and fund future activities, which have in the past and may in the future involve related companies. From time to time, we and our related entities consider restructuring ownership interests among our subsidiaries and related companies. We expect to continue this activity in the future.

We and other entities that may be deemed to be controlled by or affiliated with Ms. Simmons and Ms. Connelly routinely evaluate acquisitions of interests in, or combinations with, companies, including related companies, we perceive to be undervalued in the marketplace. These companies may or may not be engaged in businesses related to our current businesses. In some instances we actively manage the businesses we acquire with a focus on maximizing return-on-investment through cost reductions, capital expenditures, improved operating efficiencies, selective marketing to address market niches, disposition of marginal operations, use of leverage and redeployment of capital to more productive assets. In other instances, we have disposed of our interest in a company prior to gaining control. We intend to consider such activities in the future and may, in connection with such activities, consider issuing additional equity securities and increasing our indebtedness.

Website and Available Information—Our fiscal year ends December 31. We furnish our stockholders with annual reports containing audited financial statements. In addition, we file annual, quarterly and current reports, proxy and information statements and other information with the SEC. Certain of our consolidated subsidiaries (Kronos, NL and CompX) also file annual, quarterly and current reports, proxy and information statements and other information with the SEC. We also make our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments thereto, available free of charge through our website at www.valhi.net as soon as reasonably practical after they have been filed with the SEC. We also provide to anyone, without charge, copies of such documents upon written request. Requests should be directed to the attention of the Corporate Secretary at our address on the cover page of this Form 10-K.

Additional information, including our Audit Committee charter, our Code of Business Conduct and Ethics and our Corporate Governance Guidelines, can also be found on our website. Information contained on our website is not part of this Annual Report.

The SEC maintains an Internet website at www.sec.gov that contains reports, proxy and information statements and other information regarding issuers, such as us, that file electronically with the SEC.

ITEM 1A. RISK FACTORS

Listed below are certain risk factors associated with us and our businesses. 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 increased 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.

Our assets consist primarily of investments in our operating subsidiaries, and we are dependent upon distributions from our subsidiaries to service our liabilities.

The majority of our *operating* cash flows are generated by our operating subsidiaries, and our ability to service liabilities and to pay dividends on our common stock depends to a large extent upon the cash dividends or other distributions we receive from our subsidiaries. Our subsidiaries are separate and distinct legal entities and they have no obligation, contingent or otherwise, to pay such cash dividends or other distributions to us. In addition, the payment of dividends or other distributions from our subsidiaries could be subject to restrictions under applicable law, monetary transfer restrictions, currency exchange regulations in jurisdictions in which our subsidiaries operate or any other restrictions imposed by current or future agreements to which our subsidiaries may be a party, including debt instruments. Events beyond our control, including changes in general business and economic conditions, could adversely impact the ability of our subsidiaries to pay dividends or make other distributions to us. If our subsidiaries were to become unable to make sufficient cash dividends or other distributions to us, our ability to service our liabilities and to pay dividends on our common stock could be adversely affected.

In addition, a significant *portion* of our assets consist of ownership interests in our subsidiaries. If we were required to liquidate any of such securities in order to generate funds to satisfy our liabilities, we may be required to sell such securities at a time or times at which we would not be able to realize what we believe to be the long-term value of such assets.

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 operating losses.

Our Chemicals Segment's sales and profitability is largely dependent on the TiO_2 industry. In 2018, 94% of our Chemicals Segment's sales were attributable to sales of TiO_2. TiO_2 is used in many "quality of life" products for which demand historically has been linked to global, regional and local *gross* domestic product and discretionary spending, which can be negatively impacted by regional and world events or economic conditions. Such events are likely to cause a decrease in demand for our products and, as a result, may have an adverse effect on our results of operations and financial condition.

Pricing within the global TiO_2 industry over the long term is cyclical and changes in economic conditions worldwide can significantly impact our earnings and operating cash flows. Historically, the markets for many of our products have experienced alternating periods of increasing and decreasing demand. Relative changes in the selling prices for our products are one of the main factors that affect the level of our *profitability*. In periods of increasing demand, our selling prices and profit margins generally will tend to increase, while in periods of decreasing demand our selling prices and profit margins generally tend to decrease. In addition, pricing may affect customer inventory levels as customers may from time to time accelerate purchases of TiO_2 in advance of anticipated price increases or defer purchases of TiO_2 in advance of anticipated price decreases. Our ability to further increase capacity without additional investment in greenfield or brownfield capacity increases may be limited and as a result, our profitability may become even more dependent upon the selling prices of our products.

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

The global market in which we operate our Chemicals Segment is concentrated with the top six TiO_2 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.

For our Chemicals Segment, 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 Chemicals Segment's TiO_2 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 Chemicals Segment's 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. Our Chemicals Segment 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. Our Chemicals Segment may also experience higher operating costs such as energy costs, which could affect our profitability. We may not always be able to increase its selling prices to offset the impact of any higher costs or reduced production levels, which could reduce our earnings and decrease our liquidity.

Our Chemicals Segment has long-term supply contracts that provide for our TiO_2 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.

Certain raw materials used in our Component Products Segment's products are commodities that are subject to significant fluctuations in price in response to world-wide supply and demand as well as speculative investor activity. Zinc and brass are the principal raw materials used in the manufacture of security products. Stainless steel and aluminum are the major raw materials used in the manufacture of marine components. These raw materials are purchased from several suppliers and are generally readily available from numerous sources. We occasionally enters into short-term raw material supply arrangements to mitigate the impact of future increases in commodity-related raw material costs. Materials purchased outside of these arrangements are sometimes subject to unanticipated and sudden price increases. Should our vendors not be able to meet their contractual obligations or should we be otherwise unable to obtain necessary raw materials, we may incur higher costs for raw materials or may be required to reduce production levels, either of which may decrease our liquidity or negatively impact our financial condition or results of operations as we may be unable to offset the higher costs with increases in our selling prices or reductions in other operating costs.

We could incur significant costs related to legal and environmental remediation matters.

NL formerly manufactured lead pigments for use in paint. NL and others have been named as defendants in various legal proceedings seeking damages for personal injury, property damage and governmental expenditures allegedly caused by the use of lead-based paints. These lawsuits seek recovery under a variety of theories, including public and private nuisance, negligent product design, negligent failure to warn, strict liability, breach of warranty, conspiracy/concert of action, aiding and abetting, enterprise liability, market share or risk contribution liability, intentional tort, fraud and misrepresentation, violations of state consumer protection statutes, supplier negligence and similar claims. The plaintiffs in these actions generally seek to impose on the defendants responsibility for lead paint abatement and health concerns associated with the use of lead-based paints, including damages for personal injury, contribution and/or indemnification for medical expenses, medical monitoring expenses and costs for educational programs. NL has been found liable in one public nuisance case in Santa Clara, California, and we have recognized a material liability for such matter. As with all legal proceedings, the outcome is uncertain. Any additional liability we might incur in the future for these matters could be material. See also Item 3 - "Legal Proceedings - Lead pigment litigation - NL."

Certain properties and facilities used in our former operations are the subject of litigation, administrative proceedings or investigations arising under various environmental laws. These proceedings seek cleanup costs, personal injury or property damages and/or damages for injury to natural resources. Some of these proceedings involve claims for substantial amounts. Environmental obligations are difficult to assess and estimate for numerous reasons, and we may incur costs for environmental remediation in the future in excess of amounts currently estimated. Any liability we might incur in the future could be material. See also Item 3 - "Legal Proceedings - Environmental matters and litigation."

Many of the markets in which our Component Products Segment operates are mature and highly competitive resulting in pricing pressure and the need to continuously reduce costs.

Many of the markets our Component Products Segment serves are highly competitive, with a number of competitors offering similar products. We focus our efforts on the middle and high-end segment of the market where we feel that we can compete due to the importance of product design, quality and durability to the customer. However, our ability to effectively compete is impacted by a number of factors. The occurrence of any of these factors could result in reduced earnings or operating losses.

- Competitors may be able to drive down prices for our products beyond our ability to adjust costs because their costs are lower than ours, especially products sourced from Asia.

- Competitors’ financial, technological and other resources may be greater than our resources, which may enable them to more effectively withstand changes in market conditions.
- Competitors may be able to respond more quickly than we can to new or emerging technologies and changes in customer requirements.
- Consolidation of our competitors or customers in any of the markets in which we compete may result in reduced demand for our products.
- A reduction of our market share with one or more of our key customers, or a reduction in one or more of our key customers’ market share for their end-use products, may reduce demand for our products.
- New competitors could emerge by modifying their existing production facilities to manufacture products that compete with our products.
- We may not be able to sustain a cost structure that enables us to be competitive.
- Customers may no longer value our product design, quality or durability over the lower cost products of our competitors.

Our development of innovative features for current products is critical to sustaining and growing our Component Product Segment’s sales.

Historically, our Component Products Segment’s ability to provide value-added custom engineered products that address requirements of technology and space utilization has been a key element of our success. We spend a significant amount of time and effort to refine, improve and adapt our existing products for new customers and applications. Since expenditures for these types of activities are not considered research and development expense under accounting principles generally accepted in the United States of America (“GAAP”), the amount of our research and development expenditures, which is not significant, is not indicative of the overall effort involved in the development of new product features. The introduction of new product features requires the coordination of the design, manufacturing and marketing of the new product features with current and potential customers. The ability to coordinate these activities with current and potential customers may be affected by factors beyond our control. While we will continue to emphasize the introduction of innovative new product features that target customer-specific opportunities, we do not know if any new product features we introduce will achieve the same degree of success that we have achieved with our existing products. Introduction of new product features typically requires us to increase production volume on a timely basis while maintaining product quality. Manufacturers often encounter difficulties in increasing production volumes, including delays, quality control problems and shortages of qualified personnel or raw materials. As we attempt to introduce new product features in the future, we do not know if we will be able to increase production volume without encountering these or other problems, which might negatively impact our financial condition or results of operations.

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 businesses and our competitive positions. 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.

It is the practice of our Chemicals Segment to enter into confidentiality agreements with its employees and third parties to protect our proprietary expertise and other trade secrets; however 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.

Our Component Products Segment relies on patent, trademark and trade secret laws in the United States and similar laws in other countries to establish and maintain our intellectual property rights in our technology and designs. Despite these measures, any of our intellectual property rights could be challenged, invalidated, circumvented or misappropriated. Others may independently discover our trade secrets and proprietary information, and in such cases we could not assert any trade secret rights against such parties. Further, we do not know if any of our pending trademark or patent applications will be approved. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our intellectual property rights. In addition, the laws of certain countries do not protect intellectual property rights to the same extent as the laws of the United States. Therefore, in certain jurisdictions, we may be unable to protect our technology and designs adequately against unauthorized third party use, which could adversely affect our competitive position.

Third parties may claim that we or our customers are infringing upon their intellectual property rights. Even if we believe that such claims are without merit, they can be time-consuming and costly to defend and distract our management's and technical staff's attention and resources. Claims of intellectual property infringement also might require us to redesign affected technology, enter into costly settlement or license agreements or pay costly damage awards, or face a temporary or permanent injunction prohibiting us from marketing or selling certain of our technology. If we cannot or do not license the infringed technology on reasonable pricing terms or at all, or substitute similar technology from another source, our business could be adversely impacted.

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.

Our Real Estate Management and Development Segment owns a significant amount of real property in Henderson, Nevada. A prolonged downturn in the local real estate market in Nevada could negatively impact our ability to successfully complete the development of such real property.

A substantial portion of the revenues and assets associated with our Real Estate Management and Development Segment relate to certain real estate under development in Henderson, Nevada, including approximately 2,100 acres zoned for residential/planned community purposes and approximately 400 acres zoned for commercial and light industrial use. A prolonged downturn in the local real estate market in Nevada or other events could negatively impact our ability to successfully complete the development of such real property, either by requiring us to incur future development costs in excess of our current estimates, or by resulting in selling prices for future retail land sales lower than what we currently expect. If any of these events were to occur, revenue and profits in our Real Estate Management and Development segment may be significantly and negatively affected.

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

We have a significant amount of debt, primarily related to Kronos' Senior Notes, our loan from Contran Corporation, and the BMI bank note. As of December 31, 2018, our total consolidated debt was approximately $800.4 million. Our level of debt could have important consequences to our stockholders and creditors, including:

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

In addition to our indebtedness, we are party to various lease and other agreements (including feedstock ore purchase contracts as previously described) pursuant to which, along with our indebtedness, we are committed to pay approximately $539 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 certain of our revolving credit facilities in the future will, in some instances, depend in part on these subsidiaries' ability to maintain specified financial ratios and satisfy certain financial covenants contained in the applicable credit agreement.

Our businesses 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 or 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.

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 TiO_2, or its use. Increased regulatory scrutiny could affect consumer perception of TiO_2 or limit the marketability and demand for TiO_2 or products containing TiO_2, and increase our regulatory compliance obligations and costs. Increased compliance obligations and costs or restrictions on certain TiO_2 applications could negatively impact our future financial results through increased costs of production, or reduced sales which may decrease our liquidity, operating income and results of operations.

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.

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 Kronos implemented a new enterprise resource planning system covering certain finance processes (principally general ledger, accounts receivable and accounts payable), and in January 2018 Kronos 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

We along with our subsidiaries, Kronos, CompX and NL lease office space through Contran for our principal executive offices in Dallas, Texas. Our BMI and LandWell subsidiaries' principal offices are in an owned building in Henderson, Nevada. A list of operating facilities for each of our subsidiaries is described in the applicable business sections of Item 1—"Business." We believe our facilities are generally adequate and suitable for their respective uses.

ITEM 3. LEGAL PROCEEDINGS

We are involved in various legal proceedings. In addition to information included below, certain information called for by this Item is included in Note 18 to our Consolidated Financial Statements, which is incorporated herein by reference.

Lead Pigment Litigation—NL

Our former operations included the manufacture of lead pigments for use in paint and lead-based paint. We, other former manufacturers of lead pigments for use in paint and lead-based paint (together, the "former pigment manufacturers"), and the Lead Industries Association (LIA), which discontinued business operations in 2002, have been named as defendants in various legal proceedings seeking damages for personal injury, property damage and governmental expenditures allegedly caused by the use of lead-based paints. Certain of these actions have been filed by or on behalf of states, counties, cities or their public housing authorities and school districts, and certain others have been asserted as class actions. These lawsuits seek recovery under a variety of theories, including public and private nuisance, negligent product design, negligent failure to warn, strict liability, breach of warranty, conspiracy/concert of action, aiding and abetting, enterprise liability, market share or risk contribution liability, intentional tort, fraud and misrepresentation, violations of state consumer protection statutes, supplier negligence and similar claims.

The plaintiffs in these actions generally seek to impose on the defendants responsibility for lead paint abatement and health concerns associated with the use of lead-based paints, including damages for personal injury, contribution and/or indemnification for medical expenses, medical monitoring expenses and costs for educational programs. To the extent the plaintiffs seek compensatory or punitive damages in these actions, such damages are generally unspecified. In some cases, the damages are unspecified pursuant to the requirements of applicable state law. A number of cases are inactive or have been dismissed or withdrawn. Most of the remaining cases are in various pre-trial stages. Some are on appeal following dismissal or summary judgment rulings or a trial verdict in favor of either the defendants or the plaintiffs.

We believe that these actions are without merit, and we intend to continue to deny all allegations of wrongdoing and liability and to defend against all actions vigorously. Other than with respect to the Santa Clara California public nuisance case discussed below, we do not believe it is probable that we have incurred any liability with respect to all of the lead pigment litigation cases to which we are a party, and with respect to all such lead pigment litigation cases to which we are a party, other than with respect to the Santa Clara case discussed below, we believe liability to us that may result, if any, in this regard cannot be reasonably estimated, because:

- we have never settled any of the market share, intentional tort, fraud, nuisance, supplier negligence, breach of warranty, conspiracy, misrepresentation, aiding and abetting, enterprise liability, or statutory cases (subject to the final outcome of the Santa Clara case discussed below),
- no final, non-appealable adverse verdicts have ever been entered against NL (subject to the final outcome of the Santa Clara case discussed below), and
- we have never ultimately been found liable with respect to any such litigation matters, including over 100 cases over a twenty-year period for which we were previously a party and for which we have been dismissed without any finding of liability (subject to the final outcome of the Santa Clara case discussed below).

Accordingly, other than with respect to the Santa Clara case discussed below, we have not accrued any amounts for any of the pending lead pigment and lead-based paint litigation cases filed by or on behalf of states, counties, cities or their public housing authorities and school districts, or those asserted as class actions other than the Santa Clara case noted below. In addition, we have determined that liability to us which may result, if any, cannot be reasonably estimated at this time because there is no prior history of a loss of this nature on which an estimate could be made and there is no substantive information available upon which an estimate could be based.

In one of these lead pigment cases, in April 2000 we were served with a complaint in *County of Santa Clara v. Atlantic Richfield Company, et al*. (Superior Court of the State of California, County of Santa Clara, Case No. 1-00-CV-788657) brought by a number of California government entities against the former pigment manufacturers, the LIA and certain paint manufacturers. The County of Santa Clara sought to recover compensatory damages for funds the plaintiffs have expended or would in the future expend for medical treatment, educational expenses, abatement or other costs due to exposure to, or potential exposure to, lead paint, disgorgement of profit, and punitive damages. In July 2003, the trial judge granted defendants' motion to dismiss all remaining claims. Plaintiffs appealed and the intermediate appellate court reinstated public nuisance, negligence, strict liability, and fraud claims in March 2006. A fourth amended complaint was filed in March 2011 on behalf of The People of California by the County Attorneys of Alameda, Ventura, Solano, San Mateo, Los Angeles and Santa Clara, and the City Attorneys of San Francisco, San Diego and Oakland. That complaint alleged that the presence of lead paint created a public nuisance in each of the prosecuting jurisdictions and sought its abatement. In July and August 2013, the case was tried. In January 2014, the Judge issued a judgment finding us, The Sherwin Williams Company and ConAgra Grocery Products Company jointly and severally liable for the abatement of lead paint in pre-1980 homes, and ordered the defendants to pay an aggregate $1.15 billion to the people of the State of California to fund such abatement. The trial court's judgment also found that to the extent any abatement funds remained unspent after four years, such funds were to be returned to the defendants. In February 2014, we filed a motion for a new trial, and in March 2014 the trial court denied the motion. Subsequently in March 2014, we filed a notice of appeal with the Sixth District Court of Appeal for the State of California. On November 14, 2017, the Sixth District Court of Appeal issued its opinion, upholding the trial court's judgment, except that it reversed the portion of the judgment requiring abatement of homes built between 1951 and 1980 which significantly reduced the number of homes subject to the abatement order. In addition, the appellate court ordered the case be remanded to the trial court to recalculate the amount of the abatement fund, to limit it to the amount necessary to cover the cost of investigating and remediating pre-1951 homes, and to hold an evidentiary hearing to appoint a suitable receiver. In addition, the appellate court found that we and the other defendants had the right to seek recovery from liable parties that contributed to a hazardous condition at a particular property. Subsequently, we and the other defendants filed a Petition with the California Supreme Court seeking its review of a number of issues. On February 14, 2018, the California Supreme Court denied such petition.

The Santa Clara case is unusual in that this is the second time that an adverse verdict in a public nuisance lead pigment case has been entered against NL (the first adverse verdict against us was ultimately overturned on appeal). Given the appellate court's November 2017 ruling, and the denial of an appeal by the California Supreme Court, NL previously concluded that the likelihood of a loss in this case has reached a standard of "probable" as contemplated by ASC 450.

Under the remand ordered by the appellate court, the trial court was required to, among other things, (i) recalculate the amount of the abatement fund, excluding remediation of homes built between 1951 and 1980, (ii) hold an evidentiary hearing to appoint a suitable receiver for the abatement fund and (iii) enter an order or orders setting forth its rulings on these issues. We believe any party will have a right to appeal any of these new decisions to be made by the trial court from the remand of the case. Several uncertainties will still exist with respect to the new decisions to be made by the trial court from the remand of the case, including the following:

- The appellate court remanded the case back to the trial court to recalculate the total amount of the abatement, limiting the abatement to pre-1951 homes. In this regard, NL and the other defendants filed a brief with the trial court proposing a recalculated maximum abatement fund amount of no more than $409 million and plaintiffs filed a brief proposing an abatement fund amount of $730 million. In September 2018, following a case-management hearing regarding the recalculated abatement fund amount held in August 2018, the trial court issued an order setting the recalculated amount of the abatement fund at $409 million.
- The appellate court upheld NL's and the other defendants' right to seek contribution from other liable parties (e.g. property owners who have violated the applicable housing code) on a house-by-house basis. The method by which the trial court would undertake to determine such house-by-house responsibility, and the outcome of such a house-by-house determination, is not presently known;
- Participation in any abatement program by each homeowner is voluntary, and each homeowner would need to consent to allowing someone to come into the home to undertake any inspection and abatement, as well as consent to the nature, timing and extent of any abatement. The original trial court's judgment unrealistically assumed 100% participation by the affected homeowners. Actual participation rates are likely to be less than 100% (the ultimate extent of participation is not presently known);
- The remedy ordered by the trial court is an abatement fund. The trial court ordered that any funds unspent after four years are to be returned to the defendants (this provision of the trial court's original judgment was not overturned by the appellate court). As noted above, the actual number of homes which would participate in any abatement, and the nature, timing and extent of any such abatement, is not presently known; and
- We and the other two defendants are jointly and severally liable for the abatement, which means we or either of the two other defendants could ultimately be responsible for payment of the full amount of the abatement fund. However, we do not believe any individual defendant would be 100% responsible for the cost of any abatement, and the allocation of the recalculated amount of the abatement fund ($409 million, as explained below) among the three defendants has not yet been determined.

In May 2018, we and the plaintiffs entered into a settlement agreement pursuant to which, as supplemented, the plaintiffs would be paid an aggregate of $80 million, in return for which we would be dismissed from the case with prejudice and all pending and future claims, causes of action, cross-complaints, actions or proceedings against us and our affiliates for indemnity, contribution, reimbursement or declaratory relief in respect to the case would be barred, discharged and enjoined as a matter of applicable law. Of such $80 million, $65 million would be paid by us and $15 million would be provided by one of our former insurance carriers that has previously placed such amount on deposit with the trial court in satisfaction of potential liability such former carrier might have with respect to the case under certain insurance policies we had with such former carrier. Of such $65 million which would be paid by us, $45 million would be paid upon approval of the terms of the settlement, and the remaining $20 million would be paid in five annual installments beginning four years from such approval ($6 million for the first installment, $5 million for the second installment and $3 million for each of the third, fourth and fifth installments). The settlement agreement is subject to a number of conditions including the trial court's approval of the terms of the settlement (which trial court approval includes a determination that such settlement agreement meets the standards for a "good faith" settlement under applicable California law). The other defendants filed motions with the trial court objecting to the terms of the settlement.

With all of the uncertainties that exist with respect to the new decisions to be made by the trial court from the remand of the case, as noted above, we had previously concluded that the amount of such loss could not be reasonably estimated (nor could a range of loss be reasonably estimated). However, the terms of the settlement agreement entered into by us and the plaintiffs in May 2018, as supplemented, provides evidence that the amount of the loss to us could be reasonably estimated (and provides evidence of the low end of a range of loss to us). For financial reporting purposes, we discounted the five payments aggregating $20 million to be paid in installments to their estimated net present value, using a discount rate of 3.0% per annum. Such net present value is $17 million, and we would begin to accrete such present value amount upon approval of the settlement agreement. Accordingly, in the second quarter of 2018 we recognized a net $62 million pre-tax charge with respect to this matter ($45 million for the amount to be paid by us upon approval of the terms of the settlement and $17 million for the net present value of the five payments aggregating $20 million to be paid by us in installments beginning four years from such approval), representing the net amount we would pay in full settlement of our liability under the terms of the proposed settlement agreement. For purposes of our Consolidated Balance Sheet, we have presented the aggregate $45 million that would be paid to the plaintiffs upon approval of the terms of the settlement and the $15 million that would be paid to the plaintiffs from the amount placed on deposit with the trial court by one of our former insurance carriers (for a total of $60 million) as a current liability, $17 million for the net present value of the five payments aggregating $20 million to be paid by us in installments beginning four years from such approval as a noncurrent liability and the $15 million portion of such aggregate $80 million undiscounted amount which would be funded from the amount placed on deposit with the trial court by one of our former insurance carriers as a current insurance recovery receivable.

In July 2018, we and the other defendants filed appeals with the U.S. Supreme Court, seeking its review of two federal issues in the trial court's original judgment. Review by the U.S. Supreme Court is discretionary, and in October 2018 the U.S. Supreme Court denied the petitions for the Court to hear such appeals.

In September 2018, following a case-management hearing regarding the recalculated abatement fund amount held in August 2018, the trial court issued an order setting the recalculated amount of the abatement fund at $409 million. Also in September 2018, the trial court denied approval of the settlement agreement, finding among other things that the settlement agreement did not meet the standards for a "good faith" settlement under applicable California law.

Subsequently in October 2018, we filed an appeal of the trial court's denial of approval of the settlement agreement with the Sixth District Court of Appeal for the State of California, asserting among other things that in denying such approval the trial court made several legal errors in applying applicable California law to the terms of the settlement. The plaintiffs filed a brief in support of our appeal. The appellate court has discretion whether to hear such appeal, and the appellate court has not yet issued its decision as to whether it will hear such appeal. There can be no assurance that the appellate court will agree to hear such appeal, or if it agrees to hear such appeal, that it would rule in favor of us and approve the settlement agreement. We continue to believe the settlement agreement satisfies the standards for a "good faith" settlement under applicable California law.

The trial court has selected a receiver for the abatement fund, but the terms of an order appointing the receiver have not been determined and will be the subject of a further hearing scheduled in March 2019. The trial court has also stated it will not enter the judgment in the case until after the Sixth District Court of Appeal determines whether to hear the appeal regarding our settlement agreement. We expect the judgment will require full payment of all amounts due by us and the other defendants in respect to the abatement fund within sixty days of entry of the judgment.

If the appellate court does not reverse the trial court decision and approve the terms of this or any other settlement agreement between us and the plaintiffs, the proceedings in the trial court under the remand, as discussed above, would continue. In such event, NL's share of the recalculated amount of the abatement fund ($409 million) is not presently known, and other uncertainties exist with respect to the new decisions to be made by the trial court from the remand of the case, as discussed above, including but not limited to the final amount of the abatement fund which will ultimately be expended, particularly because participation in the abatement program by eligible homeowners is voluntary and the ultimate extent of participation and how the abatement fund will be administered is uncertain. As with any legal proceeding, there is no assurance that any appeal would be successful, and it is reasonably possible, based on the outcome of the appeals process and the remand proceedings in the trial court, that NL may in the future incur liability resulting in the recognition of an additional loss contingency accrual that could have a material adverse impact on our results of operations, financial position and liquidity.

In June 2000, a complaint was filed in Illinois state court, *Lewis, et al. v. Lead Industries Association, et al* (Circuit Court of Cook County, Illinois, County Department, Chancery Division, Case No. 00CH09800.) Plaintiffs seek to represent two classes, one consisting of minors between the ages of six months and six years who resided in housing in Illinois built before 1978, and another consisting of individuals between the ages of six and twenty years who lived in Illinois housing built before 1978 when they were between the ages of six months and six years and who had blood lead levels of 10 micrograms/deciliter or more. The complaint seeks damages jointly and severally from the former pigment manufacturers and the LIA to establish a medical screening fund for the first class to determine blood lead levels, a medical monitoring fund for the second class to detect the onset of latent diseases and a fund for a public education campaign. In April 2008, the trial court judge certified a class of children whose blood lead levels were screened venously between August 1995 and February 2008 and who had incurred expenses associated with such screening. In March 2012, the trial court judge decertified the class. In June 2012, the trial court judge granted plaintiffs the right to appeal his decertification order, and in August 2012 the appellate court granted plaintiffs permission to appeal. In March 2013, the appellate court agreed with the trial court's rationale regarding legislative requirements to screen children's blood lead levels and remanded the case for further proceedings in the trial court. In July 2013, plaintiffs moved to vacate the decertification. In October 2013, the judge denied plaintiffs' motion to vacate the decertification of the class. In March 2014, plaintiffs filed a new class certification motion. In April 2015, a class was certified consisting of parents or legal guardians of children who lived in certain "high risk" areas in Illinois between August 18, 1995 and February 19, 2008, and incurred an expense or liability for having their children's blood lead levels tested. In January 2019, the Illinois Supreme Court agreed to hear an interlocutory appeal addressing whether certain parents whose children's lead testing costs were fully paid by Medicaid fell within the certified class of persons who had incurred an expense for such testing. A favorable resolution of that issue could result in a reduction in the number of persons in the certified class.

In November 2018, NL was served with two complaints filed by county governments in Pennsylvania. Each county alleges that NL and several other defendants created a public nuisance by selling and promoting lead-containing paints and pigments in the counties. The plaintiffs seek abatement and declaratory relief. We believe these lawsuits are inconsistent with Pennsylvania law and without merit, and we intend to defend ourselves vigorously.

New cases may continue to be filed against us. We cannot assure you that we will not incur liability in the future in respect of any of the pending or possible litigation in view of the inherent uncertainties involved in court and jury rulings. In the future, if new information regarding such matters becomes available to us (such as a final, non-appealable adverse verdict against us or otherwise ultimately being found liable with respect to such matters), at that time we would consider such information in evaluating any remaining cases then-pending against us as to whether it might then have become probable we have incurred liability with respect to these matters, and whether such liability, if any, could have become reasonably estimable. The resolution of any of these cases could result in the recognition of a loss contingency accrual that could have a material adverse impact on our net income for the interim or annual period during which such liability is recognized and a material adverse impact on our consolidated financial condition and liquidity.

Environmental matters and litigation

NL's operations are governed by various environmental laws and regulations. Certain of NL's businesses 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. NL has implemented and continues to implement various policies and programs in an effort to minimize these risks. NL's policy is to maintain compliance with applicable environmental laws and regulations at all of our plants and to strive to improve environmental performance. From time to time, NL 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, could adversely affect our production, handling, use, storage, transportation, sale or disposal of such substances. We believe that all of our facilities are in substantial compliance with applicable environmental laws.

Certain properties and facilities used in NL's former operations, including divested primary and secondary lead smelters and former mining locations, are the subject of civil litigation, administrative proceedings or investigations arising under federal and state environmental laws and common law. Additionally, in connection with past operating practices, NL is currently involved as a defendant, potentially responsible party (PRP) or both, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (CERCLA), and similar state laws in various governmental and private actions associated with waste disposal sites, mining locations, and facilities that we or our predecessors, our subsidiaries or their predecessors currently or previously owned, operated or used, certain of which are on the United States Environmental Protection Agency's (EPA) Superfund National Priorities List or similar state lists. These proceedings seek cleanup costs, damages for personal injury or property damage and/or damages for injury to natural resources. Certain of these proceedings involve claims for substantial amounts. Although we may be jointly and severally liable for these costs, in most cases we are only one of a number of PRPs who may also be jointly and severally liable, and among whom costs may be shared or allocated. In addition, we are occasionally named as a party in a number of personal injury lawsuits filed in various jurisdictions alleging claims related to environmental conditions alleged to have resulted from our operations.

Obligations associated with environmental remediation and related matters are difficult to assess and estimate for numerous reasons including the:

- complexity and differing interpretations of governmental regulations,
- number of PRPs and their ability or willingness to fund such allocation of costs,
- financial capabilities of the PRPs and the allocation of costs among them,
- solvency of other PRPs,
- multiplicity of possible solutions,
- number of years of investigatory, remedial and monitoring activity required,
- uncertainty over the extent, if any, to which our former operations might have contributed to the conditions allegedly giving rise to such personal injury, property damage, natural resource and related claims and
- number of years between former operations and notice of claims and lack of information and documents about the former operations.

In addition, the imposition of more stringent standards or requirements under environmental laws or regulations, new developments or changes regarding site cleanup costs or the allocation of costs among PRPs, solvency of other PRPs, the results of future testing and analysis undertaken with respect to certain sites or a determination that we are potentially responsible for the release of hazardous substances at other sites, could cause our expenditures to exceed our current estimates. We cannot assure you that actual costs will not exceed accrued amounts or the upper end of the range for sites for which estimates have been made, and we cannot assure you that costs will not be incurred for sites where no estimates presently can be made. Further, additional environmental and related matters may arise in the future. If we were to incur any future liability, this could have a material adverse effect on our consolidated financial statements, results of operations and liquidity.

We record liabilities related to environmental remediation and related matters (including costs associated with damages for personal injury or property damage and/or damages for injury to natural resources) when estimated future expenditures are probable and reasonably estimable. We adjust such accruals as further information becomes available to us or as circumstances change. Unless the amounts and timing of such estimated future expenditures are fixed and reasonably determinable, we generally do not discount estimated future expenditures to their present value due to the uncertainty of the timing of the payout. We recognize recoveries of costs from other parties, if any, as assets when their receipt is deemed probable. We recognize recoveries of costs from other parties, if any, as assets when their receipt is deemed probable. At December 31, 2017 we had not recognized any receivables for recoveries and at December 31, 2018, we have recognized $15.0 million of receivables for recoveries related to the lead pigment litigation in California discussed above.

We do not know and cannot estimate the exact time frame over which we will make payments for our accrued environmental and related costs. The timing of payments depends upon a number of factors, including but not limited to the timing of the actual remediation process; which in turn depends on factors outside of our control. At each balance sheet date, we estimate the amount of our accrued environmental and related costs which we expect to pay within the next twelve months, and we classify this estimate as a current liability. We classify the remaining accrued environmental costs as a noncurrent liability.

On a quarterly basis, we evaluate the potential range of our liability for environmental remediation and related costs at sites where we have been named as a PRP or defendant, including sites for which our wholly-owned environmental management subsidiary, NL Environmental Management Services, Inc., (EMS), has contractually assumed our obligations. At December 31, 2018, NL had accrued approximately $98 million related to approximately 35 sites associated with remediation and related matters that NL believes are at the present time and/or in their current phase reasonably estimable. The upper end of the range of reasonably possible costs to NL for remediation and related matters for which NL believes it is possible to estimate costs is approximately $117 million, including the amount currently accrued.

NL believes that it is not reasonably possible to estimate the range of costs for certain sites. At December 31, 2018, there were approximately 5 sites for which it is not currently able to reasonably estimate a range of costs. For these sites, generally the investigation is in the early stages, and we are unable to determine whether or not we actually had any association with the site, the nature of our responsibility, if any, for the contamination at the site and the extent of contamination at and cost to remediate the site. The timing and availability of information on these sites is dependent on events outside of our control, such as when the party alleging liability provides information to NL. At certain of these previously inactive sites, NL has received general and special notices of liability from the EPA and/or state agencies alleging that we, sometimes with other PRPs, are liable for past and future costs of remediating environmental contamination allegedly caused by former operations. These notifications may assert that NL, along with any other alleged PRPs, are liable for past and/or future clean-up costs. As further information becomes available to us for any of these sites, which would allow us to estimate a range of costs, we would at that time adjust our accruals. Any such adjustment could result in the recognition of an accrual that would have a material effect on our consolidated financial statements, results of operations and liquidity.

In June 2008, NL received a Directive and Notice to Insurers from the New Jersey Department of Environmental Protection (NJDEP) regarding the Margaret's Creek site in Old Bridge Township, New Jersey. NJDEP alleged that a waste hauler transported waste from one of its former facilities for disposal at the site in the early 1970s. NJDEP referred the site to the EPA, and in November 2009, the EPA added the site to the National Priorities List under the name "Raritan Bay Slag Site." In 2012, EPA notified NL of its potential liability at this site. In May 2013, EPA issued its Record of Decision for the site. In June 2013, NL filed a contribution suit under CERCLA and the New Jersey Spill Act titled *NL Industries, Inc. v. Old Bridge Township, et al*. (United States District Court for the District of New Jersey, Civil Action No. 3:13-cv-03493-MAS-TJB) against the current owner, Old Bridge Township, and several federal and state entities NL alleges designed and operated the site and who have significant potential liability as compared to NL which is alleged to have been a potential source of material placed at the site by others. NL's suit also names certain former NL customers of the former NL facility alleged to be the source of some of the materials. In January 2014, EPA issued a UAO to NL for clean-up of the site based on the EPA's preferred remedy set forth in the Record of Decision. NL is in discussions with EPA about NL's performance of a defined amount of the work at the site and is otherwise taking actions necessary to respond to the UAO. If these discussions and actions are unsuccessful, NL will defend vigorously against all claims while continuing to seek contribution from other PRPs. In March 2017, in a parallel lawsuit initiated by NL in State court against the State of New Jersey, which has significant potential liability as compared to NL, the New Jersey Supreme Court ruled that the State of New Jersey had not waived its immunity under the Spill Act for its pre-1977 conduct. In August 2017, NL filed an amended complaint in the State court alleging post-1977 conduct by the State that led to contamination. In September 2017, the State filed its answer and counterclaims. NL has denied liability on the State's counterclaims and intends to continue to seek contribution from the State.

In August 2009, NL was served with a complaint in *Raritan Baykeeper, Inc. d/b/a NY/NJ Baykeeper et al. v. NL Industries, Inc. et al.* (United States District Court, District of New Jersey, Case No. 3:09-cv-04117). This is a citizen's suit filed by two local environmental groups pursuant to the Resource Conservation and Recovery Act and the Clean Water Act against NL, current owners, developers and state and local government entities. The complaint alleges that hazardous substances were and continue to be discharged from our former Sayreville, New Jersey property into the sediments of the adjacent Raritan River. The former Sayreville site is currently being remediated by owner/developer parties under the oversight of the NJDEP. The plaintiffs seek a declaratory judgment, injunctive relief, imposition of civil penalties and an award of costs. NL has denied liability and will defend vigorously against all claims.

In June 2011, NL was served in *ASARCO LLC v. NL Industries, Inc., et al.* (United States District Court, Western District of Missouri, Case No. 4:11-cv-00138-DGK). The plaintiff brought this CERCLA contribution action against several defendants to recover a portion of the amount it paid in settlement with the U.S. Government during its Chapter 11 bankruptcy in relation to the Tar Creek site, the Cherokee County Superfund Site in southeast Kansas, the Oronogo-Duenweg Lead Mining Belt Superfund Site in Jasper County, Missouri and the Newton County Mine Tailing Site in Newton County, Missouri. NL has denied liability and will defend vigorously against all of the claims. In the second quarter of 2012, NL filed a motion to stay the case. In the first quarter of 2013, NL's motion was granted and the court entered an indefinite stay. In the first quarter of 2015, Asarco was granted permission to seek an interlocutory appeal of that stay order. In March 2015, the Eighth Circuit Court of Appeals denied Asarco's request for an interlocutory appeal of the stay order and the trial court's indefinite stay remains in place.

In September 2011, NL was served in *ASARCO LLC v. NL Industries, Inc., et al.* (United States District Court, Eastern District of Missouri, Case No. 4:11-cv-00864). The plaintiff brought this CERCLA contribution action against several defendants to recover a portion of the amount it paid in settlement with the U.S. Government during its Chapter 11 bankruptcy in relation to the Southeast Missouri Mining District. In May 2015, the trial court on its own motion entered an indefinite stay of the litigation. In June 2015, Asarco filed an appeal of the stay in the Eighth Circuit Court of Appeals. NL has moved to dismiss that appeal as improperly filed. In October 2015, the Eighth Circuit Court of Appeals granted NL's motion to dismiss Asarco's appeal and the trial court's indefinite stay remains in place.

In July 2012, NL was served in *EPEC Polymers, Inc., v. NL Industries, Inc.*, (United States District Court for the District of New Jersey, Case 3:12-cv-03842-PGS-TJB). The plaintiff, a landowner of property located across the Raritan River from NL's former Sayreville, New Jersey operation, claims that contaminants from NL's former Sayreville operation came to be located on its land. The complaint seeks compensatory and punitive damages and alleges, among other things, trespass, private nuisance, negligence, strict liability, and claims under CERCLA and the New Jersey Spill Act. In April 2016, the case was stayed and administratively terminated pending court-ordered mediation. In October 2017, the parties informed the court that further mediation would not be fruitful. The case was reopened in December 2017. NL will continue to deny liability and defend vigorously against all of the claims.

In March 2013, NL received Special Notice from EPA for Operable Unit 1 (OU1), residential area, at the Big River Mine Tailings Superfund Site in St. Francois County, Missouri. The site encompasses approximately eight former mine and mill areas, only one of which is associated with former NL operations, as well as adjacent residential areas. NL initiated a dialog with EPA regarding a potential settlement for this operable unit. In October 2018, NL and the United States entered into a consent decree for OU1. The consent decree was approved by the Court in November 2018 and NL paid all sums due under the consent decree in December 2018. NL's liability for OU1 is now resolved.

In September 2013, EPA issued to NL and 34 other PRPs general notice of potential liability and a demand for payment of past costs and performance of a Remedial Design for the Gowanus Canal Superfund Site in Brooklyn, New York. In March 2014, EPA issued a UAO to NL and approximately 27 other PRPs for performance of the Remedial Design at the site. EPA contends that NL is liable as the alleged successor to the Doehler Die Casting Company, and therefore responsible for any potential contamination at the Site resulting from Doehler's ownership/operation of a warehouse and a die casting plant it owned 90 years ago. NL believes that it has no liability at the Site. NL is currently in discussions with EPA regarding a *de minimis* settlement and is otherwise taking actions necessary to respond to the UAO. If these discussions are unsuccessful, NL will continue to deny liability and will defend vigorously against all of the claims.

In June 2016, NL and one other party received special notice from EPA for Operable Unit 2 of the Madison County Mines Superfund Site near Fredericktown, Missouri. The Site includes several mining properties in Madison County, Missouri. Operable Unit 2 is a former cobalt mine and refinery that is now owned by another mining company. In the special notice, EPA requested that NL and the other mining company agree to perform a Remedial Investigation/Feasibility Study for Operable Unit 2. NL initiated a dialog with EPA regarding the special notice. In 2018 the cobalt mine portion of the property was sold to a third party. As part of the sale, the buyer agreed to perform any necessary work to manage and perform necessary environmental response actions at the cobalt mine portion of the site.

In August 2017, NL was served in *Refined Metals Corporation v. NL Industries, Inc.*, (United States District Court for the Southern District of Indiana, Case 1:17-cv-2565). This is a CERCLA and state law contribution action brought by the current owner of a former secondary lead smelting facility located in Beech Grove, Indiana. NL intends to deny liability and will defend vigorously against all claims. In September 2018, the court dismissed the case, holding that all federal claims brought against NL were barred by the statute of limitations and finding that the court lacked jurisdiction to consider the state law claims. In October 2018, Refined Metals filed an appeal with the federal court of appeals. NL will continue to deny liability and will vigorously defend against all claims in the court of appeals.

Other Litigation

NL—– NL has been named as a defendant in various lawsuits in several jurisdictions, alleging personal injuries as a result of occupational exposure primarily to products manufactured by our former operations containing asbestos, silica and/or mixed dust. In addition, some plaintiffs allege exposure to asbestos from working in various facilities previously owned and/or operated by NL. There are 109 of these types of cases pending, involving a total of approximately 584 plaintiffs. In addition, the claims of approximately 8,676 plaintiffs have been administratively dismissed or placed on the inactive docket in Ohio courts. We do not expect these claims will be re-opened unless the plaintiffs meet the courts' medical criteria for asbestos-related claims. We have not accrued any amounts for this litigation because of the uncertainty of liability and inability to reasonably estimate the liability, if any. To date, we have not been adjudicated liable in any of these matters. Based on information available to us, including:

- facts concerning historical operations,
- the rate of new claims,
- the number of claims from which we have been dismissed, and
- our prior experience in the defense of these matters,

We believe that the range of reasonably possible outcomes of these matters will be consistent with our historical costs (which are not material). Furthermore, we do not expect any reasonably possible outcome would involve amounts material to our consolidated financial position, results of operations or liquidity. We have sought and will continue to vigorously seek, dismissal and/or a finding of no liability from each claim. In addition, from time to time, we have received notices regarding asbestos or silica claims purporting to be brought against former subsidiaries, including notices provided to insurers with which we have entered into settlements extinguishing certain insurance policies. These insurers may seek indemnification from us.

In addition to the matters described above, we and our affiliates are also involved in various other environmental, contractual, product liability, patent (or intellectual property), employment and other claims and disputes incidental to present and former businesses. In certain cases, we have insurance coverage for these items, although we do not expect additional material insurance coverage for environmental claims. We currently believe that the disposition of all of these various other claims and disputes (including asbestos related claims), individually or in the aggregate, should not have a material adverse effect on our consolidated financial position, results of operations or liquidity beyond the accruals already provided.

Insurance Coverage Claims

NL is involved in certain legal proceedings with a number of its former insurance carriers regarding the nature and extent of the carriers' obligations to NL under insurance policies with respect to certain lead pigment and asbestos lawsuits. The issue of whether insurance coverage for defense costs or indemnity or both will be found to exist for our lead pigment and asbestos litigation depends upon a variety of factors and we cannot assure you that such insurance coverage will be available.

NL has agreements with four former insurance carriers pursuant to which the carriers reimburse it for a portion of our future lead pigment litigation defense costs, and one such carrier reimburses us for a portion of its future asbestos litigation defense costs. We are not able to determine how much we will ultimately recover from these carriers for defense costs incurred by us because of certain issues that arise regarding which defense costs qualify for reimbursement. While NL continues to seek additional insurance recoveries, we do not know if it will be successful in obtaining reimbursement for either defense costs or indemnity. Accordingly, we recognize insurance recoveries in income only when receipt of the recovery is probable and we are able to reasonably estimate the amount of the recovery.

In January 2014, we were served with a complaint in *Certain Underwriters at Lloyds, London, et al v. NL Industries, Inc.* (Supreme Court of the State of New York, County of New York, Index No. 14/650103). The plaintiff, a former insurance carrier of ours, is seeking a declaratory judgment of its obligations to us under insurance policies issued to us by the plaintiff with respect to certain lead pigment lawsuits. Other insurers have been added as parties to the case and have also sought a declaratory judgment regarding their obligations under certain insurance policies. NL has filed a counterclaim seeking a declaratory judgment that all of the insurers are obligated to provide NL with certain coverage and seeking damages for breach of contract. The case is now proceeding in the trial court. We believe the insurers' claims are without merit and we intend to defend NL's rights and prosecute NL's claims in this action vigorously.

In February 2014, we were served with a complaint in *Zurich American Insurance Company, as successor-in-interest to Zurich Insurance Company, U.S. Branch vs. NL Industries, Inc., and The People of the State of California, acting by and through county Counsels of Santa Clara, Alameda, Los Angeles, Monterey, San Mateo, Solano and Ventura Counties and the city Attorneys of Oakland, San Diego, and San Francisco, et al* (Superior Court of California, County of Santa Clara, Case No.: 1-14-CV-259924). In January 2015, an Order of Deposit Under CCP § 572 was entered by the trial court.

NL has settled insurance coverage claims concerning environmental claims with certain of its principal former carriers. We do not expect further material settlements relating to environmental remediation coverage.

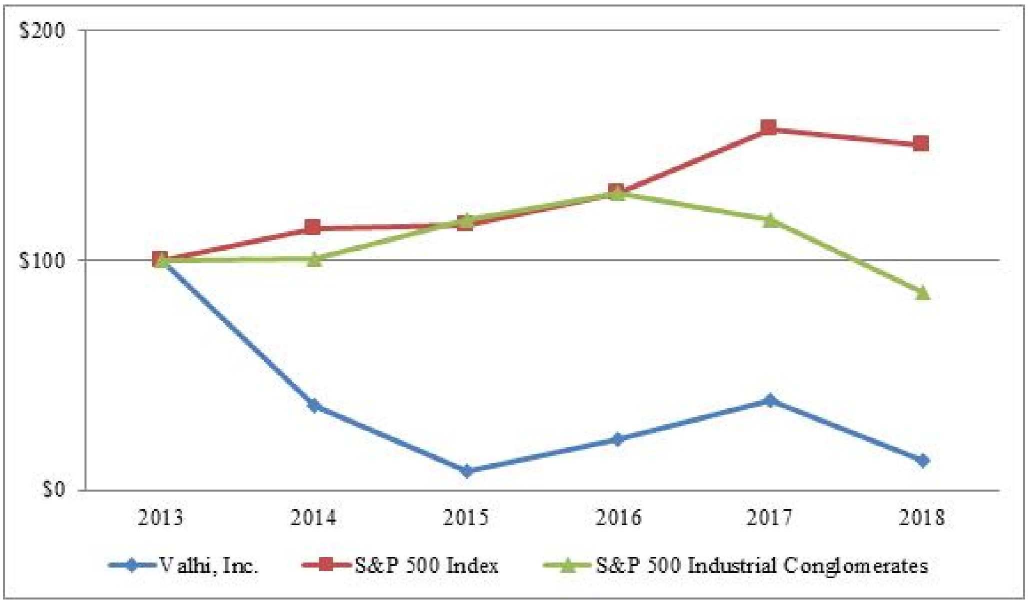
ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

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

Common Stock and Dividends—Our common stock is listed and traded on the New York Stock Exchange (symbol: VHI). As of March 1, 2019, there were approximately 1,700 holders of record of our common stock.

Performance Graph—Set forth below is a 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 Price Index and the S&P 500 Industrial Conglomerates Index for the period from December 31, 2013 through December 31, 2018. The graph shows the value at December 31 of each year assuming an original investment of $100 at December 31, 2013, and assumes the reinvestment of our regular quarterly dividends in shares of our stock.



	December 31,					
	2013	2014	2015	2016	2017	2018
Valhi common stock	$ 100	$ 37	$ 8	$ 22	$ 39	$ 13
S&P 500 Composite Stock Price Index	100	114	115	129	157	150
S&P 500 Industrial Conglomerates Index	100	101	118	128	118	86

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, as amended, 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, an aggregate of 124,000 shares were available for future award under this plan. See Note 16 to our Consolidated Financial Statements.

Treasury Stock Purchases—In March 2005, our board of directors authorized the repurchase of up to 5.0 million shares of our common stock in open market transactions, including block purchases, or in privately negotiated transactions, which may include transactions with our affiliates. In November 2006, our board of directors authorized the repurchase of an additional 5.0 million shares. We may purchase the 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 could terminate the program prior to completion. We will use our cash on hand to acquire the shares. Repurchased shares will be retired and cancelled or may be added to our treasury stock and used for employee benefit plans, future acquisitions or other corporate purposes. See Note 16 to our Consolidated Financial Statements.

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data for the years ended December 31, 2015, 2016, 2017 and 2018 has been derived from our audited Consolidated Financial Statements. For the year ended December 31, 2014, the following selected financial data has been derived from our accounting records. The following selected financial data should be read in conjunction with our Consolidated Financial Statements and related Notes and Item 7—"Management's Discussion and Analysis of Financial Condition and Results of Operations."

	Years ended December 31,				
	2014	2015	2016[1]	2017	**2018**
	(In millions, except per share data)				
STATEMENTS OF OPERATIONS DATA:					
Net sales:					
Chemicals	$ 1,651.9	$ 1,348.8	$ 1,364.3	$ 1,729.0	**$ 1,661.9**
Component products	103.9	109.0	108.9	112.0	**118.2**
Real estate management and development	40.3	30.1	46.2	38.4	**40.0**
Total net sales	$ 1,796.1	$ 1,487.9	$ 1,519.4	$ 1,879.4	**$ 1,820.1**
Operating income (loss):					
Chemicals[2]	$ 168.5	$ 19.2	$ 102.8	$ 358.5	**$ 342.9**
Component products	13.6	14.0	15.6	15.2	**17.8**
Real estate management and development	2.0	—	.8	6.6	**10.0**
Total operating income (loss)	$ 184.1	$ 33.2	$ 119.2	$ 380.3	**$ 370.7**
Net income (loss)	$ 85.6	$ (171.1)	$ (3.0)	$ 302.6	**$ 301.0**
Amounts attributable to Valhi stockholders:					
Income (loss) from continuing operations	$ 59.9	$ (111.9)	$ 8.1	$ 316.7	**$ 228.1**
Income (loss) from discontinued operations[1]	(6.1)	(21.7)	(24.0)	(109.2)	**34.1**
Net income (loss)	$ 53.8	$ (133.6)	$ (15.9)	$ 207.5	**$ 262.2**
DILUTED EARNINGS PER SHARE DATA:					
Net income (loss) attributable to Valhi stockholders:					
Income (loss) from continuing operations	$ .18	$ (.33)	$ .02	$ .93	**$ .67**
Loss from discontinued operations[1]	(.02)	(.06)	(.07)	(.32)	**.10**
Net income (loss)	$ .16	$ (.39)	$ (.05)	$ .61	**$ .77**
Cash dividends	$ .11	$ .08	$ .08	$ .08	**$ .08**
Weighted average common shares outstanding	342.0	342.0	342.0	342.0	**342.0**
STATEMENTS OF CASH FLOW DATA:					
Cash provided by (used in):					
Operating activities	$ 67.3	$ 22.1	$ 79.8	$ 259.3	**$ 165.5**
Investing activities	(73.7)	(54.1)	(61.6)	(74.4)	**(57.0)**
Financing activities	110.2	(10.6)	(45.5)	93.6	**(59.8)**
BALANCE SHEET DATA (at year end):					
Total assets	$ 2,945.2	$ 2,537.4	$ 2,443.2	$ 2,907.5	**$ 2,709.6**
Long-term debt [3]	843.2	879.7	889.3	1,041.5	**797.5**
Valhi stockholders' equity	477.6	268.7	200.9	424.4	**635.4**
Total equity	813.9	526.9	444.4	766.7	**989.0**

(1) In January 2018 we completed the sale of our Waste Management Segment. The results of operations of our Waste Management Segment have been reclassified as discontinued operations in our Consolidated Statements of Operations for all periods presented. See Note 3 to our Consolidated Financial Statements.

(2) 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, Chemicals Segment operating income 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 20 to our Consolidated Financial Statements.

(3) Excludes any indebtedness of our Waste Management Segment. The assets and liabilities of our Waste Management Segment have been reclassified as discontinued operations in our Consolidated Balance Sheet for all periods presented. See Note 3 to our Consolidated Financial Statements.

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

RESULTS OF OPERATIONS

Business Overview

We are primarily a holding company. We operate through our wholly-owned and majority-owned subsidiaries, including NL Industries, Inc., Kronos Worldwide, Inc., CompX International, Inc., Tremont LLC, Basic Management, Inc. ("BMI") and the LandWell Company ("LandWell"). Kronos (NYSE: KRO), NL (NYSE: NL) and CompX (NYSE American: CIX) each file periodic reports with the SEC.

On January 26, 2018 we completed the sale of our Waste Management Segment to JFL-WCS Partners, LLC ("JFL Partners"), an entity sponsored by certain investment affiliates of J.F. Lehman & Company, for consideration consisting of the assumption of all of WCS' third-party indebtedness and other liabilities. Accordingly the results of operations of our Waste Management Segment is reflected as discontinued operations in our Consolidated Statements of Operations for all periods presented. We recognized a pre-tax gain of approximately $58 million on the transaction in the first quarter of 2018 because the carrying value of the liabilities of the business assumed by the purchaser exceeded the carrying value of the assets sold at the time of sale in large part due to a long-lived asset impairment of $170.6 million recognized with respect to the Waste Management Segment in the second quarter of 2017. Such pre-tax gain is classified as part of discontinued operations. Our Waste Management Segment, which operated in the low-level radioactive, hazardous, toxic and other waste disposal industry historically struggled to generate sufficient recurring disposal volumes to generate positive operating results or cash flows. We believe the sale will enable us to focus more effort on continuing to develop our remaining segments which we believe have greater opportunity for higher returns. See Note 3 to our Consolidated Financial Statements.

We have three consolidated reportable operating segments:

- *Chemicals*—Our chemicals segment is operated through our majority control of Kronos. Kronos is a leading global producer and marketer of value-added titanium dioxide pigments ("TiO_2"). TiO_2 is used to impart whiteness, brightness, opacity and durability to a wide variety of products, including paints, plastics, paper, fibers and ceramics. Additionally, TiO_2 is a critical component of everyday applications, such as coatings, plastics and paper, as well as many specialty products such as inks, foods and cosmetics.
- *Component Products*—We operate in the component products industry through our majority control of CompX. CompX is a leading manufacturer of security products used in the recreational transportation, postal, office and institutional furniture, cabinetry, tool storage, healthcare and a variety of other industries. CompX is also a leading manufacturer of stainless steel exhaust systems, gauges, throttle controls, wake enhancements systems and trim tabs for the recreational marine industry.
- *Real Estate Management and Development*—We operate in real estate management and development through our majority control of BMI and LandWell. BMI provides utility services to certain industrial and municipal customers and owns real property in Henderson, Nevada. LandWell is engaged in efforts to develop certain land holdings for commercial, industrial and residential purposes in Henderson, Nevada.

Income (Loss) from Continuing Operations Overview

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017—

We reported net income from continuing operations attributable to Valhi stockholders of $228.1 million or $.67 per diluted share in 2018 compared to $316.7 million or $.93 per diluted share in 2017.

Our net income from continuing operations attributable to Valhi stockholders decreased from 2017 to 2018 primarily due to the net effects of:

- the recognition of an aggregate non-cash deferred income tax benefit of $112 million in 2018 related to a change in the deferred income tax liability related to our investment in Kronos, net of the revaluation of such change resulting from the reduction in the U.S. federal corporate income tax rate as a result of the 2017 Tax Act;
- the recognition of an aggregate non-cash deferred income tax benefit of $186.7 million in 2017 as a result of a decrease in our deferred income tax asset valuation allowance related to our Chemicals Segment's German and Belgian operations;
- a pre-tax litigation settlement expense of $62.0 million recognized in 2018;

- a securities transaction gain of $12.5 million recognized in 2018 related to the sale of our interest in Amalgamated Sugar Company LLC ("Amalgamated");
- recognition of a gain on sale of land of $12.5 million in 2018;
- an aggregate charge of $7.1 million recognized in 2017 related to the loss on prepayment of debt;
- lower operating income from our Chemicals Segments in 2018 compared to 2017 somewhat offset by higher operating income at our other segments (Component Products and Real Estate Management and Development);
- the fourth quarter 2018 recognition of a $4.0 million current cash income tax expense related to tax on global intangible low-tax income ("GILTI");
- the fourth quarter 2017 recognition of 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);
- the recognition of an $11.8 million aggregate income tax benefit in 2017 related to the execution and finalization of an Advance Pricing Agreement ("APA") 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 2017 recognition of 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;
- the fourth quarter 2017 recognition of a $77.1 million non-cash deferred income tax benefit related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income tax rate enacted as part of the 2017 Tax Act; and
- 2017 recognition of a $5.3 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.

Our net diluted income from continuing operations per share in 2018 includes:

- a non-cash deferred income tax benefit of $.33 per diluted share related to a change in the deferred income tax liability related to our investment in Kronos as a result of the 2017 Tax Act;
- a gain of $.03 per diluted share related to a securities transaction gain related to the sale of our interest in Amalgamated;
- a gain of $.03 per diluted share related to the sale of land not used in our operations;
- a charge of $.12 per diluted share related to the litigation settlement expense recognized;
- a charge of $.01 per diluted share current cash income tax expense recognized related to GILTI.

Our net diluted income from continuing operations per share in 2017 includes:

- a $.32 per diluted 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;
- a $.03 per diluted 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) recognized in the fourth quarter;
- a $.02 per diluted share income tax benefit related to the execution and finalization of an APA between Canada and Germany, mostly recognized in the third quarter;
- a $.13 per diluted 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 recognized in the fourth quarter;
- a $.22 per diluted share non-cash deferred income tax benefit related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income tax rate enacted as part of the 2017 Tax Act;
- a $.01 per diluted 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 recognized in the fourth quarter; and

- an aggregate charge of $.01 per diluted share recognized in the third quarter related to the loss on prepayment of debt.

We discuss these amounts more fully below.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016—

We reported net income from continuing operations attributable to Valhi stockholders of $316.7 million or $.93 per diluted share in 2017 compared to $8.1 million or $.02 per diluted share in 2016.

Our net income from continuing operations attributable to Valhi stockholders increased from 2016 to 2017 primarily due to the net effects of:

- higher operating income from our Chemicals and Real Estate Management and Development Segments in 2017 compared to 2016;
- the recognition of an aggregate $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;
- the fourth quarter recognition of 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);
- the recognition of an $11.8 million aggregate income tax benefit related to the execution and finalization of an APA 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 $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;
- the fourth quarter recognition of a $77.1 million non-cash deferred income tax benefit related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income tax rate enacted as part of the 2017 Tax Act;
- the fourth quarter recognition of a $5.3 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 aggregate charge of $7.1 million recognized in the third quarter of 2017 related to the loss on prepayment of debt;
- lower general and administrative expenses in 2017.

Our net diluted income from continuing operations per share in 2017 includes:

- a $.32 per diluted 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;
- a $.03 per diluted 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) recognized in the fourth quarter;
- a $.02 per diluted share income tax benefit related to the execution and finalization of an APA between Canada and Germany, mostly recognized in the third quarter;
- a $.13 per diluted 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 recognized in the fourth quarter,
- a $.22 per diluted share non-cash deferred income tax benefit related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income tax rate enacted as part of the 2017 Tax Act;
- a $.01 per diluted 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 recognized in the fourth quarter; and
- an aggregate charge of $.01 per diluted share recognized in the third quarter related to the loss on prepayment of debt.

Our diluted income from continuing operations per share attributable to Valhi stockholders in 2016 includes:

- a recognition of a net $.01 per diluted share current income tax benefit related to the execution and finalization of an Advanced Pricing Agreement associated with our Chemicals Segment;
- income of $.01 per diluted share related to business interruption insurance proceeds in our Chemicals Segment.
- a charge of $.01 per diluted share related to the contract related intangible asset impairment; and
- an aggregate non-cash income tax expense of $.02 (mostly in the fourth quarter) related to a net increase in our reserve for uncertain tax positions

We discuss these amounts more fully below.

Current Forecast for 2019—

We currently expect to report lower consolidated operating income for 2019 as compared to 2018 primarily due to the net effects of:

- lower operating income from our Chemicals Segment in 2019, 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; and
- higher operating income from our Real Estate Management and Development Segment in 2019 as we anticipate increased land development activities.

Critical accounting policies and estimates

We have based the accompanying “Management’s Discussion and Analysis of Financial Condition and Results of Operations” upon our Consolidated Financial Statements. We prepare our Consolidated Financial Statements in accordance with accounting principles generally accepted in the United States of America (“GAAP”). In many cases the accounting treatment of a particular transaction does not require us to make estimates and judgments. However, in other cases we are required 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 amounts of revenues and expenses during the reported period. On an on-going basis, we evaluate our estimates, including those related to impairments of investments in marketable securities and investments accounted for by the equity method, the recoverability of other long-lived assets (including goodwill and other intangible assets), pension benefit obligations and the underlying actuarial assumptions related thereto, the realization of deferred income and other tax assets and accruals for environmental remediation, litigation, income tax contingencies. We base our estimates on historical experience and on various other assumptions we believe are 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 might differ significantly from previously-estimated amounts under different assumptions or conditions.

Our “critical accounting policies” relate to amounts having a material impact on our financial position and results of continuing operations, and that require our most subjective or complex judgments. See Note 1 to our Consolidated Financial Statements for a detailed discussion of our significant accounting policies.

- *Goodwill*—Our net goodwill totaled $379.7 million at December 31, 2018 resulting primarily from our various step acquisitions of Kronos and NL (which occurred before the implementation of the current accounting standards related to noncontrolling interest) and to a lesser extent CompX’s purchase of various businesses. In accordance with the applicable accounting standards for goodwill, we do not amortize goodwill.

  We perform a goodwill impairment test annually in the third quarter of each year. Goodwill is also evaluated for impairment at other times whenever an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying value. A reporting unit can be a segment or an operating division based on the operations of the segment. For example, our Chemicals Segment produces a globally coordinated homogeneous product whereas our Component Products Segment operates as two distinct reporting units. If the fair value of the reporting unit is less than its book value, the goodwill is written down to estimated fair value.

  For our Chemicals Segment, we use Level 1 inputs of publicly traded market prices to compare the book value to assess impairment. We also consider control premiums when assessing fair value. Substantially all of the goodwill for our Component Products Segment relates to our security products reporting unit. In 2018, we used the qualitative assessment of ASC 350-20-35 for our annual impairment test and determined it was not necessary to perform the quantitative goodwill impairment test, as we concluded it is more-likely-than-not that the fair value of the security products reporting unit exceeded its carrying amount.

Considerable management judgment is necessary to evaluate the qualitative impact of events and circumstances on the fair value of a reporting unit. Events and circumstances considered in our impairment evaluations, such as historical profits and stability of the markets served, are consistent with factors utilized with our internal projections and operating plan. However, future events and circumstances could result in materially different findings which could result in the recognition of a material goodwill impairment.

When we performed our annual goodwill impairment test in the third quarter of 2018 for our Chemicals Segment goodwill we concluded there was no impairment of such goodwill. However, future events and circumstances could change (i.e. a significant decline in quoted market prices) and result in a materially different finding which could result in the recognition of a material impairment with respect to such goodwill.

- *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 attributable to continuing operations for impairment during 2018 because no such impairment indicators were present.

- *Revenue recognized over time using cost based inputs (formerly percentage completion revenue recognition)*—Certain real estate land sales by our Real Estate Management and Development segment (generally land sales associated with our residential/planned community) require us to complete property development and improvements after title passes to the buyer and we have received all or a substantial portion of the selling price. To date, all of the land sales associated with the residential/planned community have been recognized over time using cost based inputs of accounting in accordance with ASC 606. Under such method, revenues and profits are recognized in the same proportion of our progress towards completion of our contractual obligations, with our progress measured by costs incurred as a percentage of total costs estimated to be incurred. Such costs incurred and total estimated costs include amounts specifically identifiable with the parcels sold as well as certain development costs for the entire residential/planned community which are allocated to the parcels sold under applicable GAAP. Estimates of total costs expected to be incurred require significant management judgment, and the amount of revenue and profits that have been recognized to date are subject to revisions throughout the development period. The impact on the amount of revenue recognized resulting from any future change in the estimate of total costs estimated to be incurred would be accounted for prospectively in accordance with GAAP.

- *Defined benefit pension plans*—We provide a range of benefits including various defined benefit pension plans for our employees. We record annual amounts related to these plans based upon calculations required by GAAP, which make use of various actuarial assumptions, such as: discount rates, expected rates of returns on plan assets, compensation increases, employee turnover rates, expected mortality rates and expected health care trend rates. We review our actuarial assumptions annually and make modifications to the assumptions based on current rates and trends when we believe appropriate. As required by GAAP, modifications to the assumptions are generally recorded and amortized over future periods. Different assumptions could result in the recognition of materially different expense amounts over different periods of times and materially different asset and liability amounts in our Consolidated Financial Statements. These assumptions are more fully described below under "—Assumptions on Defined Benefit Pension."

- *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 our Chemicals Segment has 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 "*General Corporate Items, Interest Expense, Provision for Income Taxes (Benefit), Noncontrolling Interest and Related Party Transactions*" we had a deferred income tax asset valuation allowance recognized with respect to such net deferred income tax assets of our Chemicals Segment's Belgian and German operations beginning June 30, 2015. At June 30, 2017 our Chemicals Segment 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 Chemicals Segment's 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 Chemicals Segment's European subsidiaries are not permanently reinvested (we had previously concluded that all of the undistributed earnings of our Chemicals Segment's Canadian subsidiary are not permanently reinvested), and accordingly our provision for income taxes in the fourth quarter of 2017 also included 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 Chemicals Segment's non-U.S. subsidiaries, other than post-1986 undistributed earnings of our Chemicals Segment's 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 "*General Corporate Items, Interest Expense, Provision for Income Taxes (Benefit), Noncontrolling Interest and Related Party Transactions.*" 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 recognize deferred income taxes with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock because the exemption under GAAP to avoid such recognition of deferred income taxes is not available to us. At December 31, 2018, we had recognized a deferred income tax liability with respect to our direct investment in Kronos of $40.7 million. There is a maximum amount (or cap) of such deferred income taxes we are required to recognize with respect to our direct investment in Kronos. The maximum amount of such deferred income tax liability we would be required to have recognized (the cap) is $155.4 million.

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.

- *Litigation and environmental liabilities*—We are involved in numerous legal and environmental actions in part due to NL's former involvement in the manufacture of lead-based products. In accordance with applicable GAAP for accounting for contingencies, we record accruals for these liabilities when estimated future expenditures associated with such contingencies become probable, and we can reasonably estimate the amounts of such future expenditures. However, new information may become available to us, or circumstances (such as applicable laws and regulations) may change, thereby resulting in an increase or decrease in the amount we are required to accrue for such matters (and therefore a decrease or increase in our reported net income in the period of such change). At December 31, 2018 we have recorded total accrued environmental liabilities of $103.4 million.

  Obligations for environmental remediation and related costs are difficult to assess and estimate, and it is possible that actual costs for environmental remediation and related costs will exceed accrued amounts or that costs will be incurred in the future for sites in which we cannot currently estimate the liability. If these events occur in 2019, our corporate expense could be higher than we currently estimate. In addition, we adjust our accruals for environmental remediation and related costs as further information becomes available to us or as circumstances change. Such further information or changed circumstances could result in an increase or reduction in our accrued environmental remediation and related costs. See Note 18 to our Consolidated Financial Statements.

Operating income (loss) for each of our three operating segments is impacted by certain of these significant judgments and estimates, as summarized below:

- Chemicals—allowance for doubtful accounts, reserves for obsolete or unmarketable inventories, impairment of equity method investments, goodwill and other long-lived assets, defined benefit pension plans; and loss accruals.
- Component Products—impairment of goodwill and long-lived assets and loss accruals.
- Real Estate Management and Development—impairment of long-lived assets and revenue recognition under the percentage-of-completion method of accounting.

In addition, general corporate and other items are impacted by the significant judgments and estimates for impairment of marketable securities and equity method investees, defined benefit pension plans, loss accruals, and income taxes.

Segment Operating Results—2018 Compared to 2017 and 2017 Compared to 2016

Chemicals—

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

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

- TiO_2 selling prices,
- Our TiO_2 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 TiO_2 average selling prices, our level of TiO_2 sales and production volumes and the cost of our third-party feedstock ore. TiO_2 selling prices generally follow industry trends and the selling prices will increase or decrease generally as a result of competitive market pressures.

	Years ended December 31,			% Change	
	2016	2017	2018	2016-17	2017-18
	(Dollars in millions)				
Net sales	$ 1,364.3	$ 1,729.0	$ 1,661.9	27%	**(4)%**
Cost of sales	1,101.5	1,161.2	1,101.7	5%	**(5)%**
Gross margin	$ 262.8	$ 567.8	$ 560.2	116%	**(1)%**
Operating income	$ 102.8	$ 358.5	$ 342.9	249%	**(4)%**
Percent of net sales:					
Cost of sales	81%	67%	**66%**		
Gross margin	19%	33%	**34%**		
Operating income	8%	21%	**21%**		
TiO_2 operating statistics:					
Sales volumes*	559	586	**491**	5%	**(16)%**
Production volumes*	546	576	**536**	5%	**(7)**
Production rate as percent of capacity	98%	100%	**95%**		
Percent change in TiO_2 net sales:					
TiO_2 product pricing				22%	**13%**
TiO_2 sales volumes				5	**(16)**
TiO_2 product mix				(1)	**(4)**
Changes in currency exchange rates				1	**3**
Total				27%	**(4)%**

* Thousands of metric tons

Industry Conditions and 2018 Overview – Due to the successful implementation of previously-announced price increases, average TiO_2 selling prices rose throughout 2017 and the first six months of 2018. We started 2018 with average TiO_2 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 TiO_2 average selling prices declined during the third and fourth quarters of 2018. Our TiO_2 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 TiO_2 sold in 2018 was higher as compared to 2017 (excluding the effect of changes in currency exchange rates).

Net sales – Our Chemicals Segment's 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 TiO_2 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). TiO_2 selling prices will increase or decrease generally as a result of competitive market pressures, changes in the relative level of supply and demand as well as changes in raw material and other manufacturing costs.

Our Chemicals Segment's 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 TiO_2 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.

Our Chemicals Segment's 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 TiO_2 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). TiO_2 selling prices will increase or decrease generally as a result of competitive market pressures, changes in the relative level of supply and demand as well as changes in raw material and other manufacturing costs.

Our Chemicals Segment's sales volumes increased in 2017 primarily due to strength in the North American and European markets as compared to 2016. Our Chemicals Segment's 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—Our Chemicals Segment's cost of sales decreased 5% in 2018 compared to 2017 due to the net impact of a 16% decrease in sales volumes, a 7% decrease in TiO_2 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 TiO_2 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 Chemicals Segment's 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.

Our Chemicals Segment's cost of sales increased 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 TiO_2 production volumes, higher raw materials and other production costs of approximately $13 million and currency fluctuations (primarily the euro). Our Chemicals Segment's production volumes in 2017 set a new overall record for a full-year period.

Our Chemicals Segment's cost of sales as a percentage of net sales decreased to 68% in 2017 compared to 81% 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 19% 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.

Operating Income—Our Chemicals Segment's operating income decreased 4% in 2018 compared to 2017 and operating income as a percentage of net sales was flat at 21% in 2018 and 2017. This decrease was 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. We estimate that changes in currency exchange rates increased our Chemicals Segment's operating income by approximately $33 million in 2018 as compared to 2017.

Our Chemicals Segment's operating income increased 249% in 2017 compared to 2016 and operating income as a percentage of net sales increased to 21% in 2017 from 8% in 2016. Operating income increased in 2017 in part due to the net effects of higher selling prices, 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 and currency fluctuations (primarily the euro). Operating income in 2016 includes income aggregating $4.3 million related to insurance settlement gains from two separate business interruption claims.

Our Chemicals Segment's operating income (loss) is net of amortization of purchase accounting adjustments made in conjunction with our acquisitions of interests in NL and Kronos. As a result, we recognize additional depreciation expense above the amounts Kronos reports separately, substantially all of which is included within cost of sales. We recognized additional depreciation expense of $2.1 million in 2016, $2.2 million in 2017 and $2.3 million in 2018, which reduced our reported Chemicals Segment's operating income (loss) as compared to amounts reported by Kronos.

Currency Exchange Rates—– Our Chemicals Segment has substantial operations and assets located outside the United States (primarily in Germany, Belgium, Norway and Canada). The majority of our Chemicals Segment's 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 19 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 Chemicals Segment's sales and income from operations for the periods indicated.

Impact of changes in currency exchange rates - 2018 vs. 2017

	Transaction gains/(losses) recognized			Translation gains impact of rate changes	Total currency impact 2018 vs. 2017
	2017	2018	Change		
			(In millions)		
Impact on:					
Net sales	$ -	$ -	$ -	$ 49	$ 49
Operating income	(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 Chemicals Segment's Canadian and Norwegian operations are denominated in the U.S. dollar.

The $33 million increase in operating income 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 Chemicals Segment's 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

	Transaction gains/(losses) recognized			Translation gain/loss-impact of rate changes	Total currency impact 2017 vs. 2016
	2016	2017	Change		
			(In millions)		
Impact on:					
Net sales	$ -	$ -	$ -	$ 16	$ 16
Operating income	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 Chemicals Segment's 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 Chemicals Segment's Canadian and Norwegian operations are denominated in the U.S. dollar.

The $18 million decrease in operating income 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 Chemicals Segment's production facilities at 95% of practical capacity compared to full practical capacity in 2017. We expect our Chemicals Segment's 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 Chemicals Segment's 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 Chemicals Segment's 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 Chemicals Segment's results of operations beginning in the second quarter of 2018. Consequently, our Chemicals Segment's cost of sales per metric ton of TiO_2 sold in 2018 was moderately higher than our Chemicals Segment's 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 Chemicals Segment's cost of sales per metric ton of TiO_2 sold in 2019 to be higher than our Chemicals Segment's 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 TiO_2 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 Chemicals Segment's 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 Chemicals Segment's operating income 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 TiO_2 production capacity, especially for premium grades of TiO_2 products produced from the chloride process, we believe increased and sustained profit margins will be necessary to financially justify major expansions of TiO_2 production capacity required to meet expected future growth in demand. Any major expansion of TiO_2 production capacity, if announced, would take several years before such production would become available to meet future growth in demand.

Our expectations for our Chemicals Segment's 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.

Component Products—

Our Component Products Segment's product offerings consist of a large number of products that have a wide variation in selling price and manufacturing cost, which results in certain practical limitations on our ability to quantify the impact of changes in individual product sales quantities and selling prices on our net sales, cost of goods sold and gross margin. In addition, small variations in period-to-period net sales, cost of goods sold and gross margin can result from changes in the relative mix of our products sold. The key performance indicator for our Component Products Segment is operating income margins.

	Years ended December 31,			% Change	
	2016	2017	2018	2016-17	2017-18
	(Dollars in millions)				
Net sales	$ 108.9	$ 112.0	**$ 118.2**	3%	**6%**
Cost of sales	73.8	77.2	**79.9**	5%	**4%**
Gross margin	$ 35.1	$ 34.8	**$ 38.3**	(1)%	**10%**
Operating income	$ 15.6	$ 15.2	**$ 17.8**	(2)%	**17%**
Percent of net sales:					
Cost of sales	68%	69%	**68%**		
Gross margin	32%	31%	**32%**		
Operating income	14%	14%	**15%**		

Net Sales—Our Component Products Segment's net sales increased approximately 6% in 2018 compared to 2017 primarily due to higher marine components sales volumes to manufacturers of ski/wakeboard boats and larger center-console boats, and to a lesser extent higher security products sales to certain markets, particularly transportation and office furniture. Relative changes in selling prices did not have a material impact on net sales comparisons.

Our Component Products Segment's net sales increased approximately $3.1 million in 2017 compared to 2016 primarily due to higher security products sales volumes to government security, electronic lock and other markets, partially offset by a decrease in sales of security products to an original equipment manufacturer of recreational transportation products. Marine components also contributed with higher sales, primarily to the waterski/wakeboard boat market. Relative changes in selling prices did not have a material impact on net sales comparisons.

Costs Sales and Gross Margin—Our Component Products Segment's *c*ost of sales increased from 2017 to 2018 primarily due to increased sales volumes for both the security products and marine components reporting units. Gross margin dollars and gross margin as a percentage of sales increased from 2017 to 2018 primarily due to greater fixed cost leverage facilitated by higher production volumes for each of our Component Products Segment's business units.

Our Component Products Segment's cost of sales increased from 2016 to 2017 primarily due to increased sales volumes for both security products and marine components, and to a lesser extent higher raw material prices (mostly zinc and brass) and increased employee medical costs. Our Component Products Segment's cost of sales dollars in 2017 were comparable to 2016. As a percentage of sales, gross margin for 2017 decreased compared to 2016 due primarily to unfavorable relative changes in customer and product mix, higher raw material prices and increased employee medical costs in the security products reporting unit, as well as higher manufacturing costs for the marine components reporting unit.

Operating Income—Our Component Products Segment operating income improved in 2018 compared to 2017 primarily due to the increase in gross margin. Operating costs and expenses consists primarily of sales and administrative-related personnel costs, sales commissions and advertising expenses directly related to product sales and administrative costs relating to business unit and corporate management activities, as well as gains and losses on disposal of plant, property and equipment. Operating costs and expenses increased $.9 million in 2018 compared to 2017.

Our Component Products Segment operating income declined slightly in 2017 primarily due to the slight decline in gross margin noted above. Operating costs and expenses consists primarily of sales and administrative-related personnel costs, sales commissions and advertising expenses directly related to product sales and administrative costs relating to business unit and corporate management activities, as well as gains and losses on disposal of plant, property and equipment. Operating costs and expenses in 2017 was comparable to 2016 on an absolute basis and as a percentage of sales.

General— Our Component Products Segment's profitability primarily depends on our ability to utilize our production capacity effectively, which is affected by, among other things, the demand for our products and our ability to control our manufacturing costs, primarily comprised of labor costs and materials. The materials used in our Component Products Segment's products consist of purchased components and raw materials, some of which are subject to fluctuations in the commodity markets such as zinc, brass and stainless steel. Total material costs represented approximately 45% of our Component Products Segment's cost of sales in 2018, with commodity-related raw materials accounting for approximately 12% of our cost of sales. During 2017 and 2018, markets for the primary commodity-related raw materials used in the manufacture of our locking mechanisms, primarily zinc and brass, generally strengthened, but were moderating at the end of 2018. Over that same period, the market for stainless steel, the primary raw material used for the manufacture of marine exhaust headers and pipes and wake enhancement systems, remained relatively stable. While we expect the markets for our Component Products Segment's primary commodity-related raw materials to remain stable during 2019, we recognize that economic conditions could introduce renewed volatility on these and other manufacturing materials.

We occasionally enter into short-term commodity-related raw material supply arrangements to mitigate the impact of future increases in commodity related raw material costs. See Item 1 - “Business – Component Products Segment – CompX International, Inc. - Raw Materials.”

Outlook— Our Component Products Segment’s 2018 sales growth was largely attributable to high demand for our marine products, where we continue to benefit from innovation and diversification in our product offerings to the recreational boat markets. We also increased sales of security products, particularly to the transportation and office furniture markets. In 2019, we will seek to maintain the positive momentum in each of our Component Products Segment’s business units to grow sales and profitability. We will continue to monitor economic conditions and sales order rates and respond to fluctuations in customer demand through continuous evaluation of staffing levels and consistent execution of our lean manufacturing and cost improvement initiatives. Additionally, we continue to seek opportunities to gain market share in markets we currently serve, to expand into new markets and to develop new product features in order to mitigate the impact of changes in demand as well as broaden our sales base.

Real Estate Management and Development—

	Years ended December 31,		
	2016	2017	2018
		(In millions)	
Net sales	$ 46.2	$ 38.4	**$ 40.0**
Cost of sales	36.2	28.1	**29.3**
Gross margin	$ 10.0	$ 10.3	**$ 10.7**
Operating income	$ .8	$ 6.6	**$ 10.0**

General—Our Real Estate Management and Development Segment consists of BMI and LandWell. BMI provides utility services, among other things, to an industrial park located in Henderson, Nevada, and is responsible for the delivery of water to the city of Henderson and various other users through a water distribution system owned by BMI. LandWell is actively engaged in efforts to develop certain real estate in Henderson, Nevada including approximately 2,100 acres zoned for residential/planned community purposes and approximately 400 acres zoned for commercial and light industrial use.

Beginning in December 2013 and through the end of 2018, LandWell has closed or entered into escrow on approximately 530 acres of the residential/planned community and approximately 65 acres zoned for commercial and light industrial use. Contracts for land sales are negotiated on an individual basis and sales terms and prices will vary based on such factors as location (including location within a planned community), expected development work, and individual buyer needs. Although land may be under contract, we do not recognize revenue until we have satisfied the criteria for revenue recognition set forth in ASC Topic 606. In some instances, we will receive cash proceeds at the time the contract closes and record deferred revenue for some or all of the cash amount received, with such deferred revenue being recognized in subsequent periods. Because land held for development was initially recognized at estimated fair value at the acquisition date as required by ASC Topic 805, we do not expect to recognize significant operating income on land sales for the land currently under contract. We expect the development work to continue for 10 to 15 years on the rest of the land held for development, especially the remainder of the residential/planned community.

Net Sales and Operating Income— A substantial portion of the net sales from our Real Estate Management and Development segment in 2018 consisted of revenues from land sales. We recognized $31.7 million in revenues on land sales during 2018 compared to $29.9 million in 2017. As noted above we recognize revenue in our residential/planned community over time using cost based input methods (previously known as percentage completion method) and a large majority of the revenue we recognized in 2017 and 2018 was under this method of revenue recognition. The contracts on these sales (both within the planned community and otherwise) include approximately 520 acres of the residential planned community and certain other acreage which closed in December 2013 and through the end of 2018. Cost of sales related to land sales revenues was $23.5 million in 2018 compared to $22.2 million in 2017. Land sales revenues were higher in 2018 as compared to 2017 primarily due to higher infrastructure development spending in 2018 and the relatively higher percentage completion of land sales in existing development phases during the period. Land infrastructure development spending increased in 2018 as we balanced development requirements with home builder outputs during the periods along with developing new phases of our master planned community. Operating income in 2018 also includes $3.1 million of income in the first quarter 2018 related to the recognition of tax increment reimbursement note receivables which we now believe we can recognize, as discussed in Note 7 to our Consolidated Financial Statements.

We recognized $29.9 million in revenues on land sales during 2017 compared to $37.8 million in 2016. As noted above we recognize revenue in our residential/planned community under percentage completion accounting and a large majority of the revenue we recognized in 2016 and 2017 was under this method of revenue recognition. We also have commercial property not included in the planned community for which revenue is generally recognized in full at closing, as we generally have no further obligations after the closing date of the sale for these properties. Land sale revenue for such commercial property not included in the planned community was $3.0 million in 2017 and $5.6 million in 2016. The contracts on these sales (both within the planned community and otherwise) include approximately 470 acres of the residential planned community and certain other acreage which closed in December 2015 and through the end of 2017. Cost of sales related to land sales revenues was $22.2 million in 2017 and $30.3 million in 2016.

The remainder of net sales and cost of sales related to this segment primarily relates to water delivery fees and expenses. We deliver water to several customers under long-term contracts. In this regard in January 2016 we amended our water delivery contract with the City of Henderson, Nevada. As a result we recognized a contract related intangible asset impairment of $5.1 million in the first quarter of 2016 ($2.1 million, or $.01 per diluted share, net of income tax benefit and noncontrolling interest). See Note 7 to our Consolidated Financial Statements. As noted above, because land held for development was initially recognized at estimated fair value at the acquisition date as required by ASC Topic 805, we did not recognize significant operating income in either 2016, 2017 or 2018 (excluding the impact of the contract related intangible asset impairment charge in 2016).

Outlook— We are actively pursuing opportunities to maximize cash proceeds from the sale of our land held for development. In the near term, we are focused on developing and selling land we manage, primarily to residential builders, for the approximately 2,100 acres zoned for residential/planned community in Henderson, Nevada. We expect the development work for the first phase of the residential/planned community to continue over the next several years, including those parcels currently under contract for which the development work is expected to be completed in 2019. We do not expect to recognize significant amounts of operating income related to these sales for the parcels currently under contract because our basis in the land value is the December 2013 acquisition date fair value; however, we do expect to generate cash proceeds from these sales in excess of our acquisition costs, which proceeds are expected to be used, in part, to fund ongoing development work for the remainder of these properties. Beginning in the fourth quarter of 2017, we began sales of parcels that have a lower book value than the parcels previously sold; as a result we would expect to recognize more land sales related operating income in 2019 than in 2018.

General Corporate Items, Interest Expense, Provision for Income Taxes (Benefit), Noncontrolling Interest and Related Party Transactions

Securities Earnings— A significant portion of our interest and dividend income in 2016, 2017 and 2018 relates to the distributions we received from The Amalgamated Sugar Company LLC. We recognized dividend income from the LLC of $25.4 million in each of 2016 and 2017 and $16.9 million in 2018. On August 31, 2018, we sold our interest in Amalgamated for consideration consisting of $12.5 million in cash and the deemed payment in full of our $250 million in loans we owed Snake River Sugar Company. We recognized a $12.5 million securities gain on this transaction. See Note 6 to our Consolidated Financial Statements. Securities earnings is expected to be significantly lower in 2019 as compared to 2018 primarily due to the August 2018 sale of our interest in Amalgamated.

Insurance Recoveries—Insurance recoveries relate to amounts NL received from certain of its former insurance carriers, and relate principally to the recovery of prior lead pigment and asbestos litigation defense costs incurred by NL. We have agreements with four former insurance carriers pursuant to which the carriers reimburse us for a portion of our future lead pigment litigation defense costs, and one such carrier reimburses us for a portion of our future asbestos litigation defense costs. We are not able to determine how much we will ultimately recover from these carriers for defense costs incurred by us because of certain issues that arise regarding which defense costs qualify for reimbursement. While we continue to seek additional insurance recoveries for lead pigment and asbestos litigation matters, we do not know the extent to which we will be successful in obtaining additional reimbursement for either defense costs or indemnity. Any additional insurance recoveries would be recognized when the receipt is probable and the amount is determinable. Substantially all of the insurance recoveries recognized in 2016, 2017 and 2018 relate to reimbursement of ongoing litigation defense costs. See Note 18 to our Consolidated Financial Statements.

Gain on Land Sales—In the first quarter of 2018 we sold two parcels of land not used in our operating activities. See Note 13 to our Consolidated Financial Statements.

Litigation Settlement Expense–We recognized a pre-tax $62.0 million litigation settlement expense charge in the second quarter of 2018 related to the lead pigment litigation in California; see Note 18 to our Consolidated Financial Statements.

Changes in the Market Value of Valhi Common Stock held by Subsidiaries— Our subsidiaries Kronos and NL hold shares of our common stock. As discussed in Note 16 to our Consolidated Financial Statements, we account for our proportional interest in these shares of our common stock as treasury stock, at Kronos' and NL's historical cost basis. The remaining portion of these shares of our common stock, which are attributable to the noncontrolling interest of Kronos and NL, are reflected in our consolidated balance sheet at fair value. Prior to 2018, any unrealized gains or losses on the shares of our common stock attributable to the noncontrolling interest of Kronos and NL were recognized through other comprehensive income or loss, net of deferred income taxes, attributable to such noncontrolling interests. 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*, Kronos and NL recognize unrealized gains or losses in the determination of each of their respective net income or losses. Under the principles of consolidation we eliminate any gains or losses associated with our common stock to the extent of our proportional ownership interest in each subsidiary. The $12.2 million loss recognized in our Consolidated Financial Statements represents the unrealized loss in respect of these shares during 2018 attributable to the noncontrolling interest of Kronos and NL.

Other General Corporate Items— Corporate expenses were 22% higher at $42.4 million in 2018 compared to $34.7 million in 2017. Corporate expenses increased due to higher administrative costs and higher litigation and related costs in 2018 somewhat offset by lower environmental remediation and related costs. Included in corporate expense are:

- litigation and related costs at NL of $6.2 million in 2018 compared to $3.8 million in 2017; and
- environmental remediation and related costs of $3.1 million in 2018 compared to $4.1 million in 2017.

Corporate expenses were 6% lower at $34.7 million in 2017 compared to $37.6 million in 2016. Corporate expenses decreased due to lower administrative related expenses and environmental remediation and related costs in 2017. Included in corporate expense are:

- litigation and related costs at NL of $3.8 million in 2017 compared to $3.5 million in 2016; and
- environmental remediation and related costs of $4.1 million in 2017 compared to $5.9 million in 2016.

Overall, we currently expect that our net general corporate expenses in 2019 will be lower than in 2018 primarily due to lower expected litigation and related costs and environmental remediation and related costs.

The level of our litigation and related expenses varies from period to period depending upon, among other things, the number of cases in which we are currently involved, the nature of such cases and the current stage of such cases (e.g. discovery, pre-trial motions, trial or appeal, if applicable). See Note 18 to our Consolidated Financial Statements. If our current expectations regarding the number of cases in which we expect to be involved during 2019, or the nature of such cases, were to change our corporate expenses could be higher than we currently estimate.

Obligations for environmental remediation and related costs are difficult to assess and estimate, and it is possible that actual costs for environmental remediation and related costs will exceed accrued amounts or that costs will be incurred in the future for sites in which we cannot currently estimate the liability. If these events occur in 2019, our corporate expense could be higher than we currently estimate. In addition, we adjust our accruals for environmental remediation and related costs as further information becomes available to us or as circumstances change. Such further information or changed circumstances could result in an increase or reduction in our accrued environmental remediation and related costs. See Note 18 to our Consolidated Financial Statements.

Loss on Prepayment of Debt – 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 Chemicals Segment's term loan indebtedness. See Note 9 to our Consolidated Financial Statements.

Interest Expense— Interest expense decreased to $55.7 million in 2018 from $58.9 million in 2017 primarily due to the net effects of lower 2018 average debt levels primarily due to the deemed redemption of the Snake River promissory notes in August 2018 somewhat offset by higher average interest rates.

Interest expense increased to $58.9 million in 2017 from $58.1 million in 2016 primarily due to the net effects of higher 2017 average debt levels and higher average interest rates somewhat offset by higher capitalized interest in 2017.

We expect interest expense will be lower in 2019 as compared to 2018 due to lower average balances of outstanding borrowings at Valhi offset by higher average rates. See Note 19 to our Consolidated Financial Statements.

Provision for Income Taxes (Benefit)—We recognized an income tax benefit of $30.7 million in 2018 compared to income tax benefit of $120.0 million in 2017. We recognized an income tax benefit of $120.0 million in 2017 compared to income tax expense of $18.6 million in 2016. The difference is primarily due to the effects of our deferred income tax asset valuation allowance associated with our Chemicals Segment's German and Belgian operations in 2017 and the impact of the 2017 Tax Act, as discussed below.

Our income tax benefit in 2018 includes the following:

- an aggregate non-cash deferred income tax benefit of $112 million in 2018 related to a change in the deferred income tax liability related to our investment in Kronos, net of the revaluation of such change resulting from the reduction in the U.S. federal corporate tax rate as a result of the 2017 Tax Act;

- a $1.8 million non-cash deferred income tax benefit related to a decrease in our effective state income tax rate; this decrease is a direct result of the sale of our interest in Amalgamated which will reduce the number of state jurisdictions in which we are required to file;
- a net $1.4 million non-cash income tax benefit related to an APA tax settlement payment between Kronos' German and Canadian subsidiaries; and
- a $4.0 million current cash income tax expense related to tax on GILTI.

Our income tax benefit in 2017 includes 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 Chemicals Segment's 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 Chemicals Segment's 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 Chemicals Segment's non-U.S. subsidiaries,
- a $77.1 million non-cash deferred income tax benefit related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income tax rate enacted as part of the 2017 Tax Act;
- an $11.8 million aggregate income tax benefit related to the execution and finalization of an APA 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); and
- a $5.3 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 Chemicals Segment's European subsidiaries.

Our income tax expense in 2016 includes a $3.4 million current income tax benefit related to the execution and finalization of an APA related to our Chemicals Segment 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 $7.2 million increase to 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 Chemicals Segment's 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 14 to our Consolidated Financial Statements for a tabular reconciliation of our statutory income tax provision to our actual tax provision.

Our Chemicals Segment has 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 Chemicals Segment's 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 Chemicals Segment's 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 Chemicals Segment's 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 included 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 was 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 resulted in a provisional non-cash deferred income tax benefit of $77.1 million recognized as of December 31, 2017 in continuing operations, reducing our net deferred income tax liability. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information currently available. During the third quarter of 2018, in conjunction with finalizing our federal income tax return we were able to obtain, prepare and analyze the necessary information to complete the accounting under ASC 740 related to the revaluation of our net deferred tax liability associated with our U.S. net taxable temporary differences as of December 31, 2017, which resulted in a measurement period adjustment and recognition of a non-cash deferred income tax expense of $59.7 million, decreasing the provisional amount recognized at December 31, 2017. Such adjustment is almost entirely attributable to the re-measurement of our deferred income taxes with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock discussed below. Accordingly, we completed our analysis related to such revaluation as of September 30, 2018.

Prior to the enactment of the 2017 Tax Act, the undistributed earnings of our Chemicals Segment's European subsidiaries were deemed to be permanently reinvested (we had not made a similar determination with respect to the undistributed earnings of our Chemicals Segment's 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 such 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 $2.1 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 $62.2 million, which will be paid in quarterly installments over the remainder of the eight year period. Of such $62.2 million, $56.3 million is recorded as a noncurrent payable to affiliate (income taxes payable to Contran) classified as a noncurrent liability in our Consolidated Balance Sheet, and $5.9 million is included with our current payable to affiliate (income taxes payable to Contran) 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 Chemicals Segment's 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 Chemicals Segment's 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 $5.3 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 available at that date. 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 $1.8 million for the U.S. state and non-U.S. income tax and withholding tax liability attributable to the 2018 undistributed earnings of our Chemicals Segment's non-U.S. subsidiaries in 2018, including withholding taxes related to the undistributed earnings of our Chemicals Segment's 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 U.S. tax credit provisions, we recognized a current cash income tax expense of $4.0 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 law 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. 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 concluded we had 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.

The 2017 Tax Act amended the rules limiting the deduction for business interest expense beginning in 2018. The limitation applies to all taxpayers and our annual deduction for business interest expense is limited to the sum of our business interest income and 30% of our adjusted taxable income as defined under the 2017 Tax Act. Any business interest expense not allowed as a deduction as a result of the limitation may be carryforward indefinitely and is treated as interest paid in the carryforward year subject to the respective year's limitation. We have determined that our interest expense for 2018 is limited under these provisions, because of the loss we recognized on the sale of WCS for income tax purposes. We have concluded that we are required to recognize a non-cash deferred income tax asset valuation allowance under the more-likely-than-not recognition criteria with respect to a portion of our deferred tax asset attributable to the nondeductible amount of business interest expense carryforward. Consequently, our provision for income taxes in 2018 includes a non-cash deferred income tax expense of $6.8 million for the amount of such deferred income tax asset that we have determined does not meet the more-likely-than-not recognition criteria (the nondeductible portion of our business interest expense for the full year 2018 is higher than the amount recognized in the third quarter of 2018 primarily due to a decrease in our adjusted taxable income and depreciation expense as compared to our estimates at the end of the third quarter). In accordance with the ASC 740 guidance regarding intra-period allocation of income taxes, the full amount of non-cash deferred income tax expense is classified as part of the income taxes associated with the pre-tax gain we recognized for financial reporting purposes on the sale of WCS which is classified as part of discontinued operations (see Note 3 to our Consolidated Financial Statements and Discontinued Operations —Waste Control Specialists LLC).

We recognized a non-cash deferred income tax benefit of $1.8 million in 2018 related to a decrease in our effective state income tax rate; this decrease is a direct result of the sale of our interest in the Amalgamated Sugar Company LLC which will reduce the number of state jurisdictions in which we are required to file (our non-cash deferred tax benefit recognized for the full year 2018 is lower than the amount recognized in the third quarter of 2018 primarily due to a decrease in our estimate of taxable income as compared to our estimates at the end of the third quarter).

We recognize deferred income taxes with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock because the exemption under GAAP to avoid such recognition of deferred income taxes is not available to us. At December 31, 2017, we had recognized a deferred income tax liability with respect to our direct investment in Kronos of $157.6 million. There is a maximum amount (or cap) of such deferred income taxes we are required to recognize with respect to our direct investment in Kronos. The maximum amount of such deferred income tax liability we would be required to have recognized (the cap) is $155.4 million (the cap was reduced as a result of the decrease in our effective state tax rate in the third quarter of 2018 discussed above). During 2018, we recognized a non-cash deferred income tax expense with respect to our direct investment in Kronos of $4.9 million for the increase in the deferred income taxes required to be recognized with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock, to the extent such increase related to our equity in Kronos' net income during such period. We recognized a similar non-cash deferred income tax expense of $22.1 million in 2017 and $6.5 million in 2016. A portion of the net change with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock during such periods related to our equity in Kronos' other comprehensive income (loss) items, and the amounts shown in the table in Note 14 to our Consolidated Financial Statements for income tax expense (benefit) allocated to other comprehensive income (loss) items includes amounts related to our equity in Kronos' other comprehensive income (loss) items. Due to uncertainties and complexities of the new legislation, we were still evaluating the impact of the one-time deemed repatriation of the post-1986 undistributed earnings of our non-U.S. subsidiaries up through December 31, 2017 as it relates to the income tax basis of our direct investment in Kronos at December 31, 2017. Our deferred income tax liability with respect to our direct investment in Kronos and the deferred income taxes recognized at December 31, 2017 represented our reasonable estimate and, in accordance with the guidance in SAB 118, such amount was provisional and subject to adjustment as we obtain additional information and complete our analysis of the impact of the new legislation as it relates to the income tax basis of our direct investment in Kronos. 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 an adjustment, which is treated as a measurement period adjustment, to the deferred income taxes we recognized at December 31, 2017 associated with our direct investment in Kronos common stock (before revaluation of our deferred tax liability related to the decrease in the corporate income tax rate). Such adjustment resulted in an investment basis adjustment under the income tax regulations which increased the income tax basis of our direct investment in Kronos attributable to the income recognition related to the deemed repatriation of the post-1986 undistributed earnings of our non-U.S. subsidiaries in 2017. Such adjustment resulted in a non-cash deferred tax measurement period adjustment decreasing the deferred income taxes we recognize with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock. Including the impact of the non-cash deferred tax revaluation adjustment discussed above, we recognized a net non-cash deferred income tax benefit of $112 million in the third quarter of 2018 related to the incremental tax on Kronos. We completed our analysis related to the impact of the new legislation as it related to the income tax basis of our direct investment in Kronos as of September 30, 2018. Excluding the impact of such adjustments, our effective income tax rate from continuing operations was 34.4% in 2018.

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.

See Note 14 to our Consolidated Financial Statements for a tabular reconciliation of our statutory tax expense to our actual tax expense.

Discontinued Operations— On January 26, 2018, we completed the sale of the Waste Management Segment to JFL-WCS Partners, LLC, an entity sponsored by certain investment affiliates of J.F. Lehman & Company, for consideration consisting of the assumption of all of the Waste Management Segment's third-party indebtedness and other liabilities. We recognized a pre-tax gain of approximately $58 million on the transaction in the first quarter of 2018 because the carrying value of the liabilities of the business assumed by the purchaser exceeded the carrying value of the assets sold in large part due to the long-lived asset impairment of $170.6 million recognized in the second quarter of 2017 with respect to our Waste Management Segment. Such pre-tax gain is classified as part of discontinued operations. See Note 3 to our Consolidated Financial Statements for additional information.

Noncontrolling Interest in Net Income (Loss) of Subsidiaries—Noncontrolling interest in operations of subsidiaries decreased from 2017 to 2018 and increased from 2016 to 2017 primarily due to changes in operating income at Kronos.

Related Party Transactions—We are a party to certain transactions with related parties. See Note 17 to our Consolidated Financial Statements.

Assumptions on Defined Benefit Pension Plans.

We maintain various defined benefit pension plans in the U.S., Europe and Canada. See Note 13 to our Consolidated Financial Statements.

Under defined benefit pension plan accounting, we recognize defined benefit pension plan expense and prepaid and accrued pension costs based on certain actuarial assumptions, 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 $22.9 million in 2016, $29.9 million in 2017, and $26.9 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 will no longer accrue additional defined pension benefits after December 2013 and 2014, respectively. Our U.S. plan for both NL and Kronos was closed to new participants in 1996, and existing participants no longer accrued 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. 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 recognized under GAAP for financial reporting purposes. We made contributions to all of our defined benefit pension plans of $15.4 million in 2016, $17.1 million in 2017, and $19.9 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 66%, 14%, 7% and 8% of the projected benefit obligations related to our plans in Germany, Canada, Norway and the U.S., respectively. We use several different discount rate assumptions in determining our consolidated defined benefit pension plan obligation and expense. This is because we maintain defined benefit pension plans in several different countries in Europe and North America and the interest rate environment differs from country to country.

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

	Discount rates used for:		
	Obligations at December 31, 2016 and expense in 2017	Obligations at December 31, 2017 and expense in 2018	Obligations at December 31, 2018 and expense in 2019
Kronos and NL Plans:			
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, the fair value of plan assets for all defined benefit plans comprised $43.2 million related to U.S. plans and $410.7 million related to foreign plans. Substantially all of plan assets attributable to foreign plans related to plans maintained by Kronos, and approximately 70% and 30% of the plan assets attributable to U.S. plans related to plans maintained by NL and Kronos, respectively. At December 31, 2018, approximately 53%, 21%, 11% and 10% 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, substantially 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 11 to our Consolidated Financial Statements.

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

	December 31, 2018			
	Germany	Canada	Norway	U.S.
Equity securities and limited partnerships	22%	21%	12%	47%
Fixed income securities	68	79	52	46
Real estate	9	-	9	-
Other	1	-	27	7
Total	100%	100%	100%	100%

	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 non-US plan and will periodically rebalance the investments in each plan to more accurately reflect the targeted allocation when considered appropriate.

The assumed long-term rates of return on plan assets used for purposes of determining net period pension cost for 2016, 2017 and 2018 were as follows:

	2016	2017	2018
Kronos and NL plans:			
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 table 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 $27.0 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 $29 million in 2019. In comparison, we expect to be required to contribute approximately $18 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 million at that date and our defined benefit pension expense would be expected to increase by approximately $2 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 million during 2019.

Foreign Operations

We have substantial operations located outside the United States, principally our Chemicals Segment's operations in Europe and Canada. The functional currency of these operations is the local currency. As a result, the reported amount of our assets and liabilities related to these foreign operations 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 income (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 Chemicals Segment's 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 flows from operating activities decreased to $165.5 million in 2018 from $259.3 million in 2017. This $93.8 million decrease in cash provided by operations was primarily due to the net effect of the following items:

- consolidated operating income of $370.7 million in 2018, a decline of $9.6 million compared to an operating income of $380.3 million in 2017;
- higher net cash paid for income taxes in 2018 of $6.2 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 the 2017 Tax Act;
- lower cash paid for interest in 2018 of $5.4 million, primarily due to the redemption of the Snake River promissory notes in August 2018;
- a $15.7 million decrease in cash provided by WCS in 2018 as a result of the sale of WCS assets in Janaury.
- higher net distributions to our TiO_2 manufacturing joint venture in 2018 of $10.0 million, primarily due to the timing of the joint venture's working capital needs; and
- changes in receivables, inventories, payables and accrued liabilities in 2018 used $89.6 million in net cash compared to $29.9 million in net cash provided in 2017, an increase in the amount of cash used of $119.4 million compared to 2017, primarily due to the relative changes in our inventories, receivables, prepaids, land held for development, payables and accruals.

Cash flows from operating activities increased to $259.3 million in 2017 from $79.8 million in 2016. This $179.5 million increase in cash provided by operations was primarily due to the net effect of the following items:

- consolidated operating income of $380.3 million in 2017, an improvement of $261.1 million compared to an operating income of $119.2 million in 2016;
- higher net cash paid for income taxes in 2017 of $42.0 million resulting from our increased profitability;
- higher net contributions to our TiO_2 manufacturing joint venture in 2017 of $9.6 million, primarily due to the timing of the joint venture's working capital needs; and
- changes in receivables, inventories, payables and accrued liabilities in 2017 provided $29.9 million in net cash compared to $23.3 million in 2016, an increase in the amount of cash provided of $6.6 million compared to 2016, primarily due to the relative changes in our inventories, receivables, prepaids, land held for development, payables and accruals.

Changes in working capital were affected by accounts receivable and inventory changes, as shown below:

- Kronos' average days sales outstanding ("DSO") was higher 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.
- Kronos' average days sales in inventory ("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.

- CompX's average DSO increased from December 31, 2017 to December 31, 2018 primarily as a result of the timing of sales and collections in the last month of 2018 as compared to 2017.
- CompX's average DSI was comparable from December 31, 2017 to December 31, 2018.

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

	December 31, 2016	December 31, 2017	December 31, 2018
Kronos:			
Days sales outstanding	65 days	63 days	76 days
Days sales in inventory	71 days	62 days	113 days
CompX:			
Days sales outstanding	36 days	38 days	40 days
Days sales in inventory	79 days	79 days	80 days

We do not have complete access to the cash flows of our majority-owned subsidiaries, due in part to limitations contained in certain credit agreements of our subsidiaries and because we do not own 100% of these subsidiaries. A detail of our consolidated cash flows from operating activities is presented in the table below. Intercompany dividends have been eliminated.

	Years ended December 31,		
	2016	2017	2018
		(In millions)	
Cash provided by (used in) operating activities:			
Kronos	$ 89.6	$ 276.1	$ 188.4
Valhi exclusive of subsidiaries	10.7	2.8	37.4
CompX	13.9	12.5	17.7
NL exclusive of subsidiaries	14.8	7.1	.3
Waste Control Specialists	(10.7)	18.0	2.3
Tremont	9.2	(3.4)	5.8
BMI	2.8	9.1	2.9
LandWell	30.9	10.9	10.4
Eliminations	(81.4)	(73.8)	(99.7)
Total	$ 79.8	$ 259.3	$ 165.5

Investing Activities—

We disclose capital expenditures by our business segments in Note 2 to our Consolidated Financial Statements. All of our capitalized permit costs relate to our Waste Management Segment.

During 2018 we:

- had net proceeds (excluding Amalgamated) of $1.3 million of marketable securities;
- had proceeds from the sale of land not used in our operations of $19.5 million in the first quarter of 2018; and
- received $12.5 million as part of the sale of our investment in Amalgamated in the third quarter of 2018.

During 2017 we had net purchases of $.7 million of marketable securities.

During 2016 we had net purchases of $.7 million of marketable securities.

Financing Activities –

During 2018, we:

- repaid a net $6.3 million on Valhi's credit facility with Contran; and
- repaid $3.7 million under Tremont's promissory note payable.

During 2017, we:

- borrowed a net $5.4 million on Valhi's credit facility with Contran;

- Kronos issued €400 million ($477.6 million) aggregate principal amount of 3.75% Senior Secured Notes on September 13, 2017;
- Kronos repaid the remaining balance of $340.4 million on its term loan;
- Kronos borrowed $253.9 million under its North American revolving credit facility and subsequently repaid $253.9 million; and
- repaid $1.5 million under Tremont's promissory note payable.

During 2016, we:

- borrowed a net $15.1 million on Valhi's credit facility with Contran;
- repaid $3.5 million under Kronos' term loan; and
- repaid $2.6 million under Tremont's promissory note payable.

We paid aggregate cash dividends on our common stock of $27.1 million in 2016 and $27.2 million in each of 2017 and 2018 ($.02 per share each quarter). Distributions to noncontrolling interest in 2016, 2017 and 2018 are primarily comprised of: CompX dividends paid to shareholders other than NL; Kronos cash dividends paid to shareholders other than us and NL, and BMI and LandWell dividends paid to shareholders other than us.

Outstanding Debt Obligations

At December 31, 2018, our consolidated indebtedness attributable to continuing operations was comprised of:

- Valhi's $314.3 million outstanding on its $360 million credit facility with Contran which is due no earlier than December 31, 2020;
- €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;
- Tremont's promissory note payable ($9.4 million outstanding) due in December 2023;
- $18.8 million on BMI's bank loan ($18.0 million carrying amount, net of debt issuance costs), due through June 2032;
- $2.1 million on LandWell's note payable to the City of Henderson due in October 2020; and
- approximately $4.2 million of other indebtedness, primarily capital lease obligations.

Certain of our credit facilities require the respective borrowers to maintain a number of covenants and restrictions which, among other things, restrict our ability to incur additional debt, incur liens, pay dividends 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. Kronos' North American and European revolvers contain a number of covenants and restrictions which, among other things, restrict its ability to incur additional debt, incur liens, pay dividends or merge or consolidate with, or sell or transfer substantially all of its assets to, another entity, and contains other provisions and restrictive covenants customary in lending transactions of this type. Kronos' 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 9 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; however, if future operating results differ materially from our expectations we may be unable to maintain compliance.

Future Cash Requirements

Liquidity—

Our primary source of liquidity on an ongoing basis is our cash flows from operating activities and borrowings under various lines of credit and notes. We generally use these amounts to (i) fund capital expenditures, (ii) repay short-term indebtedness incurred primarily for working capital purposes and (iii) provide for the payment of dividends (including dividends paid to us by our subsidiaries) or treasury stock purchases. From time-to-time we will incur indebtedness, generally to (i) fund short-term working capital needs, (ii) refinance existing indebtedness, (iii) make investments in marketable and other securities (including the acquisition of securities issued by our subsidiaries and affiliates) or (iv) fund major capital expenditures or the acquisition of other assets outside the ordinary course of business. Occasionally we sell assets outside the ordinary course of business, and we generally use the proceeds to (i) repay existing indebtedness (including indebtedness which may have been collateralized by the assets sold), (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.

We routinely compare our liquidity requirements and alternative uses of capital against the estimated future cash flows we expect to receive from our subsidiaries, and the estimated sales value of those units. As a result of this process, we have in the past sought, and may in the future seek, to raise additional capital, refinance or restructure indebtedness, repurchase indebtedness in the market or otherwise, modify our dividend policies, consider the sale of our interests in our subsidiaries, affiliates, business units, marketable securities or other assets, or take a combination of these and other steps, to increase liquidity, reduce indebtedness and fund future activities. Such activities have in the past and may in the future involve related companies. From time to time we and our subsidiaries may enter into intercompany loans as a cash management tool. Such notes are structured as revolving demand notes and pay and receive interest on terms we believe are more favorable than current debt and investment market rates. The companies that borrow under these notes have sufficient borrowing capacity to repay the notes at any time upon demand. All of these notes and related interest expense and income are eliminated in our Consolidated Financial Statements.

We periodically evaluate acquisitions of interests in or combinations with companies (including our affiliates) that may or may not be engaged in businesses related to our current businesses. We intend to consider such acquisition activities in the future and, in connection with this activity, may consider issuing additional equity securities and increasing indebtedness. From time to time, we also evaluate the restructuring of ownership interests among our respective subsidiaries and related companies.

We believe we will be able to comply with the financial covenants contained in our credit facilities through their maturities; however, if future operating results differ materially from our expectations we may be unable to maintain compliance. Based upon our expectations of our operating performance, and the anticipated demands on our cash resources, we expect to have sufficient liquidity to meet our short-term (defined as the twelve-month period ending December 31, 2019) and long-term obligations (defined as the five-year period ending December 31, 2023). In this regard, see the discussion above in *"Outstanding Debt Obligations."* If actual developments differ from our expectations, our liquidity could be adversely affected.

At December 31, 2018, we had credit available under existing facilities of $250.2 million, which was comprised of:

- $103.2 [(1)] million under Kronos' European revolving credit facility;
- $101.3 million under Kronos' North American revolving credit facility; and
- $45.7 [(2)] million under Valhi's Contran credit facility.

(1) Based on Kronos' EBITDA over the last twelve months ending December 31, 2018, the full €90.0 million amount is available for borrowing at December 31, 2018

(2) Amounts available under this facility are at the sole discretion of Contran.

At December 31, 2018, we had an aggregate of $531.0 million of restricted and unrestricted cash, cash equivalents and marketable securities attributable to continuing operations. A detail by entity is presented in the table below.

	Total amount	Held outside U.S.
	(In millions)	
Kronos	$ 374.8	$ 119.9
CompX	40.0	—
NL exclusive of its subsidiaries	75.6	.1
BMI	16.7	—
Tremont exclusive of its subsidiaries	8.7	—
LandWell	15.0	—
Valhi exclusive of its subsidiaries	.2	—
Total cash and cash equivalents, restricted cash and marketable securities	$ 531.0	$ 120.0

Following the 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.

Capital Expenditures and Other Investments—

We currently expect our aggregate capital expenditures for 2019 will be approximately $100 million as follows:

- $85 million by our Chemicals Segment, including approximately $25 million in the area of environmental compliance, protection and improvement;
- $5 million by our Component Products Segment; and
- $10 million by our Real Estate Management and Development Segment.

In addition, LandWell expects to spend approximately $34 million on land development costs during 2019 (which are included in the determination of cash provided by operating activities).

Capital spending for 2019 is expected to be funded primarily through cash generated from operations and borrowing under existing credit facilities. Planned capital expenditures in 2019 at Kronos and CompX will primarily be to maintain and improve the cost-effectiveness of our facilities. In addition, Kronos' capital expenditures in the area of environmental compliance, protection and improvement include expenditures which are primarily focused on increased operating efficiency but also result in improved environmental protection, such as lower emissions from our manufacturing plants.

Repurchases of our Common Stock and Common Stock of our Subsidiaries—

We have in the past, and may in the future, make repurchases of our common stock in market or privately-negotiated transactions. At December 31, 2018, we had approximately 4.0 million shares available for repurchase of our common stock under the authorizations described in Note 16 to our Consolidated Financial Statements.

Prior to 2016, Kronos' board of directors authorized the repurchase of up to 2.0 million shares of its common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. Kronos may repurchase its 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, Kronos may terminate the program prior to its completion. Kronos will use cash on hand to acquire the shares. Repurchased shares will be added to Kronos' treasury and cancelled. Kronos did not make any repurchases under the plan during 2016, 2017 and 2018, and at December 31, 2018 approximately 1.95 million shares are available for repurchase.

Prior to 2016, CompX's board of directors authorized various repurchases of its Class A common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. CompX may repurchase its 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, CompX may terminate the program prior to its completion. CompX will generally use cash on hand to acquire the shares. Repurchased shares will be added to CompX's treasury and cancelled. CompX did not make any repurchases under the plan during 2016, 2017 and 2018, and at December 31, 2018 approximately 678,000 shares were available for purchase under these authorizations.

Dividends—

Because our operations are conducted primarily through subsidiaries and affiliates, our long-term ability to meet parent company level corporate obligations is largely dependent on the receipt of dividends or other distributions from our subsidiaries and affiliates. Kronos paid a regular dividend of $.17 per share in each quarter of 2018 for which we received $39.4 million. In February 2019 the Kronos Board of Directors increased its regular quarterly dividend to $.18 per share. If Kronos were to pay its $.18 per share in each quarter of 2019 based on the 58.0 million shares we held of Kronos common stock at December 31, 2018, we would receive aggregate annual regular dividends from Kronos of $41.8 million. NL has not paid a dividend since prior to 2016 and we do not know if we will receive any cash dividends from NL during 2019. BMI and LandWell do pay cash dividends from time to time, but the timing and amount of such dividends are uncertain. In this regard, we received aggregate dividends from BMI and LandWell of $12.4 million in 2016, $5.8 million in 2017 and $5.7 million in 2018. We do not know if we will receive additional distributions from BMI and LandWell during 2019. All of our ownership interest in CompX is held through our ownership in NL, as such we do not receive any dividends from CompX. Instead any dividend paid by CompX is paid to NL.

Our subsidiaries have various credit agreements with unrelated third-party lenders which contain customary limitations on the payment of dividends, typically a percentage of net income or cash flow; however, these restrictions in the past have not significantly impacted their ability to pay dividends.

Investment in our Subsidiaries and Affiliates and Other Acquisitions—

We have in the past, and may in the future, purchase the securities of our subsidiaries and affiliates or third parties in market or privately-negotiated transactions. We base our purchase decision on a variety of factors, including an analysis of the optimal use of our capital, taking into account the market value of the securities and the relative value of expected returns on alternative investments. In connection with these activities, we may consider issuing additional equity securities or increasing our indebtedness. We may also evaluate the restructuring of ownership interests of our businesses among our subsidiaries and related companies.

We generally do not guarantee any indebtedness or other obligations of our subsidiaries or affiliates. See Note 17 to our Consolidated Financial Statements. Our subsidiaries are not required to pay us dividends. If one or more of our subsidiaries were unable to maintain its current level of dividends, either due to restrictions contained in a credit agreement or to satisfy its liabilities or otherwise, our ability to service our liabilities or to pay dividends on our common stock could be adversely impacted. If this were to occur, we might consider reducing or eliminating our dividends or selling interests in subsidiaries or other assets. If we were required to liquidate assets to generate funds to satisfy our liabilities, we might be required to sell at what we believe would be less than what we believe is the long-term value of such assets.

WCS' primary source of liquidity consisted of intercompany borrowings from one of our wholly-owned subsidiaries under the terms of a revolving credit facility. We eliminate these intercompany borrowings in our Consolidated Financial Statements. WCS has borrowed substantial amounts from us over the years. Prior to 2015, we contributed these amounts to WCS' capital. WCS borrowed an aggregate $22.7 million in 2016 from our subsidiary. WCS made net repayments on the facility of $5.2 million during 2017. In addition there was an additional $.8 million repaid in January 2018 prior to the termination of the note which occurred concurrent with the sale when the outstanding balance of $35.7 million was contributed to equity.

On November 14, 2016, we entered into a $50 million revolving credit facility with a subsidiary of NL secured with approximately 35.2 million shares of the common stock of Kronos Worldwide, Inc. held by NL's subsidiary as collateral. Outstanding borrowings under the credit facility bear interest at the prime rate plus 1.875% per annum, payable quarterly, with all amounts due on December 31, 2023. The maximum principal amount which may be outstanding from time-to-time under the credit facility is limited to 50% of the amount of the most recent closing price of the Kronos stock. The credit facility contains a number of covenants and restrictions which, among other things, restrict NL's subsidiary's ability to incur additional debt, incur liens, and merge or consolidated with, or sell or transfer substantially all of NL's subsidiary's assets to, another entity, and require NL's subsidiary to maintain a minimum specified level of consolidated net worth. Upon an event of default (as defined in the credit facility), Valhi will be entitled to terminate its commitment to make further loans to NL's subsidiary, declare the outstanding loans (with interest) immediately due and payable, and exercise its rights with respect to the collateral under the Loan Documents. Such collateral rights include, upon certain insolvency events with respect to NL's subsidiary or NL, the right to purchase all of the Kronos common stock at a purchase price equal to the aggregate market value, less amounts owing to Valhi under the Loan Documents, and up to 50% of such purchase price may be paid by Valhi in the form of an unsecured promissory note bearing interest at the prime rate plus 2.75% per annum, payable quarterly, with all amounts due no later than five years from the date of purchase, with the remainder of such purchase price payable in cash at the date of purchase. We also eliminate any such intercompany borrowings in our Consolidated Financial Statements. During 2016 NL's subsidiary borrowed $.5 million under this facility, no additional amounts have been borrowed, and $.5 million is outstanding under this facility at December 31, 2018. We eliminate any such intercompany borrowings in our Consolidated Financial Statements.

We have an unsecured revolving demand promissory note with Kronos which, as amended, provides for borrowings from Kronos of up to $60 million. We also eliminate any such intercompany borrowings in our Consolidated Financial Statements. We had no borrowings from Kronos prior to 2017 under this facility, which as amended is due on demand, but in any event no earlier than December 31, 2020. We had gross borrowings of $18.2 million and gross repayments of $4.6 million from Kronos during 2017, for a total outstanding balance of $13.6 million at December 31, 2017. We had gross borrowings of $2.6 million and gross repayments of $16.2 million from Kronos during 2018 and there was no outstanding balance at December 31, 2018. We could borrow an additional $60.0 million under our current intercompany facility with Kronos at December 31, 2018. Kronos' obligation to loan us money under this note is at Kronos' discretion.

On August 3, 2016 we entered into an unsecured revolving demand promissory note with CompX which, as amended, provides for borrowings from CompX of up to $40 million. We eliminate these intercompany borrowings in our Consolidated Financial Statements. The facility, as amended, is due on demand, but in any event no earlier than December 31, 2020. We had gross borrowings of $52.1 million and gross repayments of $41.3 million from CompX for a total outstanding balance of $38.2 million at December 31, 2017. We had gross borrowings of $52.8 million and gross repayments of $51.0 million from CompX for a total outstanding balance of $40.0 million at December 31, 2018. We have no borrowing availability under our current intercompany facility with CompX at December 31, 2018. CompX's obligation to loan us money under this note is at CompX's discretion.

Off-balance Sheet Financing

We do not have any off-balance sheet financing agreements other than the operating leases discussed in Note 18 to our Consolidated Financial Statements.

Commitments and Contingencies

We are subject to certain commitments and contingencies, as more fully described in the Notes to our Consolidated Financial Statements and in this Management's Discussion and Analysis of Financial Condition and Results of Operations, including:

- certain income contingencies in various U.S. and non-U.S. jurisdictions;
- certain environmental remediation matters involving NL and BMI;
- certain litigation related to NL's former involvement in the manufacture of lead pigment and lead-based paint; and
- certain other litigation to which we are a party.

In addition to those legal proceedings described in Note 18 to our Consolidated Financial Statements, various legislation and administrative regulations have, from time to time, been proposed that seek to (i) impose various obligations on present and former manufacturers of lead pigment and lead-based paint (including NL) with respect to asserted health concerns associated with the use of such products and (ii) effectively overturn court decisions in which NL and other pigment manufacturers have been successful. Examples of such proposed legislation include bills which would permit civil liability for damages on the basis of market share, rather than requiring plaintiffs to prove that the defendant's product caused the alleged damage, and bills which would revive actions barred by the statute of limitations. While no legislation or regulations have been enacted to date that are expected to have a material adverse effect on our consolidated financial position, results of operations or liquidity, enactment of such legislation could have such an effect.

As more fully described in the Notes 9 and 19 to our 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. Our obligations related to the long-term supply contracts for the purchase of TiO_2 feedstock are more fully described in Note 18 to our Consolidated Financial Statements and above in "Business—Chemicals Segment—Kronos Worldwide, Inc.—Manufacturing, Operations and Properties." The following table summarizes our contractual commitments as of December 31, 2018 by the type and date of payment.

	Payment due date				
Contractual commitment	**2019**	**2020/ 2021**	**2022/ 2023**	**2024 and after**	**Total**
	(In millions)				
Indebtedness (1):					
Principal	$ 2.8	$ 320.1	$ 12.2	$ 472.3	$ 807.4
Interest payments	39.0	57.2	36.6	33.0	165.8
Operating leases (2)	6.3	9.4	5.6	21.5	42.8
Kronos' long-term supply contracts to purchase TiO_2 feedstock (3)	379.4	214.1	—	—	593.5
Kronos' long-term service and other supply contracts (4)	56.0	82.8	11.9	5.7	156.4
CompX's raw material and other purchase commitments (5)	10.8	2.0	—	—	12.8
Fixed asset acquisitions (2)	17.0	—	—	—	17.0
BMI and LandWell purchase commitments (6)	8.5	—	—	—	8.5
Deferred payment obligation (7)	—	—	11.1	—	11.1
Estimated income tax obligations (8)	19.0	12.0	26.0	18.6	75.6
Total	$ 538.8	$ 697.6	$ 103.4	$ 551.1	$1,890.9

(1) The amount shown for indebtedness involving revolving credit facilities is based upon the actual amount outstanding at December 31, 2018, and the amount shown for interest for any outstanding variable-rate indebtedness is based upon the December 31, 2018 interest rate, and assumes that such variable-rate indebtedness remains outstanding until the maturity of the facility. The timing and amount shown for principal payments on indebtedness is based on the mandatory contractual principal repayments schedule of such indebtedness, and assumes no voluntary principal prepayments. See Item 7A — "Quantitative and Qualitative Disclosures About Market Risk" and Note 9 to our Consolidated Financial Statements.

(2) The timing and amount shown for our operating leases and fixed asset acquisitions are based upon the contractual payment amount and the contractual payment date for such commitments.

(3) Our contracts for the purchase of TiO_2 feedstock contain fixed quantities 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 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 TiO_2 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 TiO_2 feedstock is more fully described in Note 18 to our Consolidated Financial Statements and above in "Business – Chemicals Segment – Kronos Worldwide, Inc. raw materials." The amounts shown in the table above include the feedstock ore 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 18 to our Consolidated Financial Statements.

(5) CompX's purchase obligations consist of all open purchase orders and contractual obligations (primarily commitments to purchase raw materials) and are based on the contractual payment amount and the contractual payment date for those commitments.

(6) BMI and LandWell's purchase obligations consist of contractual obligations (primarily commitments for land development and improvement costs) and are based on the contractual payment amount and the contractual payment date for those commitments.

(7) The deferred payment obligation is described in Note 10 to our Consolidated Financial Statements.

(8) The amount shown for estimated tax obligations in 2018 is the consolidated amount of income taxes payable at December 31, 2018, which is assumed to be paid during 2019 and includes taxes payable, if any, to Contran as a result of our being a member of the Contran Tax Group. The amounts shown for estimated tax obligations in 2019 and thereafter relate to the Transition Tax which will be paid in the years indicated above. See Notes 1 and 14 to our Consolidated Financial Statements.

The table above does not include:

- Our obligations under the Louisiana Pigment Company, L.P. joint venture, as the timing and amount of such purchases are unknown and dependent on, among other things, the amount of TiO_2 produced by the joint venture in the future, and the joint venture's future cost of producing such TiO_2. However, the table of contractual commitments does include amounts related to our share of the joint venture's ore requirements necessary for it to produce TiO_2 for us. See Notes 7 and 18 to our Consolidated Financial Statements and "Business—Chemicals—Kronos Worldwide, Inc."
- Amounts we might pay to fund our defined benefit pension plans 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. Our defined benefit pension plans are discussed in greater detail in Note 11 to our Consolidated Financial Statements. We currently expect we will be required to contribute an aggregate of $18.2 million to our defined benefit pension plans during 2019.
- Any amounts that 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 14 to our Consolidated Financial Statements.
- Any amounts we will pay to settle the Santa Clara, California public nuisance case, see Note 18 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 20 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, raw materials and equity security prices.

Interest Rates—We are exposed to market risk from changes in interest rates, primarily related to our indebtedness.

At December 31, 2018 our aggregate indebtedness was split between 61% of fixed-rate instruments and 39% of variable-rate borrowings (in 2017 the percentages were 73% of fixed-rate instruments and 27% of variable rate borrowings). The fixed-rate debt instruments 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, 2018.

	Indebtedness* Amount			
	Carrying value	Fair value	Year end interest rate	Maturity date
	(In millions)			
Fixed-rate indebtedness:				
Kronos fixed-rate Senior Notes	$ 452.4	412.9	3.75%	2025
Tremont promissory note payable	9.4	9.4	3.00	2023
BMI bank note payable	18.0	18.8	5.34	2032
Note payable to the City of Henderson	2.1	2.1	3.00	2020
Total fixed-rate indebtedness	$ 481.9	$ 443.2	3.8%	
Variable-rate indebtedness:				
Valhi Contran credit facility	$ 314.3	$ 314.3	6.50%	2020

* Excludes capital lease obligations.

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.

Also, we are subject to currency exchange rate risk associated with Kronos' new Senior Notes, as such indebtedness is denominated in the euro. At December 31, 2018, we had the equivalent of $458.7 million outstanding under Kronos' euro-denominated Senior 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 date would be approximately $46 million.

See Notes 1 and 19 to our Consolidated Financial Statements for a discussion of the assumptions we used to estimate the fair value of the financial instruments to which we are a party at December 31, 2017 and 2018.

Raw Materials — Our Chemicals Segment is 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.

Our Component Products Segment will occasionally enter into short term commodity-related raw material supply arrangements to mitigate the impact of future increases in commodity-related raw material costs. We do not have long-term supply agreements for our raw material requirements because either we believe the risk of unavailability of those raw materials is low and we believe the downside risk of price volatility to be too great or because long-term supply agreements for those materials are generally not available. We do not engage in commodity raw material hedging programs.

Marketable Equity and Debt Security Prices — We are exposed to market risk due to changes in prices of the marketable securities we own. The fair value of such debt and equity securities (determined using Level 1, Level 2 and Level 3 inputs) at December 31, 2017 and 2018 was $258.7 million and $7.3 million, respectively. The potential change in the aggregate fair value of these investments, assuming a hypothetical 10% change in prices, would be approximately $25.9 and $.7 million at December 31, 2017 and 2018, respectively.

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 interest rates discussed above ignores the potential effect on other variables that affect our results of operations and cash flows, such as demand for our products, sales volumes and selling prices and operating expenses. Contrary to the above assumptions, changes in interest rates rarely result in simultaneous comparable shifts along the yield curve. Accordingly, the amounts we present above are not necessarily an accurate reflection of the potential losses we would incur assuming the hypothetical changes in market prices were actually to occur.

The above discussion and estimated sensitivity analysis amounts include forward-looking statements of market risk which assume hypothetical changes in market prices. 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 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 and Robert D. Graham, our Vice Chairman of the Board, President and Chief Executive Officer, and Gregory M. Swalwell, our Executive Vice President, Chief Financial Officer and Chief Accounting 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 were 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.

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 we will file with the SEC pursuant to Regulation 14A within 120 days after the end of the fiscal year covered by this report (the “Valhi Proxy Statement”).

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 DIRECTORS INDEPENDENCE

The information required by this Item is incorporated by reference to our 2019 proxy statement. See also Note 17 to our Consolidated Financial Statements.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

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

PART IV

ITEM 15. EXHIBITS

(a) and (c) Financial Statements

The Registrant

Our Consolidated Financial Statements 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 have retained a signed original of any of these exhibits that contain signatures, and we will provide such exhibit to the Commission or its staff upon request. We will furnish a copy of any of the exhibits listed below upon request and payment of $4.00 per exhibit to cover our costs of furnishing the exhibits. Such requests should be directed to the attention of our Corporate Secretary at our corporate offices located at 5430 LBJ Freeway, Suite 1700, Dallas, Texas 75240. Pursuant to Item 601(b)(4)(iii) of Regulation S-K, we will furnish to the Commission upon request any instrument defining the rights of holders of long-term debt issues and other agreements related to indebtedness which do not exceed 10% of our consolidated total assets as of December 31, 2018.

Item No.	Exhibit Index
2.1	Purchase Agreement by and between JFL-WCS Partners, LLC, as Purchaser, and Andrews County Holdings, Inc., as Seller, dated as of December 19, 2017 – incorporated by reference to Exhibit 2.1 to our Current Report on Form 8-K (File No. 1-5467) dated January 26, 2018 and filed on January 26, 2018.
2.2	Amendment to Purchase Agreement by and between JFL-WCS Partners, LLC, as Purchaser, and Andrews County Holdings, Inc., as Seller, dated as of January 19, 2018 – incorporated by reference to Exhibit 2.2 to our Current Report on Form 8-K (File No. 1-5467) dated January 26, 2018 and filed on January 26, 2018.
3.1	Third Amended and Restated Certificate of Incorporation of Valhi, Inc. – incorporated by reference to Exhibit 3.1 to our Current Report on Form 8-K (File no. 1-5467) dated May 27, 2016 and filed on May 31, 2016.
3.2	Amended and Restated By-Laws of Valhi, Inc. —incorporated by reference to Exhibit 3.1 of our Current Report on Form 8-K (File No. 1-5467) dated November 6, 2007.
10.1	Intercorporate Services Agreement between Valhi, Inc. and Contran Corporation effective as of January 1, 2004—incorporated by reference to Exhibit 10.1 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2004.
10.2	Intercorporate Services Agreement between Contran Corporation and NL Industries, Inc. effective as of January 1, 2004—incorporated by reference to Exhibit 10.1 to NL's Quarterly Report on Form 10-Q (File No. 1-640) for the quarter ended March 31, 2004.
10.3	Intercorporate Services Agreement between Contran Corporation and CompX International Inc. effective January 1, 2004—incorporated by reference to Exhibit 10.2 to CompX's Annual Report on Form 10-K (File No. 1-13905) for the year ended December 31, 2003.
10.4	Intercorporate Services Agreement between Contran Corporation and Kronos Worldwide, Inc. effective January 1, 2004—incorporated by reference to Exhibit No. 10.1 to Kronos' Quarterly Report on Form 10-Q (File No. 1-31763) for the quarter ended March 31, 2004.
10.5	Tax Agreement between Valhi, Inc. and Contran Corporation dated June 3, 2015 —incorporated by reference to Exhibit 10.5 to our Annual Report on Form 10-K (File No. 1-5467) for the year ended December 31, 2015.
10.6*	Valhi, Inc. 2012 Director Stock Plan—incorporated by reference to Exhibit 4.5 of the Registration statement on Form S-8 of the Registrant (File No. 333-48391). Filed on May 31, 2012.
10.7*	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). Filed on May 31, 2012.
10.8*	CompX International 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. 333-47539). Filed on May 31, 2012.
10.9*	NL Industries, Inc. 2012 Director Stock Plan—incorporated by reference to Exhibit 4.4 of the Registrant's statement on Form S-8 (File No. 001-00640) Filed on May 31, 2012.
10.10**	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.
10.11	Master Purchase and Termination Agreement dated May 30, 2018 by and between the registrant, ASC Holdings, Inc., Snake River Sugar Company, The Amalgamated Sugar Company LLC and the Amalgamated Collateral Trust - incorporated by reference to Exhibit 10.1 to our Current Report on Form 8-K (File No. 1-5467) dated May 30, 2018 and filed by the registrant on June 4, 2018.
10.12	Closing Agreement dated August 31, 2018 by and between the registrant, ASC Holdings, Inc., Snake River Sugar Company, The Amalgamated Sugar Company LLC, the Amalgamated Collateral Trust and the other parties named therein - incorporated by reference to Exhibit 10.1 to our Current Report on Form 8-K (File No. 1-5467) dated August 31, 2018 and filed by the registrant on September 5, 2018.
10.13	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 of NL's Quarterly Report on Form 10-Q (File No. 1-640) for the quarter ended September 30, 1993. (P)

Item No.	Exhibit Index
10.14	Joint Venture Agreement dated as of October 18, 1993 between Tioxide Americas Inc. and Kronos Louisiana, Inc.—incorporated by reference to Exhibit 10.3 of NL's Quarterly Report on Form 10-Q (File No. 1-640) for the quarter ended September 30, 1993. (P)
10.15	Kronos Offtake Agreement dated as of October 18, 1993 by and between Kronos Louisiana, Inc. and Louisiana Pigment Company, L.P.—incorporated by reference to Exhibit 10.4 of NL's Quarterly Report on Form 10-Q (File No. 1-640) for the quarter ended September 30, 1993. (P)
10.16	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 of NL's Annual Report on Form 10-K (File No. 1-640) for the year ended December 31 1995. (P)
10.17	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's Quarterly Report on Form 10-Q (File No. 1-640) for the quarter ended September 30, 1993. (P)
10.18	Lease Contract dated June 21, 1952, between Farbenfabrieken Bayer Aktiengesellschaft and Titangesellschaft mit beschrankter Haftung (German language version and English translation thereof)—incorporated by reference to Exhibit 10.14 of NL's Annual Report on Form 10-K (File No. 1-640) for the year ended December 31, 1985. (P)
10.19	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 Annual Report on Form 10-K of Kronos Worldwide, Inc. (File No. 001-31763) for the year ended December 31, 2015.
10.20	Indenture, dated as of September 13, 2017, among Kronos International, Inc. the guarantors named therein, and Deutche 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 Kronos Worldwide, Inc. on September 13, 2017.
10.21	Pledge Agreement, dated as of September 13, 2017, among Kronos International, Inc. the guarantors named therein and Deutche Bank Trust Company Americas, as collateral agent – intercorporate by reference to Exhibit 4.2 to the Current Report on Form 8-K (File No. 001-31763) dated September 13, 2017 and filed by Kronos Worldwide, Inc. on September 13, 2017.
10.22**	Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2018 in the principal amount of $360.0 million executed by Valhi, Inc. and payable to the order of Contran Corporation.
10.23**	Collateral Agreement dated March 12, 2013 between Valhi, Inc. and Contran Corporation.
21.1**	Subsidiaries of Valhi, Inc.
23.1**	Consent of PricewaterhouseCoopers LLP with respect to Valhi's Consolidated Financial Statements
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

* Management contract, compensatory plan or agreement.
** 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.

VALHI, INC.
(Registrant)

By: /s/ Robert D. Graham
Robert D. Graham, March 11, 2019
(Vice Chairman of the Board, 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/ Thomas E. Barry
Thomas E. Barry, March 11, 2019
(Director)

/s/ Terri L. Harrington
Terri L. Harrington, March 11, 2019
(Director)

/s/ W. Hayden McIlroy
W. Hayden McIlroy, March 11, 2019
(Director)

/s/ Mary A.Tidlund
Mary A. Tidlund, March 11, 2019
(Director)

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

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

/s/ Amy Allbach Samford
Amy Allbach Samford, March 11, 2019
(Vice President and Controller)

Annual Report on Form 10-K

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

Index of Financial Statements

We have omitted all financial statement schedules because they are not applicable or the required amounts are either not material or are presented in the Notes to the Consolidated Financial Statements.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Valhi, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Valhi, Inc. and its subsidiaries ("the Company") as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income (loss), 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 1987.

VALHI, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(In millions)

	December 31, 2017	December 31, 2018
ASSETS		
Current assets:		
Cash and cash equivalents	$ 435.7	**$ 499.8**
Restricted cash equivalents	16.1	**15.0**
Marketable securities	3.0	**2.5**
Accounts and other receivables, net	332.7	**318.4**
Accrued insurance recovery related to litigation settlement	—	**15.0**
Refundable income taxes	.5	**5.7**
Receivable from affiliates	32.6	**13.5**
Land held for development	16.5	—
Inventories, net	398.4	**515.8**
Other current assets	15.5	**23.1**
Current assets of discontinued operations	11.2	—
Total current assets	1,262.2	**1,408.8**
Other assets:		
Marketable securities	255.7	**4.8**
Investment in TiO_2 manufacturing joint venture	86.5	**81.3**
Goodwill	379.7	**379.7**
Deferred income taxes	119.8	**101.0**
Pension asset	4.2	**2.7**
Other assets	169.9	**167.8**
Noncurrent assets of discontinued operations	40.8	—
Total other assets	1,056.6	**737.3**
Property and equipment:		
Land	47.0	**46.6**
Buildings	261.6	**250.5**
Equipment	1,150.8	**1,155.2**
Mining properties	35.0	**28.6**
Construction in progress	58.3	**44.2**
	1,552.7	**1,525.1**
Less accumulated depreciation	964.0	**961.6**
Net property and equipment	588.7	**563.5**
Total assets	$ 2,907.5	**$ 2,709.6**

VALHI, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS (CONTINUED)

(In millions, except share data)

	December 31, 2017	December 31, 2018
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current maturities of long-term debt	$ 1.6	**$ 2.9**
Accounts payable	116.1	**111.5**
Accrued liabilities	124.8	**140.8**
Accrued litigation settlement	—	**60.0**
Payable to affiliates	16.2	**26.7**
Income taxes	25.1	**9.1**
Current liabilities of discontinued operations	47.3	—
Total current liabilities	331.1	**351.0**
Noncurrent liabilities:		
Long-term debt	1,041.5	**797.5**
Deferred income taxes	183.2	**41.2**
Payable to affiliates	70.1	**56.3**
Long-term litigation settlement	—	**17.0**
Accrued pension costs	266.4	**273.3**
Accrued environmental remediation and related costs	110.7	**96.9**
Other liabilities	84.9	**87.4**
Noncurrent liabilities of discontinued operations	52.9	—
Total noncurrent liabilities	1,809.7	**1,369.6**
Equity:		
Valhi stockholders' equity:		
Preferred stock, $.01 par value; 5,000 shares authorized; 5,000 shares issued	667.3	**667.3**
Common stock, $.01 par value; 500.0 million shares authorized; 355.3 million shares issued and outstanding	3.6	**3.6**
Additional paid-in capital	—	—
Retained earnings (deficit)	(17.9)	**220.3**
Accumulated other comprehensive loss	(179.0)	**(206.2)**
Treasury stock, at cost—13.2 million shares	(49.6)	**(49.6)**
Total Valhi stockholders' equity	424.4	**635.4**
Noncontrolling interest in subsidiaries	342.3	**353.6**
Total equity	766.7	**989.0**
Total liabilities and equity	$ 2,907.5	**$ 2,709.6**

Commitments and contingencies (Notes 9, 14, 17 and 18)

See accompanying Notes to Consolidated Financial Statements.

VALHI, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF OPERATIONS

(In millions, except per share data)

	Years ended December 31, 2016	2017	2018
Revenues and other income:			
Net sales	$ 1,519.4	$ 1,879.4	**$ 1,820.1**
Other income, net	39.0	25.2	**69.2**
Total revenues and other income	1,558.4	1,904.6	**1,889.3**
Costs and expenses:			
Cost of sales	1,211.5	1,266.5	**1,210.9**
Selling, general and administrative	232.6	262.6	**310.0**
Contract related intangible asset impairment	5.1	—	**—**
Litigation settlement expense, net	—	—	**62.0**
Loss on prepayment of debt	—	7.1	**—**
Other components of net periodic pension expense	11.5	17.7	**14.5**
Interest	58.1	58.9	**55.7**
Total costs and expenses	1,518.8	1,612.8	**1,653.1**
Income from continuing operations before income taxes	39.6	291.8	**236.2**
Income tax expense (benefit)	18.6	(120.0)	**(30.7)**
Net income from continuing operations	21.0	411.8	**266.9**
Income (loss) from discontinued operations, net of tax	(24.0)	(109.2)	**34.1**
Net income (loss)	(3.0)	302.6	**301.0**
Noncontrolling interest in net income of subsidiaries	12.9	95.1	**38.8**
Net income (loss) attributable to Valhi stockholders	$ (15.9)	$ 207.5	**$ 262.2**
Amounts attributable to Valhi stockholders:			
Income from continuing operations	$ 8.1	$ 316.7	**$ 228.1**
Income (loss) from discontinued operations	(24.0)	(109.2)	**34.1**
Net income (loss) attributable to Valhi stockholders	$ (15.9)	$ 207.5	**$ 262.2**
Basic and diluted net income (loss) per share:			
Income from continuing operations	$ .02	$ .93	**$ .67**
Income (loss) from discontinued operations	(.07)	(.32)	**.10**
Net income (loss) per share	$ (.05)	$ .61	**$ .77**
Cash dividends per share	$ .08	$ .08	**$ .08**
Basic and diluted weighted average shares outstanding	342.0	342.0	**342.0**

See accompanying Notes to Consolidated Financial Statements.

VALHI, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(In millions)

	Years ended December 31,		
	2016	2017	2018
Net income (loss)	$ (3.0)	$ 302.6	**$ 301.0**
Other comprehensive income (loss), net of tax:			
Currency translation	(14.5)	47.9	**(29.4)**
Interest rate swap	.2	1.5	**—**
Marketable securities	4.0	5.0	**—**
Defined benefit pension plans	(19.7)	11.0	**(6.8)**
Other	(.9)	(.8)	**(.9)**
Total other comprehensive income (loss), net	(30.9)	64.6	**(37.1)**
Comprehensive income (loss)	(33.9)	367.2	**263.9**
Comprehensive income (loss) attributable to noncontrolling interest	(6.9)	116.8	**29.0**
Comprehensive income (loss) attributable to Valhi stockholders	$ (40.8)	$ 250.4	**$ 234.9**

See accompanying Notes to Consolidated Financial Statements.

VALHI, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

Years ended December 31, 2016, 2017 and 2018

(In millions)

	Valhi Stockholders' Equity							
	Preferred stock	Common stock	Additional paid-in capital	Retained earnings (deficit)	Accumulated other comprehensive income (loss)	Treasury stock	Non-controlling interest	Total equity
Balance at December 31, 2015	$ 667.3	$ 3.6	—	$ (155.6)	$ (197.0)	$ (49.6)	$ 258.2	$ 526.9
Net income (loss)	—	—	—	(15.9)	—	—	12.9	(3.0)
Cash dividends	—	—	(.2)	(26.9)	—	—	(21.6)	(48.7)
Other comprehensive loss, net	—	—	—	—	(24.9)	—	(6.0)	(30.9)
Equity transactions with noncontrolling interest, net	—	—	.2	(.1)	—	—	—	.1
Balance at December 31, 2016	667.3	3.6	—	(198.5)	(221.9)	(49.6)	243.5	444.4
Net income	—	—	—	207.5	—	—	95.1	302.6
Cash dividends	—	—	(.3)	(26.9)	—	—	(18.1)	(45.3)
Other comprehensive loss, net	—	—	—	—	42.9	—	21.7	64.6
Equity transactions with noncontrolling interest, net	—	—	.3		—	—	.1	.4
Balance at December 31, 2017	667.3	3.6	—	(17.9)	(179.0)	(49.6)	342.3	766.7
Change in accounting principle – ASU 2014-09	—	—	—	2.7	—	—	2.3	5.0
Balance at January 1, 2018, as adjusted	667.3	3.6	—	(15.2)	(179.0)	(49.6)	344.6	771.7
Net income	**—**	**—**	**—**	**262.2**	**—**	**—**	**38.8**	**301.0**
Cash dividends	**—**	**—**	**(.4)**	**(26.7)**	—	**—**	**(20.1)**	**(47.2)**
Other comprehensive loss, net	**—**	**—**		—	**(27.3)**	**—**	**(9.8)**	**(37.1)**
Equity transactions with noncontrolling interest, net	**—**	**—**	**.4**	—	**.1**	**—**	**.1**	**.6**
Balance at December 31, 2018	**$ 667.3**	**$ 3.6**	**$ —**	**$ 220.3**	**$ (206.2)**	**$ (49.6)**	**$ 353.6**	**$ 989.0**

See accompanying Notes to Consolidated Financial Statements.

VALHI, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)

	Years ended December 31,		
	2016	2017	2018
Cash flows from operating activities:			
Net income (loss)	$ (3.0)	$ 302.6	**$ 301.0**
Depreciation and amortization	67.5	59.0	**58.4**
Net (gain) loss from:			
Sale of WCS	—	—	**(58.4)**
Land sales	—	—	**(12.5)**
Securities transactions, net	(.5)	(.1)	**(12.4)**
Disposal of property and equipment, net	.3	.5	**.3**
Noncash interest expense	2.6	2.5	**2.0**
Benefit plan expense greater than cash funding	4.6	10.5	**5.7**
Deferred income taxes	(39.1)	(293.2)	**(73.5)**
Loss on prepayment of debt	—	7.1	**—**
Payment for termination of interest rate swap contract	—	(3.3)	**—**
Long-lived asset impairment	—	170.6	**—**
Distributions from (contributions to) TiO_2 manufacturing joint venture, net	3.6	(6.0)	**4.0**
Contract related intangible asset impairment	5.1	—	**—**
Other, net	1.9	—	**13.9**
Change in assets and liabilities:			
Accounts and other receivables, net	(47.4)	(47.5)	**(11.1)**
Land held for development, net	18.3	6.6	**7.8**
Inventories, net	39.6	(5.5)	**(137.3)**
Accounts payable and accrued liabilities	(.3)	12.9	**65.7**
Income taxes	3.7	19.5	**(18.2)**
Accounts with affiliates	13.8	35.2	**19.5**
Other noncurrent assets	.1	(.9)	**2.6**
Other noncurrent liabilities	(3.8)	3.7	**13.0**
Other, net	12.8	(14.9)	**(5.0)**
Net cash provided by operating activities	79.8	259.3	**165.5**

VALHI, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS (CONTINUED)
(In millions)

	Years ended December 31, 2016	2017	2018
Cash flows from investing activities:			
Capital expenditures	$ (58.9)	$ (71.3)	$ **(61.4)**
Cash, cash equivalents and restricted cash and cash equivalents of discontinued operations at time of sale	—	—	**(28.9)**
Capitalized permit costs	(1.5)	(2.2)	**—**
Purchases of marketable securities	(11.4)	(9.7)	**(4.4)**
Proceeds from land sales	—	—	**19.5**
Proceeds from disposal of marketable securities	10.7	9.0	**18.2**
Other, net	(.5)	(.2)	**—**
Net cash used in investing activities	(61.6)	(74.4)	**(57.0)**
Cash flows from financing activities:			
Indebtedness:			
Borrowings	312.2	748.1	**—**
Principal payments	(309.0)	(600.2)	**(12.6)**
Deferred financing costs paid	—	(9.0)	**—**
Valhi cash dividends paid	(27.1)	(27.2)	**(27.1)**
Distributions to noncontrolling interest in subsidiaries	(21.6)	(18.1)	**(20.1)**
Net cash provided by (used in) financing activities	(45.5)	93.6	**(59.8)**
Cash, cash equivalents and restricted cash and cash equivalents – net change from			
Operating, investing and financing activities	$ (27.3)	$ 278.5	**$ 48.7**
Effect of exchange rates on cash	(5.3)	14.4	**(14.4)**
Net change for the year	(32.6)	292.9	**34.3**
Balance at beginning of year	229.1	196.5	**489.4**
Balance at end of year	$ 196.5	$ 489.4	**$ 523.7**
Supplemental disclosures:			
Cash paid for:			
Interest, net of amounts capitalized	$ 60.6	$ 59.3	**$ 53.9**
Income taxes, net	20.3	62.3	**68.5**
Noncash investing activities:			
Changes in accruals for capital expenditures	8.0	9.4	**5.4**
Sale of investment in Amalgamated Sugar Company LLC	—	—	**250.0**
Noncash financing activities:			
Trade payable to affiliate converted to indebtedness	—	—	**36.3**
Deemed repayment of Snake River Sugar Company indebtedness	—	—	**(250.0)**
Borrowings paid directly to lender to settle refinanced indebtedness	—	9.3	**—**
Principal payments paid directly by lender	—	(8.4)	**—**
Borrowings paid directly to lender for debt issuance costs	—	(.9)	**—**

See accompanying Notes to Consolidated Financial Statements.

Note 1—Summary of significant accounting policies:

Nature of our business. Valhi, Inc. (NYSE: VHI) is primarily a holding company. We operate through our wholly-owned and majority-owned subsidiaries, including NL Industries, Inc., Kronos Worldwide, Inc., CompX International Inc., Tremont LLC, Basic Management, Inc. ("BMI") and The LandWell Company ("LandWell"). Kronos (NYSE: KRO), NL (NYSE: NL), and CompX (NYSE American: CIX) each file periodic reports with the Securities and Exchange Commission ("SEC"). In January 2018, we sold Waste Control Specialists LLC ("WCS"), see Note 3.

Organization. We are majority owned by a wholly-owned subsidiary of Contran Corporation ("Contran"), which owns approximately 92% of our outstanding common stock at December 31, 2018. 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 and us.

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

Management's estimates. The preparation of our Consolidated Financial Statements in conformity with accounting principles generally accepted in the United States of America ("GAAP"), requires us to make estimates and assumptions that affect the reported amounts of our assets and liabilities and disclosures of contingent assets and liabilities at each balance sheet date and the reported amounts of our revenues and expenses during each reporting period. Actual results may differ significantly from previously-estimated amounts under different assumptions or conditions.

Principles of consolidation. Our Consolidated Financial Statements include the financial position, results of operations and cash flows of Valhi and our majority-owned and wholly-owned subsidiaries. We eliminate all material intercompany accounts and balances. Changes in ownership are accounted for as equity transactions with no gain or loss recognized on the transaction unless there is a change in control. See Note 3.

Foreign currency translation. The financial statements of our foreign subsidiaries are translated to U.S. dollars. The functional currency of our foreign subsidiaries is generally the local currency of the country. Accordingly, we translate the assets and liabilities at year-end rates of exchange, while we translate their 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 income (loss), net of related deferred income taxes and noncontrolling interest. We recognize currency transaction gains and losses in income.

Derivatives and hedging activities. We recognize derivatives as either an asset or liability measured at fair value in accordance with Accounting Standards Codification ("ASC") Topic 815, *Derivatives and Hedging*. 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 19.

Cash and cash equivalents. We classify bank time deposits and government and commercial notes and bills with original maturities of three months or less as cash equivalents.

Restricted cash and cash equivalents. We classify cash and cash equivalents that have been segregated or are otherwise limited in use as restricted. Such restrictions principally include amounts pledged as collateral with respect to performance obligations or letters of credit required by regulatory agencies for various environmental remediation sites, cash held in escrow under various hold-back agreements with third-party homebuilders associated with our Real Estate Management and Development Segment, cash pledged under debt agreement covenants and cash held in trust by our insurance brokerage subsidiary pending transfer to the applicable insurance or reinsurance carrier. To the extent the restricted amount relates to a recognized liability, we classify the restricted amount as current or noncurrent according to the corresponding liability. To the extent the restricted amount does not relate to a recognized liability, we classify restricted cash as a current asset. Restricted cash and cash equivalents classified as a current asset are presented separately on our Consolidated Balance Sheets, and restricted cash and cash equivalents classified as a noncurrent asset are presented as a component of other assets on our Consolidated Balance Sheets, as disclosed in Note 7.

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

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

We classify all of our marketable securities as available-for-sale. 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 will 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 Operations. See Note 19. We base realized gains and losses upon the specific identification of the securities sold.

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

Inventories and cost of sales. We state inventories at the lower of cost or net realizable value. 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, shipping and handling, and salaries and benefits associated with our manufacturing process. We allocate fixed manufacturing overhead costs based on normal production capacity. Unallocated overhead costs resulting from periods with abnormally low production levels are charged to expense as incurred. As inventory is sold to third parties, we recognize the cost of sales in the same period 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.

Land held for development. Land held for development relates to BMI and LandWell, for which we gained a controlling interest prior to 2016. The primary asset of LandWell is certain real property in Henderson, Nevada some of which we are developing for residential lots in a master planned community. Land held for development was recorded at the estimated acquisition date fair value based on a value per developable acre at the time of purchase. Development costs, including infrastructure improvements, real estate taxes, capitalized interest and other costs, some of which may be allocated, are capitalized during the period incurred. We allocate costs to each parcel sold on a pro-rata basis associated with the relevant development activity, and the costs allocated to parcels expected to be sold within one year are presented separately in current assets on our Consolidated Balance Sheets. As land parcels are sold, costs of land sales, including land and development costs, are allocated based on specific identification, relative sales value, square footage or a combination of these methods. All sales and marketing activities and general overhead are charged to selling, general and administrative expense as incurred.

Investment in TiO_2 manufacturing joint venture. We account for our investment in a 50%-owned manufacturing joint venture by the equity method. Distributions received from such investee are classified for statement of cash flow purposes using the "nature of distribution" approach under ASC Topic 230. See Note 7.

Goodwill and other intangible assets; amortization expense. Goodwill represents the excess of cost over fair value of individual net assets acquired in business combinations. Goodwill is not subject to periodic amortization. We amortize other intangible assets by the straight-line method over their estimated lives and state them net of accumulated amortization. We evaluate goodwill for impairment, annually, or when events or changes in circumstances indicate the carrying value may not be recoverable. We evaluate other intangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. See Note 8.

Property and equipment; depreciation expense. We state property and equipment at acquisition cost, including capitalized interest on borrowings during the actual construction period of major capital projects. In 2016, 2017 and 2018 we capitalized $1.0 million, $2.2 million and $1.1 million, respectively, of interest costs. 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 expenditures for maintenance, repairs and minor renewals as incurred that do not improve or extend the life of the assets, including planned major maintenance.

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 or asset group to the asset's net carrying value to determine if a write-down to fair value is required.

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

Employee benefit plans. Accounting and funding policies for our defined benefit pension and defined contribution retirement plans are described in Note 11. 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 10.

Income taxes. We and our qualifying subsidiaries are members of Contran's consolidated U.S federal income tax group (the "Contran Tax Group"). 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 17. As a member of the Contran Tax Group, we are a party to a tax sharing agreement which provides that we compute our tax 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 Contran 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 cash payments for income taxes to Contran of $10.7 million in 2016 and $38.9 million in 2017 and received $5.8 million in cash payment for income taxes from Contran 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 our Chemicals Segment's 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 Chemicals Segment's investments in non-U.S. subsidiaries, other than post-1986 undistributed earnings of our Chemicals Segment's European subsidiaries and all undistributed earnings of our Chemicals Segment's 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 Chemicals Segment's 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 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 Chemicals Segment's 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 where we believe 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 14.

Environmental remediation and related costs. We record liabilities related to environmental remediation and related costs when estimated future expenditures are probable and reasonably estimable. We adjust these accruals as further information becomes available to us or as circumstances change. We generally do not discount estimated future expenditures to their present value due to the uncertainty of the timing of the ultimate payout. We recognize any recoveries of remediation costs from other parties when we deem their receipt to be probable. We expense any environmental remediation related legal costs as incurred. At December 31, 2017, we had not recognized any material receivables for recoveries and at December 31, 2018 we had accrued insurance recoveries of $15.0 million. See Note 18.

Revenue recognition. *Chemicals and Component Products Segments* - 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 No. 2014-09, *Revenue from Contracts with Customers (Topic 606)*, see Note 12, we record revenue when we satisfy our performance obligations 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 being 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). In such arrangements shipping and handling are considered fulfillment activities, and accordingly, such costs are accrued when the related revenue is recognized. 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 we have not assessed whether a contract has a significant financing component. We state sales net of price, early payment and distributor discounts as well as 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. We report any tax assessed by a governmental authority that we collect from our customers that is both imposed on and concurrent with our revenue-producing activities (such as sales, use, value added and excise taxes) on a net basis (meaning we do not recognize these taxes either in our revenues or in our costs and expenses).

Frequently, we receive orders for products to be delivered over dates that may extend across reporting periods. We invoice for each delivery upon shipment and recognize revenue for each distinct shipment when all sales recognition criteria for that shipment have been satisfied. As scheduled delivery dates for these orders are within a one year period, under the optional exemption provided by ASU 2014-09, we do not disclose sales allocated to future shipments of partially completed contracts.

Real Estate Management and Development Segment – Revenues from our Real Estate Management and Development Segment are generally not material. Our sales involve providing utility services, among other things, to an industrial park located in Henderson, Nevada and we are responsible for the delivery of water to the city of Henderson and various other users through a water distribution system we own. These sales involve single performance obligations and we record revenue when we satisfy our performance obligations to our customers generally after the service is performed and our customers become obligated to pay us and such payment being probable of occurring. Revenue is recorded in an amount that reflects the net consideration we expect to receive in exchange for our services. Prices for our products are based on contracted rates and do not include financing components, noncash consideration or consideration paid to our customers. As our standard payment terms are less than one year, we have elected the practical expedient under ASC 606 and we have not assessed whether a contract has a significant financing component.

Our revenues also are related to efforts to develop certain real estate in Henderson, Nevada, including approximately 2,100 acres zoned for residential/planned community purposes and approximately 400 acres zoned for commercial and light industrial use. Contracts for land sales are negotiated on an individual basis, involve single performance obligations, and generally require us to complete property development and improvements after title passes to the buyer and we have received all or a substantial portion of the selling price. We recognize land sales revenue associated with the residential/planned community over time using cost based input methods. Land sales associated with the residential/planned community have variable consideration components which are based on a percentage of the builder's ultimate selling price of residential housing unit to their customer (generally 3.5% of such sales price). The amount we recognize when a parcel is sold to a home builder is 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. By recognizing revenue over time using cost based input methods, revenues (including variable consideration) and profits are recognized in the same proportion of our progress towards completion of our contractual obligations, with our progress measured by costs incurred as a percentage of total costs estimated to be incurred relative to the parcels sold. Estimates of total costs expected to be incurred require significant management judgment, and the amount of revenue and profits that have been recognized to date are subject to revisions throughout the development period. The impact on the amount of revenue recognized resulting from any future change in the estimate of total costs estimated to be incurred would be accounted for prospectively in accordance with GAAP. We record estimated deferred revenue on the amount to which we are most-likely to be entitled and deferred revenue is recognized into revenue as the housing units are sold. Prior to the adoption of ASU 2014-09, we did not include variable consideration in the percentage-of-completion method of revenue recognition.

Selling, general and administrative expenses; shipping and handling costs; advertising costs; research and development costs. Selling, general and administrative expenses include costs related to marketing, sales, distribution, shipping and handling, research and development, legal, environmental remediation 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. Shipping and handling costs of our Chemicals Segment were approximately $90 million in 2016, $101 million in 2017 and $105 million in 2018. Shipping and handling costs of our Component Products and Waste Management Segments are not material. We expense advertising and research and development costs as incurred. Advertising costs were approximately $1 million in each of 2016, 2017 and 2018. Research, development and certain sales technical support costs were approximately $13 million in 2016, $19 million in 2017, and $16 million in 2018.

Note 2—Business and geographic segments:

Business segment	Entity	% controlled at December 31, 2018
Chemicals	Kronos	80%
Component products	CompX	87%
Real estate management and development	BMI and LandWell	63% - 77%

Our control of Kronos includes 50% we hold directly and 30% held directly by NL. We own 83% of NL. Our control of CompX is through NL. We own 63% of BMI. Our control of LandWell includes the 27% we hold directly and 50% held by BMI. See Note 3.

We are organized based upon our operating subsidiaries. Our operating segments are defined as components of our consolidated operations about which separate financial information is available that is regularly evaluated by our chief operating decision maker in determining how to allocate resources and in assessing performance. Each operating segment is separately managed, and each operating segment represents a strategic business unit offering different products.

We have the following three consolidated reportable operating segments.

- *Chemicals*—Our chemicals segment is operated through our majority control of Kronos. Kronos is a leading global producer and marketer of value-added titanium dioxide pigments (“TiO_2”). TiO_2 is used to impart whiteness, brightness, opacity and durability to a wide variety of products, including paints, plastics, paper, fibers and ceramics. Additionally, TiO_2 is a critical component of everyday applications, such as coatings, plastics and paper, as well as many specialty products such as inks, foods and cosmetics. See Note 7.
- *Component Products*—We operate in the component products industry through our majority control of CompX. CompX is a leading manufacturer of security products used in the recreational transportation, postal, office and institutional furniture, cabinetry, tool storage, healthcare and a variety of other industries. CompX is also a leading manufacturer of stainless steel exhaust systems, gauges, throttle controls, wake enhancement systems and trim tabs for the recreational marine industry. All of CompX production facilities are in the United States.
- *Real Estate Management and Development*—We operate in real estate management and development through our majority control of BMI and LandWell. BMI provides utility services to certain industrial and municipal customers and owns real property in Henderson, Nevada. LandWell is engaged in efforts to develop certain land holdings for commercial, industrial and residential purposes in Henderson, Nevada.

We evaluate segment performance based on segment operating income, which we define as income before income taxes and interest expense, exclusive of certain non-recurring items (such as gains or losses on disposition of business units and other long-lived assets outside the ordinary course of business and certain legal settlements) and certain general corporate income and expense items (including securities transactions gains and losses and interest and dividend income), which are not attributable to the operations of the reportable operating segments. The accounting policies of our reportable operating segments are the same as those described in Note 1. Segment results we report may differ from amounts separately reported by our various subsidiaries and affiliates due to purchase accounting adjustments and related amortization or differences in how we define operating income. Intersegment sales are not material.

Interest income included in the calculation of segment operating income is not material in 2016, 2017 or 2018. Capital expenditures include additions to property and equipment but exclude amounts we paid for business units acquired in business combinations. Depreciation and amortization related to each reportable operating segment includes amortization of any intangible assets attributable to the segment. Amortization of deferred financing costs and any premium or discount associated with the issuance of indebtedness is included in interest expense.

Segment assets are comprised of all assets attributable to each reportable operating segment, including goodwill and other intangible assets. Our investment in the TiO_2 manufacturing joint venture (see Note 7) is included in the Chemicals Segment’s assets. Corporate assets are not attributable to any operating segment and consist principally of cash and cash equivalents, restricted cash and restricted cash equivalents and marketable securities. Our Chemicals Segment’s operating income in 2016 includes $4.3 million in business interruption insurance proceeds which is included in the determination of its operating income, see Note 12.

Upon acquiring a controlling interest in our Real Estate Management and Development Segment in December 2013, we recognized an indefinite-lived customer relationship intangible asset of $5.1 million for long-term contracts related to water delivery services to the City of Henderson, Nevada and various other users through a water system owned by BMI. Aggregate revenues associated with water delivered under the City of Henderson contract have historically represented approximately 70% of the Segment’s aggregate water delivery revenues. These contracts generally span many years and feature automatic renewing provisions. The initial City of Henderson water delivery contract extended for a period of 25 years, and contained an automatic renewal provision. In January 2016, the water delivery contract with the City of Henderson was amended. As part of such amendment, required minimum volumes were reduced, pricing was lowered, the automatic renewal provision of the contract was eliminated, and the contract term now runs through June 2040. The amendment to the City of Henderson water delivery contract represents an event or change in circumstance which triggered the need to perform a quantitative impairment analysis with respect to the intangible asset in the first quarter of 2016, in accordance with the guidance in ASC 350-30-35. Accordingly, as a result of a quantitative impairment analysis performed in the first quarter of 2016 we concluded that the $5.1 million contract related intangible asset primarily related to the City of Henderson water delivery contract was fully impaired as a result of the amended contract (with its reduced minimum volumes and lower pricing), and we recognized an aggregate $5.1 million contract related intangible impairment loss in 2016.

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Net sales:			
Chemicals	$ 1,364.3	$ 1,729.0	**$ 1,661.9**
Component products	108.9	112.0	**118.2**
Real estate management and development	46.2	38.4	**40.0**
Total net sales	$ 1,519.4	$ 1,879.4	**$ 1,820.1**
Cost of sales:			
Chemicals	$ 1,101.5	$ 1,161.2	**$ 1,101.7**
Component products	73.8	77.2	**79.9**
Real estate management and development	36.2	28.1	**29.3**
Total cost of sales	$ 1,211.5	$ 1,266.5	**$ 1,210.9**
Gross margin:			
Chemicals	$ 262.8	$ 567.8	**$ 560.2**
Component products	35.1	34.8	**38.3**
Real estate management and development	10.0	10.3	**10.7**
Total gross margin	$ 307.9	$ 612.9	**$ 609.2**
Operating income:			
Chemicals	$ 102.8	$ 358.5	**$ 342.9**
Component products	15.6	15.2	**17.8**
Real estate management and development	.8	6.6	**10.0**
Total operating income	119.2	380.3	**370.7**
General corporate items:			
Securities earnings	27.2	29.5	**38.5**
Insurance recoveries	.4	.4	**1.3**
Gain on land sales	—	—	**12.5**
Other components of net periodic pension expense	(11.5)	(17.7)	**(14.5)**
Litigation settlement expense, net	—	—	**(62.0)**
Changes in market value of Valhi common stock held by subsidiaries	—	—	**(12.2)**
General expenses, net	(37.6)	(34.7)	**(42.4)**
Loss on prepayment of debt	—	(7.1)	**—**
Interest expense	(58.1)	(58.9)	**(55.7)**
Income (loss) from continuing operations before income taxes	$ 39.6	$ 291.8	**$ 236.2**

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Depreciation and amortization:			
Chemicals	$ 42.6	$ 43.4	**$ 52.0**
Component products	3.7	3.7	**3.5**
Waste management (1)	18.3	8.9	**—**
Real estate management and development	2.9	3.0	**2.9**
Total	$ 67.5	$ 59.0	**$ 58.4**
Capital expenditures:			
Chemicals	$ 53.0	$ 64.3	**$ 56.3**
Component products	3.2	2.8	**3.1**
Waste management(1)	.7	.9	**.1**
Real estate management and development	2.0	3.3	**1.9**
Total	$ 58.9	$ 71.3	**$ 61.4**

	December 31,		
	2016	2017	2018
	(In millions)		
Total assets:			
Operating segments:			
Chemicals	$ 1,548.9	$ 2,190.5	**$ 2,266.6**
Component products	97.9	104.9	**120.4**
Waste management(1)	228.6	52.0	**—**
Real estate management and development	200.9	206.9	**218.5**
Corporate and eliminations	366.9	353.2	**104.1**
Total	$ 2,443.2	$ 2,907.5	**$ 2,709.6**

(1)Denotes discontinued operations

Geographic information. We attribute net sales to the place of manufacture (point-of-origin) and the location of the customer (point-of-destination); we attribute property and equipment to their physical location. At December 31, 2018 the net assets of our non-U.S. subsidiaries included in consolidated net assets approximated $614 million (in 2017 the total was also $614 million).

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Net sales—point of origin:			
United States	$ 819.3	$ 992.3	**$ 997.6**
Germany	699.8	918.6	**886.1**
Canada	257.7	309.2	**307.2**
Belgium	187.4	279.9	**272.2**
Norway	164.8	216.4	**209.6**
Eliminations	(609.6)	(837.0)	**(852.6)**
Total	$ 1,519.4	$ 1,879.4	**$ 1,820.1**
Net sales—point of destination:			
North America	$ 566.8	$ 668.3	**$ 698.7**
Europe	698.2	899.2	**817.6**
Asia and other	254.4	311.9	**303.8**
Total	$ 1,519.4	$ 1,879.4	**$ 1,820.1**

	December 31,		
	2016	2017	2018
	(In millions)		
Net property and equipment:			
United States	$ 76.2	$ 80.8	**$ 74.5**
Germany	223.7	259.2	**245.8**
Canada	60.5	69.0	**66.1**
Norway	75.5	81.7	**81.0**
Belgium	80.1	98.0	**96.1**
Total	$ 516.0	$ 588.7	**$ 563.5**

Note 3—Business combinations, dispositions and related transactions:

Kronos Worldwide, Inc.

Prior to 2016, Kronos' board of directors authorized the repurchase of up to 2.0 million shares of its common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. Kronos may repurchase its 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, Kronos may terminate the program prior to its completion. Kronos would use cash on hand to acquire the shares. Repurchased shares will be added to Kronos' treasury and cancelled. Kronos did not make any repurchases under the plan during 2016, 2017 or 2018, and at December 31, 2018 approximately 1.95 million shares are available for repurchase under these authorizations.

CompX International Inc.

Prior to 2016, CompX's board of directors authorized various repurchases of its Class A common stock in open market transactions, including block purchases, or in privately-negotiated transactions at unspecified prices and over an unspecified period of time. CompX may repurchase its 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, CompX may terminate the program prior to its completion. CompX would generally use cash on hand to acquire the shares. Repurchased shares will be added to CompX's treasury and cancelled. CompX did not make any repurchases under the plan during 2016, 2017 or 2018, and at December 31, 2018 approximately 678,000 shares were available for purchase under these authorizations.

Discontinued Operations —Waste Control Specialists LLC

Pursuant to an agreement we entered into in December 2017, on January 26, 2018 we completed the sale of our Waste Management Segment to JFL-WCS Partners, LLC ("JFL Partners"), an entity sponsored by certain investment affiliates of J.F. Lehman & Company, for consideration consisting of the assumption of all of WCS' third-party indebtedness and other liabilities. We recognized a pre-tax gain of approximately $58 million primarily in the first quarter of 2018 on the transaction ($34.7 million, or $.10 per diluted share, net of tax) because the carrying value of the liabilities of the business assumed by the purchaser exceeded the carrying value of the assets sold at the time of the sale in large part due to the previously-reported long-lived asset impairment of $170.6 million recognized in the second quarter of 2017 as discussed below. The net assets of the disposed Waste Management Segment at the time we completed the sale on January 26, 2018 were not materially different as compared to December 31, 2017. Our Waste Management Segment, which operated in the low-level radioactive, hazardous, toxic and other waste disposal industry historically struggled to generate sufficient recurring disposal volumes to generate positive operating results or cash flows. We believe the sale enables us to focus more effort on continuing to develop our remaining segments which we believe have greater opportunity for higher returns.

In accordance with GAAP, the Waste Management Segment has been reclassified as discontinued operations in our Consolidated Balance Sheets and Consolidated Statements of Operations for all periods presented. Also in accordance with GAAP, we have not reclassified our Consolidated Statement of Cash Flows to reflect the Waste Management Segment as discontinued operations.

Selected financial data for the operations of the disposed Waste Management Segment is presented below. Current assets consist principally of trade accounts receivable.

	December 31, 2017 (In millions)
ASSETS	
Current assets	$ 11.2
Restricted cash	27.2
Property and equipment, net	6.0
Other noncurrent assets	7.6
Total noncurrent assets	40.8
Total assets	$ 52.0
LIABILITIES	
Current portion of long-term debt	$ 3.0
Payable to Contran	36.1
Other current liabilities	8.2
Total current liabilities	47.3
Long-term debt	65.0
Deferred income taxes	(43.8)
Accrued noncurrent closure and post closure costs	31.7
Total noncurrent liabilities	52.9
Total liabilities	$ 100.2

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Net sales	$ 47.4	$ 75.4	$ 4.6
Operating loss	$ (26.2)	$ (167.1)	$ (.4)
Termination fee	—	4.0	—
Other income (expense), net	(5.3)	(8.4)	—
Interest expense, net	(5.1)	(4.8)	(.3)
Loss before taxes	(36.6)	(176.3)	(.7)
Income tax benefit	(12.6)	(67.1)	(.1)
Net loss	$ (24.0)	$ (109.2)	$ (.6)
Pre-tax gain on disposal	—	—	58.4
Income tax expense	—	—	23.7
After-tax gain on disposal	—	—	34.7
Total	$ (24.0)	$ (109.2)	$ 34.1
Net cash provided by (used in) operating activities	$ (10.7)	$ 18.1	$ 2.3
Net cash provided by (used in) investing activities	(2.7)	(3.4)	(.1)

The Waste Management Segment's operating loss in 2017 includes a $170.6 million long-lived asset impairment which is included in the determination of its operating income. As previously reported, in November 2015 we entered into an agreement with Rockwell Holdco, Inc. ("Rockwell"), for the sale of WCS to Rockwell. The agreement, as amended, was for $270 million in cash plus the assumption of all of WCS' third-party indebtedness incurred prior to the date of the agreement. Additionally, Rockwell and its affiliates would have assumed all financial assurance obligations related to the WCS business. Rockwell is the parent company of EnergySolutions, Inc. Completion of the sale was subject to certain customary closing conditions, including the receipt of U.S. anti-trust approval. The U.S. Department of Justice ("DOJ") did not give the parties anti-trust clearance, and on November 16, 2016, the DOJ filed an anti-trust action in the U.S. federal district court for the District of Delaware styled *United States of America vs. Energy Solutions, Inc., et al* (Case No. 1:16-cv-01056-UNA), seeking an injunction to enjoin completion of the sale of WCS. Trial was held in late April and early May 2017. On June 21, 2017, the court issued an order enjoining the sale of WCS. While we disagreed with the court's decision, the parties determined that they would not appeal the decision to the Third Circuit Court of Appeals, and on June 22, 2017, we provided written notice to Rockwell terminating the purchase agreement for the sale of WCS to Rockwell effective June 22, 2017.

The Court's decision and resulting termination of the purchase agreement with Rockwell constituted triggering events under ASC 360-10-35-21, requiring WCS' long-lived assets to be tested for recoverability. Given the challenges facing WCS' disposal operations we concluded that the long-lived assets associated with WCS' operations were impaired at June 30, 2017, concurrent with the termination of the purchase agreement with Rockwell. Accordingly, we recognized an aggregate $170.6 million impairment charge as of June 30, 2017, to reduce the carrying value of WCS' long-lived assets recognized for financial reporting purposes to their estimated fair value. Such $170.6 million impairment charge relates to the following long-lived assets of WCS: net property and equipment - $127.5 million; waste disposal site operating permits, net - $42.0 million; and other assets - $1.1 million. With respect to the operating permits, we concluded such long-lived assets were fully impaired, as these permits are specific to WCS' land and facility in Andrews County and have no salvage value as there is no alternative use for permits. Similarly, with respect to the net property and equipment, we concluded such long-lived assets were fully impaired except to the extent certain items of property and equipment had an alternate use outside of WCS' operations; for those items of property and equipment, they were written down to estimated salvage value, primarily using dealer or auction-site quotes (Level 3 inputs) as the basis for salvage value. At June 30, 2017, the time the impairment was recognized, the salvage value for such items of property and equipment aggregated $5.7 million.

As part of the terms of the fourth amendment to the purchase agreement with Rockwell, in the event of termination of the purchase agreement for any reason (including termination of the purchase agreement if completion of the sale of WCS is enjoined on anti-trust grounds), we would be entitled to receive a termination fee from Rockwell. Such termination fee (net of applicable expenses) aggregated $4 million, was received in June 2017 and is recognized as part of loss from discontinued operations in 2017 (classified as part of other income (expense), net in the table above). Other income (expense), net in the table above also includes expenses aggregating $5.8 million in 2016 and $8.7 million in 2017 related to efforts to sell WCS (principally legal fees).

In connection with the January 2018 sale, JFL Partners did not assume WCS' trade payable owed to Contran, which consisted primarily of intercorporate service fees charged to WCS by Contran for which WCS did not pay Contran for several years. Immediately prior to the closing of the sale of WCS, Contran transferred its associated receivable from WCS to Valhi, in return for a deemed borrowing by Valhi under its revolving credit facility with Contran. Valhi subsequently contributed such receivable from WCS to WCS's equity, and the trade payable obligation of WCS was deemed paid in full.

Note 4—Accounts and other receivables, net:

	December 31, 2017	December 31, 2018
	(In millions)	
Trade accounts receivable:		
Kronos	$ 301.4	**$ 273.3**
CompX	10.5	**12.2**
BMI/LandWell	1.6	**1.5**
VAT and other receivables	20.7	**32.7**
Allowance for doubtful accounts	(1.5)	**(1.3)**
Total	$ 332.7	**$ 318.4**

Note 5—Inventories, net:

	December 31, 2017	December 31, 2018
	(In millions)	
Raw materials:		
Chemicals	$ 106.9	**$ 93.1**
Component products	2.7	**2.7**
Total raw materials	109.6	**95.8**
Work in process:		
Chemicals	20.8	**23.5**
Component products	9.8	**11.1**
Total in-process products	30.6	**34.6**
Finished products:		
Chemicals	192.2	**317.6**
Component products	2.8	**3.3**
Total finished products	195.0	**320.9**
Supplies (chemicals)	63.2	**64.5**
Total	$ 398.4	**$ 515.8**

Note 6—Marketable securities:

	Market value	Cost basis	Unrealized losses, net
		(In millions)	
December 31, 2017:			
Current assets	$ 3.0	$ 3.0	$ —
Noncurrent assets:			
The Amalgamated Sugar Company LLC	$ 250.0	$ 250.0	$ —
Other	5.7	5.9	(.2)
Total	$ 255.7	$ 255.9	$ (.2)
December 31, 2018:			
Current assets	**$ 2.5**	**$ 2.5**	**$ —**
Noncurrent assets	**$ 4.8**	**$ 5.2**	**$ (.4)**

	Fair Value Measurements			
	Total	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(In millions)			
December 31, 2017:				
Current assets	$ 3.0	$ —	$ 3.0	$ —
Noncurrent assets:				
The Amalgamated Sugar Company LLC	$ 250.0	$ —	$ —	$ 250.0
Fixed income securities	4.4	—	4.4	—
Common stocks and exchange traded funds	1.3	1.3	—	—
Total	$ 255.7	$ 1.3	$ 4.4	$ 250.0
December 31, 2018:				
Current assets	**$ 2.5**	**$ —**	**$ 2.5**	**$ —**
Noncurrent assets:				
Fixed income securities	**$ 3.2**	**$ —**	**$ 3.2**	**$ —**
Common stocks and exchange traded funds	**1.6**	**1.6**	**—**	**—**
Total	**$ 4.8**	**$ 1.6**	**$ 3.2**	**$ —**

Amalgamated Sugar. Prior to 2016, we transferred control of the refined sugar operations previously conducted by our wholly-owned subsidiary, The Amalgamated Sugar Company, to Snake River Sugar Company, an Oregon agricultural cooperative formed by certain sugar beet growers in Amalgamated's areas of operations. Pursuant to the transaction, we contributed substantially all of the net assets of our refined sugar operations to The Amalgamated Sugar Company LLC, a limited liability company controlled by Snake River, on a tax-deferred basis in exchange for a non-voting ownership interest in the LLC. The cost basis of the net assets we transferred to the LLC was approximately $34 million. When we transferred control of our operations to Snake River in return for our interest in the LLC, we recognized a gain in earnings equal to the difference between $250 million (the fair value of our investment in the LLC as evidenced by its $250 million redemption price, as discussed below) and the $34 million cost basis of the net assets we contributed to the LLC, net of applicable deferred income taxes. Therefore, the cost basis of our investment in the LLC was $250 million. As part of this transaction, Snake River made certain loans to us aggregating $250 million. These loans are collateralized by our interest in the LLC. See Notes 9 and 13. We and Snake River shared in distributions from the LLC up to an aggregate of $26.7 million per year (the "base" level), with a preferential 95% share going to us. Additionally, Snake River agreed that the annual amount of distributions we receive from the LLC would exceed the annual amount of interest payments we owe to Snake River on our $250 million in loans from Snake River by at least $1.8 million on an annual basis.

On May 30, 2018, we entered into an agreement with Snake River, completed on August 31, 2018, in which we sold our interest in Amalgamated for consideration consisting of $12.5 million in cash and the deemed payment in full of our $250 million in loans from Snake River (see Note 9). As a result, in the third quarter of 2018 we recognized a securities transaction gain of $12.5 million related to the sale and our $250 million in loans were deemed repaid in full.

Other. The fair value of our marketable securities are either determined using Level 1 inputs (because the securities are actively traded) or determined using Level 2 inputs (because although these securities are traded, in many cases the market is not active and the year-end valuation is generally based on the last trade of the year, which may be several days prior to December 31).

Note 7—Investment in TiO_2 manufacturing joint venture and other assets:

	December 31,	
	2017	2018
	(In millions)	
Other assets:		
Land held for development	$ 126.6	**$ 129.2**
Restricted cash and cash equivalents	9.9	**8.9**
Land contract receivables	—	**9.1**
IBNR receivables	6.8	**6.0**
Note receivables - OPA	—	**1.9**
Other	26.6	**12.7**
Total	$ 169.9	**$ 167.8**

Investment in TiO_2 manufacturing joint venture. Our Chemicals Segment owns 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 TiO_2 plant in Lake Charles, Louisiana.

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

	Years ended December 31,		
	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**

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**
Tioxide	157.9	158.3	**167.0**
Total	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	315.4	315.8	**332.9**
Net income	$ —	$ —	**$ —**

Land held for development. The land held for development relates to BMI and LandWell and is discussed in Note 1.

Land contract receivables. Land contract receivables classified as a noncurrent asset relate to our Real Estate Management and Development Segment. Such receivables relate to certain fees we collect from builders when the builder sells a home to a customer, as discussed in Notes 1 and 20.

Notes receivables – OPA. Under an Owner Participation Agreement ("OPA") entered into by LandWell with the Redevelopment Agency of the City of Henderson, Nevada, if LandWell develops certain real property for commercial and residential purposes in a master planned community in Henderson, Nevada, the cost of certain public infrastructure may be reimbursed to us through tax increment. The maximum reimbursement under the OPA is $209 million, and is subject to, among other things, completing construction of approved qualifying public infrastructure, transferring title of such infrastructure to the City of Henderson, receiving approval from the Redevelopment Agency of the funds expended to be eligible for tax increment reimbursement and the existence of a sufficient property tax valuation base and property tax rates in order to generate tax increment reimbursement funds. We are entitled to receive 75% of the tax increment generated by the master planned community through 2036, subject to the qualifications and limitations indicated above. Public infrastructure costs previously incurred for which the Redevelopment Agency had provided its approval for tax increment reimbursement but we had not yet received such reimbursement through tax increment receipts aggregated $3.1 million at December 31, 2017 and $2.9 million at December 31, 2018. Such amount is evidenced by a promissory note issued to LandWell by the City of Henderson.

Prior to 2018, due to the significant uncertainty of the timing and amount of any of such potential tax increment reimbursements, we recognized any such tax increment reimbursements only when received. However, due to growth in the master planned community and the increase in tax increment funds to which we are entitled, we determined in the first quarter of 2018 we expected the tax increment reimbursements to be collected in the future would at least be sufficient to support recognizing the $3.1 million note payable issued by the City of Henderson to us. The note payable bears interest at 6% annually and the note expires in 2036. Any unpaid balances in 2036 are forfeited. See Note 13.

Other. We have certain related party transactions with LPC, as more fully described in Note 17.

The IBNR receivables relate to certain insurance liabilities, the risk of which we have reinsured with certain third party insurance carriers. We report the insurance liabilities related to these IBNR receivables which have been reinsured as part of noncurrent accrued insurance claims and expenses. Certain of our insurance liabilities are classified as current liabilities and the related IBNR receivables are classified with other current assets. See Notes 10 and 17.

Note 8—Goodwill:

We have assigned goodwill to each of our reporting units (as that term is defined in ASC Topic 350-20-20, *Goodwill*) which corresponds to our operating segments. All of our goodwill related to our Chemicals Segment is from our various step acquisitions of NL and Kronos which occurred prior to 2015, as goodwill was determined prior to the adoption of the equity transaction framework provisions of ASC Topic 810. Substantially all of the net goodwill related to the Component Products Segment was generated from CompX's acquisitions of certain business units and the step acquisitions of CompX. The Component Products Segment goodwill is assigned to the security products reporting unit within that operating segment.

	Operating segment		
	Chemicals	Component Products	Total
	(In millions)		
Balance at December 31, 2016, 2017 and 2018	**$ 352.6**	**$ 27.1**	**$ 379.7**

We test for goodwill impairment at the reporting unit level. In determining the estimated fair value of the reporting units, we use appropriate valuation techniques, such as discounted cash flows and, with respect to our Chemicals Segment, we consider quoted market prices, a Level 1 input, while discounted cash flows are a Level 3 input. We also consider control premiums when assessing fair value using quoted market prices. If the carrying amount of the reporting unit's net assets exceeds its fair value, an impairment charge is recorded for the amount by which such carrying amount exceeds the reporting unit's fair value (not to exceed the amount of goodwill recognized). We review goodwill for each of our reporting units for impairment during the third quarter of each year. Goodwill is also evaluated for impairment at other times whenever an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying value. If the fair value of an evaluated asset is less than its book value, the asset is written down to fair value.

In 2016, 2017 and 2018, no goodwill impairment was indicated as part of our annual impairment review of goodwill. As permitted by GAAP, during 2017 and 2018 we used the qualitative assessment of ASC 350-20-35 for our Component Products security products reporting unit's annual impairment test and determined it was not necessary to perform a quantitative goodwill impairment test. During 2016, we used the quantitative assessment of ASC 350-20-35 for security products reporting unit's annual impairment test using discounted cash flows to determine the estimated fair value of our security products reporting unit. Such discounted cash flows are a Level 3 input as defined by ASC 820-10-35.

Prior to 2016, we recorded an aggregate $16.5 million goodwill impairment, mostly with respect to our Component Products Segment. Our consolidated gross goodwill at December 31, 2018 is $396.2 million.

Note 9—Long-term debt:

	December 31, 2017	December 31, 2018
	(In millions)	
Valhi:		
Snake River Sugar Company	$ 250.0	**$ —**
Contran credit facility	284.3	**314.3**
Total Valhi debt	534.3	**314.3**
Subsidiary debt:		
Kronos —		
Senior Notes	471.1	**452.4**
Tremont —		
Promissory note payable	13.1	**9.4**
BMI —		
Bank note payable Western Alliance Bank	18.8	**18.0**
LandWell —		
Note payable to the City of Henderson	2.5	**2.1**
Other	3.3	**4.2**
Total subsidiary debt	508.8	**486.1**
Total debt	1,043.1	**800.4**
Less current maturities	1.6	**2.9**
Total long-term debt	$ 1,041.5	**$ 797.5**

Valhi*—Snake River Sugar Company—* In connection with the sale of our ownership interest in Amalgamated on August 31, 2018, our $250 million outstanding debt obligations owed to Snake River Sugar Company were deemed paid in full. Such loans bore interest at a weighted average fixed interest rate of 9.4%. See Note 6.

Contran credit facility—We also have an unsecured revolving credit facility with Contran which, as amended, provides for borrowings from Contran of up to $360 million. The facility, as amended, bears interest at prime plus 1% (6.5% at December 31, 2018), and is due on demand, but in any event no earlier than December 31, 2020. The facility contains no financial covenants or other financial restrictions. Valhi pays an unused commitment fee quarterly to Contran on the available balance (except during periods during which Contran would be a net borrower from Valhi). The average interest rate on the credit facility for the year ended December 31, 2018 was 5.9%. In January 2018 in conjunction with the sale of our Waste Management Segment discussed in Note 3, we acquired Contran's $36.3 million trade receivable from WCS in return for an assumed $36.3 million borrowing by us under this facility (and we subsequently contributed such receivable to WCS' equity). During 2018 we repaid $6.3 million under this facility and at December 31, 2018 an additional $45.7 million was available for borrowings under this facility.

Kronos*—Senior Notes*—On September 13, 2017, Kronos International, Inc. ("KII"), Kronos' wholly-owned subsidiary, issued €400 million aggregate principal amount of its 3.75% Senior Secured Notes due September 15, 2025 (the "Senior Notes"), at par value ($477.6 million when issued). Kronos used $338.6 million of the net proceeds of the new Senior Notes to prepay in full the outstanding principal balance of its term loan (along with accrued and unpaid interest through the prepayment date) and $21.0 million to repay the outstanding balance under its North American revolving credit facility. The remaining net proceeds of the Senior Notes are available for Kronos' general corporate purposes. The new Senior Notes:

- bear interest at 3.75% per annum, payable semi-annually on March 15 and September 15 of each year, beginning on March 15, 2018;
- have a maturity date of September 15, 2025. Prior to September 15, 2020, Kronos 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, Kronos 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, Kronos 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 Kronos experiences certain specified change of control events, it would be required to make an offer to purchase the Senior Notes at 101% of the principal amount. Kronos would also be required to make an offer to purchase a specified portion of the Senior Notes at par value in the event that it generates 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 its 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 foreign subsidiary that is directly owned by KII or any guarantor;
- contain a number of covenants and restrictions which, among other things, restrict Kronos' 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 its 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 Kronos' 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 (at December 31, 2017 the balance was $7.5 million).

Term loan – During 2016 and the first six months of 2017, we made our required quarterly term loan principal payments aggregating $1.8 million on our prior term loan indebtedness. 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 18. 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 North American credit facility—Kronos has a $125 million revolving bank credit facility, that as amended, matures in 2022. Borrowings under the revolving credit facility are available for Kronos' 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 Kronos' North American subsidiaries less any outstanding letters of credit up to $15 million issued under the facility (with revolving borrowings by Kronos' Canadian subsidiary limited to $25 million). Any amounts outstanding under the revolving credit facility bear interest, at Kronos' 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 under this facility. 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, Kronos had approximately $101.3 million available for borrowing under this revolving facility.

Revolving European credit facility— Kronos' operating subsidiaries in Germany, Belgium, Norway and Denmark have a €90 million secured revolving credit facility that, as amended in September 2017, 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, restrict 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.

Kronos had no borrowing or repayments under this facility during 2017 and 2018 and at December 31, 2018, there were no outstanding borrowings under this facility. Kronos' European credit facility requires the maintenance of certain financial ratios. Kronos' 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 ($103.2 million) was available for borrowing at December 31, 2018.

Other. Prior to 2016, and in conjunction with the acquisition of a controlling interest of our Real Estate Management and Development Segment, Tremont issued a $19.1 million promissory note with the seller, Nevada Environmental Response Trust ("NERT"). The note bears interest at 3% per annum, with interest payable annually and all principal due in December 2023. The promissory note is collateralized by the BMI and LandWell interests acquired as well as the real property acquired from NERT as part of the transaction. The note may be prepaid at any time, without penalty. We must make mandatory prepayments on the note in specified amounts whenever we receive distributions from BMI or LandWell, or in the event we sell any of the real property acquired. We made principal prepayments of $1.5 million during 2017 and $3.7 million during 2018, under the terms of the note.

In February 2017, a wholly-owned subsidiary of BMI entered into a $20.5 million loan agreement with Western Alliance Bank. The proceeds were used to refinance the $8.5 million outstanding bank note payable to Meadows Bank and to finance improvements to BMI's water delivery system. The agreement requires semi-annual payments of principal and interest on June 1 and December 1 aggregating $1.9 million annually beginning on June 1, 2017 through the maturity date in June 2032 (except during 2017 which calls for prorated aggregate principal and interest payments of $1.6 million). The agreement bears interest at 5.34% and is collateralized by certain real property, including the water delivery system, and revenue streams under the City of Henderson water contract. The carrying value of the loan is stated net of debt issuance costs of $.8 million.

Prior to 2016, LandWell entered into a $3.9 million promissory note payable to the City of Henderson, Nevada. The note requires semi-annual principal payments of $250,000 payable solely from cash received from certain specified revenue sources with any remaining unpaid balance due in October 2020, see Note 18. The loan bears interest at a 3% fixed rate. We made payments of $.4 million during 2018 using receipts from the specified revenue sources.

Aggregate maturities of long-term debt at December 31, 2018

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

Years ending December 31,	Amount (In millions)
Gross amounts due each year:	
2019	$ 2.9
2020	318.4
2021	1.7
2022	1.8
2023	10.6
2024 and thereafter	472.1
Subtotal	807.5
Less amounts representing interest on capital leases, original issue discount and debt issuance costs	7.1
Total long-term debt	$ 800.4

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

Note 10—Accounts payable and accrued liabilities:

	December 31, 2017	December 31, 2018
	(In millions)	
Accounts payable:		
Kronos	$ 107.9	**$ 103.2**
CompX	2.3	**3.2**
BMI/LandWell	3.7	**2.9**
NL	1.8	**1.6**
Other	.4	**.6**
Total	$ 116.1	**$ 111.5**
Current accrued liabilities:		
Employee benefits	$ 36.3	**$ 37.5**
Accrued sales discounts and rebates	14.3	**29.7**
Deferred income	28.3	**28.3**
Environmental remediation and related costs	6.8	**6.5**
Interest	5.5	**5.2**
Other	33.6	**33.6**
Total	$ 124.8	**$ 140.8**
Noncurrent accrued liabilities:		
Other postretirement benefits	$ 11.3	$ **10.3**
Reserve for uncertain tax positions	16.5	**19.1**
Deferred income	15.7	**15.8**
Employee benefits	8.4	**7.1**
Insurance claims and expenses	9.1	**8.1**
Deferred payment obligation	9.3	**9.6**
Accrued development costs	6.1	**7.5**
Other	8.5	**9.9**
Total	$ 84.9	**$ 87.4**

The risks associated with certain of our accrued insurance claims and expenses have been reinsured, and the related IBNR receivables are recognized as noncurrent assets to the extent the related liability is classified as a noncurrent liability. See Note 7. Our reserve for uncertain tax positions is discussed in Note 14.

Prior to 2016, and in conjunction with the acquisition of a controlling interest of our Real Estate Management and Development Segment, we issued a face value $11.1 million deferred payment obligation owed to NERT that bears interest at 3% per annum, commencing in December 2023, and is collateralized by the BMI and LandWell interests acquired. The deferred payment obligation has no specified maturity date. We are required to make repayments on the deferred payment obligation, in specified amounts, whenever we receive distributions from BMI and LandWell, and we may make voluntary repayments on the deferred payment obligation at any time, in each case without any penalty, but in any case only after our promissory note payable to NERT (discussed in Note 9) has been repaid in full. For financial reporting purposes, the obligation was recorded at its acquisition date present value using a 3% discount rate from December 2023 (when it becomes interest bearing at 3%).

Note 11—Defined contribution and defined benefit retirement:

Defined contribution plans. Certain of our subsidiaries maintain various defined contribution pension plans for our employees worldwide. Defined contribution plan expense approximated $5.6 million in 2016, $5.5 million in 2017 and $6.6 million in 2018.

Defined benefit plans. Kronos and NL sponsor various defined benefit pension plans worldwide. The benefits under our defined benefit 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 foreign) 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 $18.2 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:

2019	$	26.7 million
2020		28.0 million
2021		28.1 million
2022		29.4 million
2023		29.2 million
Next 5 years		165.8 million

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

	Years ended December 31, 2017	2018
	(In millions)	
Change in projected benefit obligations ("PBO"):		
Balance at beginning of the year	$ 62.8	**$ 63.0**
Interest cost	2.5	**2.2**
Actuarial losses (gains)	1.9	**(3.4)**
Benefits paid	(4.2)	**(4.2)**
Balance at end of the year	$ 63.0	**$ 57.6**
Change in plan assets:		
Fair value at beginning of the year	$ 45.6	**$ 46.5**
Actual return on plan assets	4.0	**(2.5)**
Employer contributions	1.1	**3.4**
Benefits paid	(4.2)	**(4.2)**
Fair value at end of year	$ 46.5	**$ 43.2**
Funded status	$ (16.5)	**$ (14.4)**
Amounts recognized in the Consolidated Balance Sheets:		
Accrued pension costs:		
Current	$ (.3)	**$ (.2)**
Noncurrent	(16.2)	**(14.2)**
Total	(16.5)	**(14.4)**
Accumulated other comprehensive loss—		
Actuarial loss	37.2	**39.0**
Total	$ 20.7	**$ 24.6**
Accumulated benefit obligations ("ABO")	$ 63.0	**$ 57.6**

The components of our net periodic defined benefit pension benefit cost for U.S. plans are presented in the table below. The amounts shown below for the amortization of unrecognized actuarial losses for 2016, 2017 and 2018 were recognized as components of our accumulated other comprehensive income (loss) at December 31, 2015, 2016 and 2017, respectively, net of deferred income taxes and noncontrolling interest.

	Years ended December 31, 2016	2017	2018
		(In millions)	
Net periodic pension benefit cost (credit) for U.S. plans:			
Interest cost	$ 2.7	$ 2.5	**$ 2.2**
Expected return on plan assets	(3.4)	(3.3)	**(3.4)**
Amortization of unrecognized net actuarial loss	1.9	2.0	**2.0**
Total	$ 1.2	$ 1.2	**$ .8**

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

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	December 31,	
	2017	2018
	(In millions)	
Plans for which the ABO exceeds plan assets:		
Projected benefit obligations	$ 63.0	**$ 57.6**
Accumulated benefit obligations	63.0	**57.6**
Fair value of plan assets	46.5	**43.2**

The discount rate assumptions used in determining the actuarial present value of the benefit obligation for our U.S. defined benefit pension plans 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 plans are frozen with regards to compensation.

The weighted-average rate assumptions used in determining the net periodic pension cost for our U.S. defined benefit pension plans for 2016, 2017 and 2018 are presented in the table below. The impact of assumed increases in future compensation levels does not have an effect on the periodic pension cost as the plans are frozen with regards to compensation.

	Years ended December 31,		
Rate	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 funded status of our foreign defined benefit pension plans is presented in the table below.

	Years ended December 31, 2017	2018
	(In millions)	
Change in PBO:		
Balance at beginning of the year	$ 603.4	**$ 691.2**
Service cost	11.4	**11.6**
Interest cost	13.4	**13.8**
Participants' contributions	1.5	**1.5**
Actuarial loss	9.3	**5.8**
Plan settlement	(.3)	**—**
Change in currency exchange rates	73.7	**(33.9)**
Benefits paid	(21.2)	**(22.8)**
Balance at end of the year	$ 691.2	**$ 667.2**
Change in plan assets:		
Fair value at beginning of the year	$ 381.8	**$ 445.2**
Actual return on plan assets	24.1	**(6.1)**
Employer contributions	16.0	**16.5**
Participants' contributions	1.5	**1.5**
Change in currency exchange rates	43.0	**(23.6)**
Benefits paid	(21.2)	**(22.8)**
Fair value at end of year	$ 445.2	**$ 410.7**
Funded status	$ (246.0)	**$ (256.5)**
Amounts recognized in the Consolidated Balance Sheets:		
Pension asset	$ 4.2	**$ 2.7**
Accrued pension costs:		
Noncurrent	(250.2)	**(259.2)**
Total	(246.0)	**(256.5)**
Accumulated other comprehensive loss:		
Actuarial loss	242.8	**254.1**
Prior service cost	1.5	**1.2**
Total	244.3	**255.3**
Total	$ (1.7)	**$ (1.2)**
ABO	$ 664.7	**$ 642.2**

The components of our net periodic defined benefit pension benefit cost for our foreign plans are presented in the table below. The amounts shown below for the amortization of unrecognized prior service cost and actuarial losses for 2016, 2017 and 2018 were recognized as components of our accumulated other comprehensive income (loss) at December 31, 2015, 2016 and 2017, respectively, net of deferred income taxes and noncontrolling interest.

	Years ended December 31, 2016	2017	2018
		(In millions)	
Net periodic pension cost for foreign plans:			
Service cost	$ 9.9	$ 11.4	**$ 11.6**
Interest cost	15.1	13.4	**13.8**
Settlement loss	—	.1	**—**
Expected return on plan assets	(14.9)	(9.7)	**(12.7)**
Amortization of unrecognized:			
Prior service cost	.2	.3	**.2**
Net actuarial loss	11.4	13.2	**13.2**
Total	$ 21.7	$ 28.7	**$ 26.1**

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	December 31, 2018
	(In millions)	
Plans for which the ABO exceeds plan assets:		
Projected benefit obligations	$ 625.1	**$ 605.0**
Accumulated benefit obligations	603.8	**585.0**
Fair value of plan assets	375.0	**346.3**

A summary of our key actuarial assumptions used to determine foreign benefit obligations as of December 31, 2017 and 2018 was:

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

A summary of our key actuarial assumptions used to determine foreign net periodic benefit cost for 2016, 2017 and 2018 are as follows:

Rate	Years ended December 31, 2016	2017	2018
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%	2.5%	**3.0%**

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

The amounts shown for all of our defined benefit plans for unrecognized actuarial losses and prior service cost at December 31, 2017 and 2018 have not 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. These amounts, net of deferred income taxes and noncontrolling interest, are recognized in our accumulated other comprehensive income (loss) at December 31, 2017 and 2018. We expect approximately $15.6 million and $.2 million of the unrecognized actuarial losses and prior service cost, respectively, will be recognized as components of our periodic defined benefit pension cost in 2019. The table below details the changes in other comprehensive income (loss) during 2016, 2017 and 2018.

	Years ended December 31, 2016	2017	2018
		(In millions)	
Changes in plan assets and benefit obligations recognized in other comprehensive income (loss):			
Net actuarial gain (loss)	$ (38.0)	$ 4.0	**$ (27.0)**
Amortization of unrecognized:			
Prior service cost	.3	.3	**.2**
Net actuarial losses	13.3	15.2	**15.2**
Total	$ (24.4)	$ 19.5	**$ (11.6)**

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 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 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, and 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 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 plan 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 determine 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% to 30% to equity securities and 70% to 80% to fixed income securities. We expect the long-term rate of return for such investments to average 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 Belgian 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. The amounts shown for plan assets invested in the CMRT include a nominal amount of cash held by our U.S. pension plan which is not part of the plan's investment in the CMRT.

	Fair Value Measurements at December 31, 2017			
	Total	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(In millions)			
Germany	$ 257.9	$ —	$ —	$ 257.9
Canada:				
Local currency equities	8.4	8.4	—	—
Foreign currency equities	16.4	16.4	—	—
Local currency fixed income	81.8	81.8	—	—
Cash and other	.3	.3	—	—
Norway:				
Local currency equities	1.8	1.8	—	—
Foreign currency equities	4.6	4.6	—	—
Local currency fixed income	21.0	21.0	—	—
Foreign currency fixed income	6.8	6.8	—	—
Real estate	4.7	—	—	4.7
Cash and other	15.4	14.5	—	.9
US — CMRT	46.5	—	46.5	—
Other	26.1	16.0	—	10.1
Total	$ 491.7	$ 171.6	$ 46.5	$ 273.6

	Fair Value Measurements at December 31, 2018				
	Total	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Assets measured at NAV
	(In millions)				
Germany	$ 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	16.3	4.9	—	—	11.4
Fixed income	19.9	19.9	—	—	—
Cash and other	4.7	3.4	—	—	1.3
CMRT	2.3	—	—	2.3	—
Other	24.4	13.9	—	10.5	—
Total	$ 454.0	$ 176.2	$ 5.5	$ 259.6	$ 12.7

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

	Years ended December 31,	
	2017	2018
	(In millions)	
Fair value at beginning of year	$ 230.5	$ 273.6
Gain 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
Assets sold	(13.8)	(14.5)
Transfer in	—	2.3
Currency exchange rate fluctuations	32.3	(11.3)
Fair value at end of year	$ 273.6	$ 259.6

Note 12 –Disaggregation of Sales

Disaggregation of sales–The following table disaggregates the net sales of our Chemicals Segment by place of manufacture (point of origin) and the location of the customer (point of destination), which are the categories that depict how the nature, amount, timing and uncertainty of revenue and cash flows are affected by economic factors (as required by ASC 606).

	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**

The following table disaggregates the net sales of our Component Products and Real Estate Management and Development Segments by major product line, which are the categories that depict how the nature, amount, timing and uncertainty of revenue and cash flows for these segments are affected by economic factors.

	Year Ended December 31,		
	2016	2017	2018
	(In millions)		
Component Products:			
Net sales:			
Security products	$ 94.7	$ 96.6	**$ 98.4**
Marine components	14.2	15.4	**19.8**
Total	$ 108.9	$ 112.0	**$ 118.2**
Real Estate Management and Development:			
Net sales:			
Land sales	$ 38.3	$ 30.2	**$ 32.3**
Water delivery	6.0	6.0	**5.6**
Utility and other	1.9	2.2	**2.1**
Total	$ 46.2	$ 38.4	**$ 40.0**

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Note 13—Other income, net:

	Years ended December 31, 2016	2017	2018
		(In millions)	
Securities earnings:			
Dividends and interest	$ 26.7	$ 29.4	**$ 26.1**
Securities transactions, net	.5	.1	**12.4**
Total	27.2	29.5	**38.5**
Gain on land sales	—	—	**12.5**
Insurance recoveries	.4	.4	**1.3**
Currency transactions, net	5.5	(7.5)	**10.1**
Disposal of property and equipment, net	(.3)	(.5)	**(.3)**
Business interruption insurance proceeds	4.3	—	—
Infrastructure reimbursement	.6	1.0	**4.3**
Other, net	1.3	2.3	**2.8**
Total	$ 39.0	$ 25.2	**$ 69.2**

Dividends and interest income includes distributions from The Amalgamated Sugar Company LLC of $25.4 million in each of 2016 and 2017 and $16.9 million in 2018. Securities transactions, net in 2018 includes a $12.5 million gain on the sale of our investment in The Amalgamated Sugar Company LLC. See Note 6.

Infrastructure reimbursements related to the OPA are discussed in Note 7.

Insurance recoveries relate primarily to amounts NL received from certain of its former insurance carriers, and relate principally to the recovery of prior lead pigment and asbestos litigation defense costs incurred by us. We have agreements with four former insurance carriers pursuant to which the carriers reimburse us for a portion of our future lead pigment litigation defense costs, and one such carrier reimburses us for a portion of our future asbestos litigation defense costs. We are not able to determine how much we will ultimately recover from these carriers for defense costs incurred by us because of certain issues that arise regarding which defense costs qualify for reimbursement. While we continue to seek additional insurance recoveries for lead pigment and asbestos litigation matters, we do not know the extent to which we will be successful in obtaining additional reimbursement for either defense costs or indemnity.

In the first quarter of 2018 we sold two parcels of land not used in our operating activities. We sold the first parcel for net proceeds of $18.9 million, and recognized a pre-tax gain on the sale of $11.9 million. We were required under our debt agreement with NERT to use a portion of the net proceeds received for the property to pay down our note balance and accordingly we made $2.2 million in principal payments on our debt, see Note 9. In addition, NL sold excess property with a nominal book value for proceeds of $.6 million.

During 2016, we recognized $3.4 million in income related to cash Kronos received from settlement of a business interruption insurance claim arising in 2014, and income of $.9 million recognized in the fourth quarter related to cash Kronos 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 14—Income taxes:

	Years ended December 31, 2016	2017	2018
	(In millions)		
Pre-tax income (loss):			
United States	$ (8.2)	$ 26.7	**$ (22.5)**
Non-U.S. subsidiaries	47.8	265.1	**258.7**
Total	$ 39.6	$ 291.8	**$ 236.2**
Expected tax expense (benefit) at U.S. federal statutory income tax rate of 35% in 2016 and 2017 and 21% in 2018	$ 13.8	$ 102.1	**$ 49.6**
Non-U.S. tax rates	(4.3)	(13.1)	**20.8**
Incremental net tax expense (benefit) on earnings and losses of non-U.S. and non-tax group companies	8.2	14.8	**(167.8)**
Valuation allowance	(2.2)	(205.4)	—
Transition tax	—	76.2	**(2.1)**
Global intangible low-tax income, net	—	—	**4.0**
Change in federal tax rate	—	(77.1)	**60.6**
Change in state tax rate	—	—	**(1.8)**
U.S. state income taxes, net	1.7	3.5	**.6**
Adjustment to the reserve for uncertain tax positions, net	7.2	(18.2)	**4.1**
Nondeductible expenses	1.9	2.2	**3.0**
Canada – Germany APA	—	—	**(1.4)**
U.S. – Canada APA	(3.4)	—	—
Domestic production activities deduction	(3.8)	(3.8)	—
Other, net	(.5)	(1.2)	**(.3)**
Provision for income taxes (benefit)	$ 18.6	$ (120.0)	**$ (30.7)**
Components of income tax expense (benefit):			
Currently payable (refundable):			
U.S. federal and state	$ 35.5	$ 87.3	**$ 34.1**
Non-U.S.	9.5	38.5	**51.1**
Total	45.0	125.8	**85.2**
Deferred income taxes (benefit):			
U.S. federal and state	(29.1)	(96.9)	**(145.5)**
Non-U.S.	2.7	(148.9)	**29.6**
Total	(26.4)	(245.8)	**(115.9)**
Provision for income taxes (benefit)	$ 18.6	$ (120.0)	**$ (30.7)**
Comprehensive provision for income taxes (benefit) allocable to:			
Income (loss) from continuing operations	$ 18.6	$ (120.0)	**$ (30.7)**
Discontinued operations	(12.6)	(67.1)	**23.7**
Retained earnings-change in accounting principle	—	—	**1.1**
Other comprehensive income (loss):			
Marketable securities	2.1	2.8	—
Currency translation	(3.4)	31.1	**(4.2)**
Pension plans	(5.0)	8.6	**(4.7)**
Other	(.5)	(.6)	**(.4)**
Interest rate swap	.2	1.6	—
Total	$ (.6)	$ (143.6)	**$ (15.2)**

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% and 21% in 2018. The amount shown on such table for incremental net tax (benefit) on earnings and losses on non-U.S. and non-tax group 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 Chemicals Segment's Canadian subsidiary and, beginning in 2018, the post-1986 undistributed earnings of our Chemicals Segment's European subsidiaries (such post-1986 undistributed earnings were subject to a permanent reinvestment plan until December 31, 2017), (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 Kronos' 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, (iv) deferred income taxes associated with our direct investment in Kronos and (v) current and deferred income taxes associated with distributions and earnings from our investment in LandWell and BMI.

The components of the net deferred tax liability at December 31, 2017 and 2018 are summarized below.

	December 31,			
	2017		2018	
	Assets	Liabilities	Assets	Liabilities
	(In millions)			
Tax effect of temporary differences related to:				
Inventories	$ 3.3	$ (.8)	$ **4.7**	$ **(3.3)**
Marketable securities	—	(25.4)	**—**	**(.2)**
Property and equipment	.1	(71.8)	**—**	**(69.0)**
Accrued OPEB costs	3.0	—	**2.8**	**—**
Accrued pension costs	70.9	—	**75.5**	**—**
Accrued environmental liabilities	28.8	—	**35.8**	**—**
Other deductible differences	11.7	—	**10.3**	**—**
Other taxable differences	—	(14.0)	**—**	**(13.2)**
Investments in subsidiaries and affiliates	2.7	(175.8)	**2.6**	**(58.8)**
Tax on unremitted earnings of non-U.S. subsidiaries	—	(9.5)	**—**	**(11.3)**
Tax loss and tax credit carryforwards	116.2	—	**93.9**	**—**
Valuation allowance	(2.8)	—	**(10.0)**	**—**
Adjusted gross deferred tax assets (liabilities)	233.9	(297.3)	**215.6**	**(155.8)**
Netting of items by tax jurisdiction	(114.1)	(114.1)	**(114.6)**	**(114.6)**
Net noncurrent deferred tax asset (liability)	$ 119.8	$ (183.2)	$ **101.0**	$ **(41.2)**

Tax authorities may in the future examine certain of our U.S. and non-U.S. tax returns and have or 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 will be resolved in our favor, and therefore our potential exposure, if any, is also uncertain.

Our Chemicals Segment has substantial net operating loss (NOL) carryforwards in Germany (the equivalent of $541 million for German corporate purposes 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 Chemicals Segment's 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 Chemicals Segment's 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, our Chemicals Segment 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 Chemicals Segment's 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 included 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) reduces the U.S. Federal corporate income tax rate from 35% to 21% effective January 1, 2018; (ii) implements a territorial tax system and imposes 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) eliminates U.S. tax on future non-U.S. earnings (subject to certain exceptions); (iv) eliminates the domestic production activities deduction beginning in 2018; (v) eliminates 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 was 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 assets as of December 31, 2017. Such revaluation was recognized in continuing operations and was not material to us. Such revaluation resulted in a provisional non-cash deferred income tax benefit of $77.1 million recognized as of December 31, 2017 in continuing operations, reducing our net deferred income tax liability. The amounts recorded as of December 31, 2017 as a result of the 2017 Tax Act represented estimates based on information currently available. During the third quarter of 2018, in conjunction with finalizing our federal income tax return we were able to obtain, prepare and analyze the necessary information to complete the accounting under ASC 740 related to the revaluation of our net deferred tax liability associated with our U.S. net taxable temporary differences as of December 31, 2017, which resulted in a measurement period adjustment and recognition of a non-cash deferred income tax expense of $59.7 million, decreasing the provisional amount recognized at December 31, 2017. Such adjustment is almost entirely attributable to the re-measurement of our deferred income taxes with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock discussed below. Accordingly, we completed our analysis related to such revaluation as of September 30, 2018.

Prior to the enactment of the 2017 Tax Act, the undistributed earnings of our Chemicals Segment's European subsidiaries were deemed to be permanently reinvested (we had not made a similar determination with respect to the undistributed earnings of our Chemicals Segment's 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 $2.1 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 $62.2 million, which will be paid in quarterly installments over the remainder of the eight year period. Of such $62.2 million, $56.3 million is recorded as a noncurrent payable to affiliate (income taxes payable to Contran) classified as a noncurrent liability in our Consolidated Balance Sheet, and $5.9 million is included with our current payable to affiliate (income taxes payable to Contran) 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 Chemicals Segment's European subsidiaries were deemed to be permanently reinvested (we had not made a similar determination with respect to the undistributed earnings of our Chemicals Segment's 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 have now determined 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 $5.3 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 available at that date. 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 $1.8 million for the U.S. state and non-U.S. income tax and withholding tax liability attributable to the 2018 undistributed earnings of our Chemicals Segment's non-U.S. subsidiaries in 2018, including withholding taxes related to the undistributed earnings of our Chemicals Segment's 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 U.S. tax credit provisions, we recognized a current cash income tax expense of $4.0 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 law 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 non-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. 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 concluded we had 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.

The 2017 Tax Act amended the rules limiting the deduction for business interest expense beginning in 2018. The limitation applies to all taxpayers and our annual deduction for business interest expense is limited to the sum of our business interest income and 30% of our adjusted taxable income as defined under the 2017 Tax Act. Any business interest expense not allowed as a deduction as a result of the limitation may be carryforward indefinitely and is treated as interest paid in the carryforward year subject to the respective year's limitation. We have determined that our interest expense for 2018 is limited under these provisions, because of the loss we recognized on the sale of WCS for income tax purposes. We have concluded that we are required to recognize a non-cash deferred income tax asset valuation allowance under the more-likely-than-not recognition criteria with respect to a portion of our deferred tax asset attributable to the nondeductible amount of business interest expense carryforward. Consequently, our provision for income taxes in 2018 includes a non-cash deferred income tax expense of $6.8 million for the amount of such deferred income tax asset that we have determined does not meet the more-likely-than-not recognition criteria (the nondeductible portion of our business interest expense for the full year 2018 is higher than the amount recognized in the third quarter of 2018 primarily due to a decrease in our adjusted taxable income and depreciation expense as compared to our estimates at the end of the third quarter). In accordance with the ASC 740 guidance regarding intra-period allocation of income taxes, the full amount of non-cash deferred income tax expense is classified as part of the income taxes associated with the pre-tax gain we recognized for financial reporting purposes on the sale of WCS which is classified as part of discontinued operations (see Note 3 to our Consolidated Financial Statements and Discontinued Operations —Waste Control Specialists LLC).

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, Kronos' 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, Kronos' 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 Kronos' German and Canadian subsidiaries.

We recognized a non-cash deferred income tax benefit of $1.8 million in 2018 related to a decrease in our effective state income tax rate; this decrease is a direct result of the sale of our interest in the Amalgamated Sugar Company LLC which will reduce the number of state jurisdictions in which we are required to file (our non-cash deferred tax benefit recognized for the full year 2018 is lower than the amount recognized in the third quarter of 2018 primarily due to a decrease in our estimate of taxable income as compared to our estimates at the end of the third quarter).

We recognize deferred income taxes with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock because the exemption under GAAP to avoid such recognition of deferred income taxes is not available to us. At December 31, 2017, we had recognized a deferred income tax liability with respect to our direct investment in Kronos of $157.6 million. There is a maximum amount (or cap) of such deferred income taxes we are required to recognize with respect to our direct investment in Kronos. The maximum amount of such deferred income tax liability we would be required to have recognized (the cap) is $155.4 million (the cap was reduced as a result of the decrease in our effective state tax rate in the third quarter of 2018 discussed above). During 2018, we recognized a non-cash deferred income tax expense with respect to our direct investment in Kronos of $4.9 million for the increase in the deferred income taxes required to be recognized with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock, to the extent such increase related to our equity in Kronos' net income during such period. We recognized a similar non-cash deferred income tax expense of $22.1 million in 2017 and $6.5 million in 2016. A portion of the net change with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock during such periods related to our equity in Kronos' other comprehensive income (loss) items, and the amounts shown in the table above for income tax expense (benefit) allocated to other comprehensive income (loss) items includes amounts related to our equity in Kronos' other comprehensive income (loss) items. Due to uncertainties and complexities of the new legislation, we were still evaluating the impact of the one-time deemed repatriation of the post-1986 undistributed earnings of our non-U.S. subsidiaries up through December 31, 2017 as it relates to the income tax basis of our direct investment in Kronos at December 31, 2017. Our deferred income tax liability with respect to our direct investment in Kronos and the deferred income taxes recognized at December 31, 2017 represented our reasonable estimate and, in accordance with the guidance in SAB 118, such amounts were provisional and subject to adjustment as we obtain additional information and complete our analysis of the impact of the new legislation as it relates to the income tax basis of our direct investment in Kronos. 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 an adjustment, which is treated as a measurement period adjustment, to the deferred income taxes we recognized at December 31, 2017 associated with our direct investment in Kronos common stock (before revaluation of our deferred tax liability related to the decrease in the corporate income tax rate). Such adjustment resulted in an investment basis adjustment under the income tax regulations which increased the income tax basis of our direct investment in Kronos attributable to the income recognition related to the deemed repatriation of the post-1986 undistributed earnings of our non-U.S. subsidiaries in 2017. Such adjustment resulted in a non-cash deferred tax measurement period adjustment decreasing the deferred income taxes we recognize with respect to the excess of the financial reporting carrying amount over the income tax basis of our direct investment in Kronos common stock. Including the impact of the non-cash deferred tax revaluation adjustment discussed above, we recognized a net non-cash deferred income tax benefit of $112 million in the third quarter of 2018 related to the incremental tax on Kronos. We completed our analysis related to the impact of the new legislation as it related to the income tax basis of our direct investment in Kronos as of September 30, 2018.

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.

The following table shows the changes in the amount of our uncertain tax positions (exclusive of the effect of interest and penalties) during 2016, 2017 and 2018:

	Years ended December 31,		
	2016	2017	2018
		(In millions)	
Unrecognized tax benefits:			
Amount beginning of year	$ 28.8	$ 35.6	**$ 17.1**
Net increase (decrease):			
Tax positions taken in prior periods	(.6)	(13.3)	**1.3**
Tax positions taken in current period	11.0	4.5	**4.5**
Lapse due to applicable statute of limitations	(1.6)	(8.1)	**(1.8)**
Settlement with taxing authorities	(2.3)	(2.3)	**—**
Changes in currency exchange rates	.3	.7	**(.1)**
Amount at end of year	$ 35.6	$ 17.1	**$ 21.0**

If our uncertain tax positions were recognized, a benefit of $19.1 million at December 31, 2018, would affect our effective income tax rate. We currently estimate that our unrecognized tax benefits will decrease by approximately $3.7 million, excluding interest, during the next twelve months related to the expiration of certain statutes of limitations.

We and Contran file income tax returns in U.S. federal and various state and local jurisdictions. We also file income tax returns in various foreign 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 foreign income tax returns are generally considered closed to examination for years prior to: 2009 for Norway; 2013 for Canada; 2014 for Germany; and 2015 for Belgium.

We accrue interest and penalties on our uncertain tax positions as a component of our provision for income taxes. We accrued interest and penalties of $1.6 million during 2016 and $2.1 million during 2017 and $1.3 million during 2018, and at December 31, 2017 and 2018 we had $1.5 million and $2.2 million, respectively, accrued for interest and an immaterial amount accrued for penalties for our uncertain tax positions.

Note 15—Noncontrolling interest in subsidiaries:

	December 31, 2017	December 31, 2018
	(In millions)	
Noncontrolling interest in net assets:		
Kronos Worldwide	$ 204.9	**$ 221.4**
NL Industries	71.1	**62.4**
CompX International	17.8	**19.4**
BMI	26.0	**27.1**
LandWell	22.5	**23.3**
Total	$ 342.3	**$ 353.6**

	Years ended December 31, 2016	2017	2018
	(In millions)		
Noncontrolling interest in net income (loss) of subsidiaries:			
Kronos Worldwide	$ 8.3	$ 69.3	**$ 39.9**
NL Industries	2.6	19.7	**(7.0)**
CompX International	1.4	1.7	**2.0**
BMI	(.4)	3.2	**1.5**
LandWell	1.0	1.2	**2.4**
Total	$ 12.9	$ 95.1	**$ 38.8**

Note 16—Valhi stockholders' equity:

	Shares of common stock Issued	Treasury	Outstanding
		(In millions)	
Balance at December 31, 2016, 2017 and 2018	**355.3**	**(13.2)**	**342.0**

Valhi common stock. We issued a nominal number of shares of Valhi common stock during 2016, 2017 and 2018, associated with annual stock awards to members of our board of directors.

Valhi share repurchases and cancellations. Prior to 2016, our board of directors authorized the repurchase of up to 10.0 million shares of our common stock in open market transactions, including block purchases, or in privately negotiated transactions, which may include transactions with our affiliates or subsidiaries. We may purchase the 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 completion. We will use cash on hand to acquire the shares. Repurchased shares could be retired and cancelled or may be added to our treasury stock and used for employee benefit plans, future acquisitions or other corporate purposes. We did not make any such purchases under the plan in 2016, 2017 or 2018.

Treasury stock. At December 31, 2017 and 2018, NL and Kronos held approximately 14.4 million and 1.7 million shares of our common stock, respectively. The treasury stock we reported for financial reporting purposes at December 31, 2017 and 2018 represents our proportional interest in these shares of our common stock held by NL and Kronos, at NL's and Kronos' historical cost basis. The remaining portion of these shares of our common stock, which are attributable to the noncontrolling interest of N and Kronos, are reflected in our consolidated balance sheet at fair value and are classified as part of other noncurrent assets. Under Delaware Corporation Law, 100% (and not the proportionate interest) of a parent company's shares held by a majority-owned subsidiary of the parent is considered to be treasury stock for voting purposes. As a result, our common shares outstanding for financial reporting purposes differ from those outstanding for legal purposes. Prior to 2018, any unrealized gains or losses on the shares of our common stock attributable to the noncontrolling interest of Kronos and NL were recognized through other comprehensive income or loss, net of deferred income taxes, attributable to such noncontrolling interests. 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*, Kronos and NL recognize unrealized gains or losses in the determination of each of their respective net income or losses. Under the principles of consolidation we eliminate any gains or losses associated with our common stock to the extent of our proportional ownership interest in each subsidiary. The $12.2 million loss recognized in our Consolidated Statement of Operations in 2018 represents the unrealized loss in respect of these shares during 2018 attributable to the noncontrolling interest of Kronos and NL. See Note 2.

Preferred stock. Our outstanding preferred stock consists of 5,000 shares of our Series A Preferred Stock having a liquidation preference of $133,466.75 per share, or an aggregate liquidation preference of $667.3 million. The outstanding shares of Series A Preferred Stock are held by Contran and represent all of the shares of Series A Preferred Stock we are authorized to issue. The preferred stock has a par value of $.01 per share and pays a non-cumulative cash dividend at an annual rate of 6% of the aggregate liquidation preference only when authorized and declared by our board of directors. The shares of Series A Preferred Stock are non-convertible, and the shares do not carry any redemption or call features (either at our option or the option of the holder). A holder of the Series A shares does not have any voting rights, except in limited circumstances, and is not entitled to a preferential dividend right that is senior to our shares of common stock. Upon the liquidation, dissolution or winding up of our affairs, a holder of the Series A shares is entitled to be paid a liquidation preference of $133,466.75 per share, plus an amount (if any) equal to any declared but unpaid dividends, before any distribution of assets is made to holders of our common stock. Through December 31, 2018, we have not declared any dividends on the Series A Preferred Stock since its issuance prior to 2016.

Valhi 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 could be awarded. Under the plan, we awarded 16,000 shares in 2016, 12,000 shares in 2017 and 14,500 shares in 2018, and at December 31, 2018, 124,000 shares are available for future award under this new plan.

Stock plans of subsidiaries. Kronos, NL and CompX each maintain plans which provide for the award of their common stock to their board of directors. At December 31, 2018, Kronos, NL and CompX had 149,900, 141,400 and 156,550 shares of their respective common stock available for future award under respective plans.

Accumulated other comprehensive income (loss). Accumulated other comprehensive income (loss) attributable to Valhi stockholders comprises changes in equity as presented in the table below.

	Years ended December 31,		
	2016	2017	2018
	(In millions)		
Accumulated other comprehensive income (loss) (net of tax and noncontrolling interest):			
Marketable securities:			
Balance at beginning of year	$ 1.6	$ 1.7	**$ 1.7**
Other comprehensive income (loss):			
Unrealized gain arising during the year	.1	—	**—**
Balance at end of year	$ 1.7	$ 1.7	**$ 1.7**
Interest rate swap:			
Balance at beginning of year	$ (1.3)	$ (1.2)	**$ —**
Other comprehensive loss:			
Unrealized losses during the year	(1.2)	(1.2)	**—**
Less reclassification adjustments for amounts included in interest expense	1.3	2.4	**—**
Balance at end of year	$ (1.2)	$ —	**$ —**
Currency translation:			
Balance at beginning of year	$ (78.1)	$ (88.5)	**$ (54.1)**
Other comprehensive gain (loss) arising during the year	(10.4)	34.4	**(21.5)**
Balance at end of year	$ (88.5)	$ (54.1)	**$ (75.6)**
Defined benefit pension plans:			
Balance at beginning of year	$ (123.0)	$ (137.0)	**$ (129.0)**
Other comprehensive income (loss):			
Amortization of prior service cost and net (gains) losses included in net periodic pension cost	5.7	6.4	**7.6**
Net actuarial gain (loss) arising during the year	(19.7)	1.6	**(12.6)**
Balance at end of year	$ (137.0)	$ (129.0)	**$ (134.0)**
OPEB plans:			
Balance at beginning of year	$ 3.8	$ 3.1	**$ 2.4**
Other comprehensive loss:			
Amortization of prior service credit and net losses included in net periodic OPEB cost	(1.0)	(.8)	**(.8)**
Net actuarial gain arising during the year	.3	.1	**.1**
Balance at end of year	$ 3.1	$ 2.4	**$ 1.7**
Total accumulated other comprehensive income (loss):			
Balance at beginning of year	$ (197.0)	$ (221.9)	**$ (179.0)**
Other comprehensive income (loss)	(24.9)	42.9	**(27.2)**
Balance at end of year	$ (221.9)	$ (179.0)	**$ (206.2)**

See Note 11 for amounts related to our defined benefit pension plans and OPEB plans and Note 19 for a discussion of our interest rate swap contract.

Note 17—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.

From time to time, we may have loans and advances outstanding between us and various related parties, including Contran, 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. While certain of these loans may be of a lesser credit quality than cash equivalent instruments otherwise available to us, we believe we have evaluated the credit risks involved and appropriately reflect those credit risks in the terms of the applicable loans. When we borrow from related parties, we are generally able to pay a lower rate of interest than we would pay if we borrowed from unrelated parties. See Note 9 for more information on the Valhi credit facility with Contran. We paid Contran $12.9 million, $14.4 million and $18.7 million in interest on borrowings under credit facilities in 2016, 2017 and 2018, respectively.

We and a subsidiary of Contran have guaranteed (i) Tremont's obligation under its $9.4 million promissory note payable to NERT discussed in Note 9 and (ii) Tremont's $9.6 million ($11.1 million face value) deferred payment obligation discussed in Note 10. The guaranty obligation would only arise upon our failure to make any required repayments. Prior to our sale of our Waste Management Segment, a subsidiary of Contran guaranteed certain third-party indebtedness of WCS. The purchaser of WCS assumed such indebtedness of WCS in January 2018, and such guarantee was released.

Under the terms of various intercorporate services agreements ("ISAs") we enter into with Contran, employees of Contran provide us certain management, tax planning, financial and administrative services on a fee basis. Such charges are based upon estimates of the time devoted by the Contran employees to our affairs, and the compensation and other expenses associated with those 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 all of our subsidiaries, thus allowing certain Contran employees to provide services to multiple companies but only be compensated by Contran. The net ISA fees charged to us by Contran aggregated $36.5 million in 2016, $40.0 million in 2017 and $39.6 million in 2018.

We had an aggregate 30.2 million shares at December 31, 2017 and 2018 of our Kronos common stock pledged as collateral for certain debt obligations of Contran. We receive a fee from Contran for pledging these Kronos shares, determined by a formula based on the market value of the shares pledged. We received $1.2 million in 2016, $2.8 million in 2017 and $3.1 million in 2018 from Contran for this pledge.

Our subsidiaries Tall Pines Insurance Company and EWI RE, Inc. provide for or broker certain insurance or reinsurance policies for Contran and certain of its subsidiaries and affiliates, including us. Tall Pines purchases reinsurance for substantially all of the risks it underwrites from third party insurance carriers with an A.M. Best Company rating of generally at least A- (Excellent). 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 to us. We received cash payments for insurance premiums from Contran and certain other affiliates not members of our consolidated financial reporting group of $5.3 million in 2016 and $5.9 million 2017 and $5.4 million in 2018. 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 justify 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 $253,000 in 2016, $258,000 in 2017 and $312,000 in 2018 for such services. We expect that this relationship with Contran will continue in 2019.

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

	December 31, 2017	December 31, 2018
	(In millions)	
Current receivables from affiliates:		
Contran:		
Trade items	$ 1.0	**$ .5**
Income taxes	19.4	**—**
Louisiana Pigment Company, L.P.	8.9	**10.2**
Other	3.3	**2.8**
Total	$ 32.6	**$ 13.5**
Current payables to affiliates:		
Louisiana Pigment Company, L.P.	$ 16.2	**$ 16.7**
Contran income taxes	—	**10.0**
Total	$ 16.2	**$ 26.7**
Noncurrent payable to affiliates:		
Contran – income taxes	$ 70.1	**$ 56.3**
Payables to affiliate included in long-term debt:		
Valhi—Contran credit facility	$ 284.3	**$ 314.3**

Amounts payable to LPC are generally for the purchase of TiO_2, while amounts receivable from LPC are generally from the sale of TiO_2 feedstock. See Note 7. Purchases of TiO_2 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. The noncurrent payable to Contran for income taxes is discussed in Note 14.

Note 18—Commitments and contingencies:

Lead pigment litigation

Our former operations included the manufacture of lead pigments for use in paint and lead-based paint. We, other former manufacturers of lead pigments for use in paint and lead-based paint (together, the "former pigment manufacturers"), and the Lead Industries Association (LIA), which discontinued business operations in 2002, have been named as defendants in various legal proceedings seeking damages for personal injury, property damage and governmental expenditures allegedly caused by the use of lead-based paints. Certain of these actions have been filed by or on behalf of states, counties, cities or their public housing authorities and school districts, and certain others have been asserted as class actions. These lawsuits seek recovery under a variety of theories, including public and private nuisance, negligent product design, negligent failure to warn, strict liability, breach of warranty, conspiracy/concert of action, aiding and abetting, enterprise liability, market share or risk contribution liability, intentional tort, fraud and misrepresentation, violations of state consumer protection statutes, supplier negligence and similar claims.

The plaintiffs in these actions generally seek to impose on the defendants responsibility for lead paint abatement and health concerns associated with the use of lead-based paints, including damages for personal injury, contribution and/or indemnification for medical expenses, medical monitoring expenses and costs for educational programs. To the extent the plaintiffs seek compensatory or punitive damages in these actions, such damages are generally unspecified. In some cases, the damages are unspecified pursuant to the requirements of applicable state law. A number of cases are inactive or have been dismissed or withdrawn. Most of the remaining cases are in various pre-trial stages. Some are on appeal following dismissal or summary judgment rulings or a trial verdict in favor of either the defendants or the plaintiffs.

We believe that these actions are without merit, and we intend to continue to deny all allegations of wrongdoing and liability and to defend against all actions vigorously. Other than with respect to the Santa Clara, California public nuisance case discussed below, we do not believe it is probable that we have incurred any liability with respect to all of the lead pigment litigation cases to which we are a party, and with respect to all such lead pigment litigation cases to which we are a party, other than with respect to the Santa Clara case discussed below, we believe liability to us that may result, if any, in this regard cannot be reasonably estimated, because:

- we have never settled any of the market share, intentional tort, fraud, nuisance, supplier negligence, breach of warranty, conspiracy, misrepresentation, aiding and abetting, enterprise liability, or statutory cases (subject to the final outcome of the Santa Clara case discussed below),
- no final, non-appealable adverse verdicts have ever been entered against us (subject to the final outcome of the Santa Clara case discussed below), and
- we have never ultimately been found liable with respect to any such litigation matters, including over 100 cases over a twenty-year period for which we were previously a party and for which we have been dismissed without any finding of liability (subject to the final outcome of the Santa Clara case discussed below).

Accordingly, other than with respect to the Santa Clara case discussed below, we have not accrued any amounts for any of the pending lead pigment and lead-based paint litigation cases filed by or on behalf of states, counties, cities or their public housing authorities and school districts, or those asserted as class actions other than the Santa Clara case noted below. In addition, we have determined that liability to us which may result, if any, cannot be reasonably estimated at this time because there is no prior history of a loss of this nature on which an estimate could be made and there is no substantive information available upon which an estimate could be based.

In one of these lead pigment cases, in April 2000 we were served with a complaint in *County of Santa Clara v. Atlantic Richfield Company, et al*. (Superior Court of the State of California, County of Santa Clara, Case No. 1-00-CV-788657) brought by a number of California government entities against the former pigment manufacturers, the LIA and certain paint manufacturers. The County of Santa Clara sought to recover compensatory damages for funds the plaintiffs have expended or would in the future expend for medical treatment, educational expenses, abatement or other costs due to exposure to, or potential exposure to, lead paint, disgorgement of profit, and punitive damages. In July 2003, the trial judge granted defendants' motion to dismiss all remaining claims. Plaintiffs appealed and the intermediate appellate court reinstated public nuisance, negligence, strict liability, and fraud claims in March 2006. A fourth amended complaint was filed in March 2011 on behalf of The People of California by the County Attorneys of Alameda, Ventura, Solano, San Mateo, Los Angeles and Santa Clara, and the City Attorneys of San Francisco, San Diego and Oakland. That complaint alleged that the presence of lead paint created a public nuisance in each of the prosecuting jurisdictions and sought its abatement. In July and August 2013, the case was tried. In January 2014, the trial court judge issued a judgment finding us, The Sherwin Williams Company and ConAgra Grocery Products Company jointly and severally liable for the abatement of lead paint in pre-1980 homes, and ordered the defendants to pay an aggregate $1.15 billion to the people of the State of California to fund such abatement. The trial court's judgment also found that to the extent any abatement funds remained unspent after four years, such funds were to be returned to the defendants. In February 2014, we filed a motion for a new trial, and in March 2014 the trial court denied the motion. Subsequently in March 2014, we filed a notice of appeal with the Sixth District Court of Appeal for the State of California. On November 14, 2017, the Sixth District Court of Appeal issued its opinion, upholding the trial court's judgment, except that it reversed the portion of the judgment requiring abatement of homes built between 1951 and 1980 which significantly reduced the number of homes subject to the abatement order. In addition, the appellate court ordered the case be remanded to the trial court to recalculate the amount of the abatement fund, to limit it to the amount necessary to cover the cost of investigating and remediating pre-1951 homes, and to hold an evidentiary hearing to appoint a suitable receiver. In addition, the appellate court found that we and the other defendants had the right to seek recovery from liable parties that contributed to a hazardous condition at a particular property. Subsequently, we and the other defendants filed a Petition with the California Supreme Court seeking its review of a number of issues. On February 14, 2018, the California Supreme Court denied such petition.

The Santa Clara case is unusual in that this is the second time that an adverse verdict in a public nuisance lead pigment case has been entered against us (the first adverse verdict against us was ultimately overturned on appeal). Given the appellate court's November 2017 ruling, and the denial of an appeal by the California Supreme Court, we previously concluded that the likelihood of a loss in this case has reached a standard of "probable" as contemplated by ASC 450.

Under the remand ordered by the appellate court, the trial court was required to, among other things, (i) recalculate the amount of the abatement fund, excluding remediation of homes built between 1951 and 1980, (ii) hold an evidentiary hearing to appoint a suitable receiver for the abatement fund and (iii) enter an order or orders setting forth its rulings on these issues. We believe any party will have a right to appeal any of these new decisions to be made by the trial court from the remand of the case. Several uncertainties will still exist with respect to the new decisions to be made by the trial court from the remand of the case, including the following:

- The appellate court remanded the case back to the trial court to recalculate the total amount of the abatement, limiting the abatement to pre-1951 homes. In this regard, NL and the other defendants filed a brief with the trial court proposing a recalculated maximum abatement fund amount of no more than $409 million and plaintiffs filed a brief proposing an abatement fund amount of $730 million. In September 2018, following a case-management hearing regarding the recalculated abatement fund amount held in August 2018, the trial court issued an order setting the recalculated amount of the abatement fund at $409 million;

- The appellate court upheld NL's and the other defendants' right to seek contribution from other liable parties (e.g. property owners who have violated the applicable housing code) on a house-by-house basis. The method by which the trial court would undertake to determine such house-by-house responsibility, and the outcome of such a house-by-house determination, is not presently known;
- Participation in any abatement program by each homeowner is voluntary, and each homeowner would need to consent to allowing someone to come into the home to undertake any inspection and abatement, as well as consent to the nature, timing and extent of any abatement. The original trial court's judgment unrealistically assumed 100% participation by the affected homeowners. Actual participation rates are likely to be less than 100% (the ultimate extent of participation is not presently known);
- The remedy ordered by the trial court is an abatement fund. The trial court ordered that any funds unspent after four years are to be returned to the defendants (this provision of the trial court's original judgment was not overturned by the appellate court). As noted above, the actual number of homes which would participate in any abatement, and the nature, timing and extent of any such abatement, is not presently known; and
- We and the other two defendants are jointly and severally liable for the abatement, which means we or either of the two other defendants could ultimately be responsible for payment of the full amount of the abatement fund. However, we do not believe any individual defendant would be 100% responsible for the cost of any abatement, and the allocation of the recalculated amount of the abatement fund ($409 million, as explained below) among the three defendants has not yet been determined.

In May 2018, we and the plaintiffs entered into a settlement agreement pursuant to which, as supplemented, the plaintiffs would be paid an aggregate of $80 million, in return for which we would be dismissed from the case with prejudice and all pending and future claims, causes of action, cross-complaints, actions or proceedings against us and our affiliates for indemnity, contribution, reimbursement or declaratory relief in respect to the case would be barred, discharged and enjoined as a matter of applicable law. Of such $80 million, $65 million would be paid by us and $15 million would be provided by one of our former insurance carriers that has previously placed such amount on deposit with the trial court in satisfaction of potential liability such former carrier might have with respect to the case under certain insurance policies we had with such former carrier. Of such $65 million which would be paid by us, $45 million would be paid upon approval of the terms of the settlement, and the remaining $20 million would be paid in five annual installments beginning four years from such approval ($6 million for the first installment, $5 million for the second installment and $3 million for each of the third, fourth and fifth installments). The settlement agreement is subject to a number of conditions including the trial court's approval of the terms of the settlement (which trial court approval includes a determination that such settlement agreement meets the standards for a "good faith" settlement under applicable California law). The other defendants filed motions with the trial court objecting to the terms of the settlement.

With all of the uncertainties that exist with respect to the new decisions to be made by the trial court from the remand of the case, as noted above, we had previously concluded that the amount of such loss could not be reasonably estimated (nor could a range of loss be reasonably estimated). However, the terms of the settlement agreement entered into by us and the plaintiffs in May 2018, as supplemented, provides evidence that the amount of the loss to us could be reasonably estimated (and provides evidence of the low end of a range of loss to us). For financial reporting purposes, we discounted the five payments aggregating $20 million to be paid in installments to their estimated net present value, using a discount rate of 3.0% per annum. Such net present value is $17 million, and we would begin to accrete such present value amount upon approval of the settlement agreement. Accordingly, in the second quarter of 2018 we recognized a net $62 million pre-tax charge with respect to this matter ($45 million for the amount to be paid by us upon approval of the terms of the settlement and $17 million for the net present value of the five payments aggregating $20 million to be paid by us in installments beginning four years from such approval), representing the net amount we would pay in full settlement of our liability under the terms of the proposed settlement agreement. For purposes of our Consolidated Balance Sheet, we have presented the aggregate $45 million that would be paid to the plaintiffs upon approval of the terms of the settlement and the $15 million that would be paid to the plaintiffs from the amount placed on deposit with the trial court by one of our former insurance carriers (for a total of $60 million) as a current liability, $17 million for the net present value of the five payments aggregating $20 million to be paid by us in installments beginning four years from such approval as a noncurrent liability and the $15 million portion of such aggregate $80 million undiscounted amount which would be funded from the amount placed on deposit with the trial court by one of our former insurance carriers as a current insurance recovery receivable.

In July 2018, we and the other defendants filed appeals with the U.S. Supreme Court, seeking its review of two federal issues in the trial court's original judgment. Review by the U.S. Supreme Court is discretionary, and in October 2018 the U.S. Supreme Court denied the petitions for the Court to hear such appeals.

In September 2018, following a case-management hearing regarding the recalculated abatement fund amount held in August 2018, the trial court issued an order setting the recalculated amount of the abatement fund at $409 million. Also in September 2018, the trial court denied approval of the settlement agreement, finding among other things that the settlement agreement did not meet the standards for a "good faith" settlement under applicable California law.

Subsequently in October 2018, we filed an appeal of the trial court's denial of approval of the settlement agreement with the Sixth District Court of Appeal for the State of California, asserting among other things that in denying such approval the trial court made several legal errors in applying applicable California law to the terms of the settlement. The plaintiffs filed a brief in support of our appeal. The appellate court has discretion whether to hear such appeal, and the appellate court has not yet issued its decision as to whether it will hear such appeal. There can be no assurance that the appellate court will agree to hear such appeal, or if it agrees to hear such appeal, that it would rule in favor of us and approve the settlement agreement. We continue to believe the settlement agreement satisfies the standards for a "good faith" settlement under applicable California law.

The trial court has selected a receiver for the abatement fund, but the terms of an order appointing the receiver have not been determined and will be the subject of a further hearing scheduled in March 2019. The trial court has also stated it will not enter the judgment in the case until after the Sixth District Court of Appeal determines whether to hear the appeal regarding our settlement agreement. We expect the judgment will require full payment of all amounts due by us and the other defendants in respect to the abatement fund within sixty days of entry of the judgment.

If the appellate court does not reverse the trial court decision and approve the terms of this or any other settlement agreement between us and the plaintiffs, the proceedings in the trial court under the remand, as discussed above, would continue. In such event, NL's share of the recalculated amount of the abatement fund is not presently known, and other uncertainties exist with respect to the new decisions to be made by the trial court from the remand of the case, as discussed above, including but not limited to the final amount of the abatement fund which will ultimately be expended, particularly because participation in the abatement program by eligible homeowners is voluntary and the ultimate extent of participation and how the abatement fund will be administered is uncertain. As with any legal proceeding, there is no assurance that any appeal would be successful, and it is reasonably possible, based on the outcome of the appeals process and the remand proceedings in the trial court, that NL may in the future incur liability resulting in the recognition of an additional loss contingency accrual that could have a material adverse impact on our results of operations, financial position and liquidity.

In November 2018, NL was served with two complaints filed by county governments in Pennsylvania. Each county alleges that NL and several other defendants created a public nuisance by selling and promoting lead-containing paints and pigments in the counties. The plaintiffs seek abatement and declaratory relief. We believe these lawsuits are inconsistent with Pennsylvania law and without merit, and we intend to defend ourselves vigorously.

New cases may continue to be filed against us. We cannot assure you that we will not incur liability in the future in respect of any of the pending or possible litigation in view of the inherent uncertainties involved in court and jury rulings. In the future, if new information regarding such matters becomes available to us (such as a final, non-appealable adverse verdict against us or otherwise ultimately being found liable with respect to such matters), at that time we would consider such information in evaluating any remaining cases then-pending against us as to whether it might then have become probable we have incurred liability with respect to these matters, and whether such liability, if any, could have become reasonably estimable. The resolution of any of these cases could result in the recognition of a loss contingency accrual that could have a material adverse impact on our net income for the interim or annual period during which such liability is recognized and a material adverse impact on our consolidated financial condition and liquidity.

Environmental matters and litigation

Our operations are governed by various environmental laws and regulations. Certain of our businesses 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 plants and to strive to improve 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, could adversely affect our production, handling, use, storage, transportation, sale or disposal of such substances. We believe that all of our facilities are in substantial compliance with applicable environmental laws.

Certain properties and facilities used in NL's former operations, including divested primary and secondary lead smelters and former mining locations, are the subject of civil litigation, administrative proceedings or investigations arising under federal and state environmental laws and common law. Additionally, in connection with past operating practices, we are currently involved as a defendant, potentially responsible party ("PRP") or both, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act ("CERCLA"), and similar state laws in various governmental and private actions associated with waste disposal sites, mining locations, and facilities that we or our predecessors, our subsidiaries or their predecessors currently or previously owned, operated or used, certain of which are on the United States Environmental Protection Agency's ("EPA") Superfund National Priorities List or similar state lists. These proceedings seek cleanup costs, damages for personal injury or property damage and/or damages for injury to natural resources. Certain of these proceedings involve claims for substantial amounts. Although we may be jointly and severally liable for these costs, in most cases we are only one of a number of PRPs who may also be jointly and severally liable, and among whom costs may be shared or allocated. In addition, we are occasionally named as a party in a number of personal injury lawsuits filed in various jurisdictions alleging claims related to environmental conditions alleged to have resulted from our operations.

Obligations associated with environmental remediation and related matters are difficult to assess and estimate for numerous reasons including the:

- complexity and differing interpretations of governmental regulations,
- number of PRPs and their ability or willingness to fund such allocation of costs,
- financial capabilities of the PRPs and the allocation of costs among them,
- solvency of other PRPs,
- multiplicity of possible solutions,
- number of years of investigatory, remedial and monitoring activity required,
- uncertainty over the extent, if any, to which our former operations might have contributed to the conditions allegedly giving rise to such personal injury, property damage, natural resource and related claims, and
- number of years between former operations and notice of claims and lack of information and documents about the former operations.

In addition, the imposition of more stringent standards or requirements under environmental laws or regulations, new developments or changes regarding site cleanup costs or the allocation of costs among PRPs, solvency of other PRPs, the results of future testing and analysis undertaken with respect to certain sites or a determination that we are potentially responsible for the release of hazardous substances at other sites, could cause our expenditures to exceed our current estimates. We cannot assure you that actual costs will not exceed accrued amounts or the upper end of the range for sites for which estimates have been made, and we cannot assure you that costs will not be incurred for sites where no estimates presently can be made. Further, additional environmental and related matters may arise in the future. If we were to incur any future liability, this could have a material adverse effect on our consolidated financial statements, results of operations and liquidity.

We record liabilities related to environmental remediation and related matters (including costs associated with damages for personal injury or property damage and/or damages for injury to natural resources) when estimated future expenditures are probable and reasonably estimable. We adjust such accruals as further information becomes available to us or as circumstances change. Unless the amounts and timing of such estimated future expenditures are fixed and reasonably determinable, we generally do not discount estimated future expenditures to their present value due to the uncertainty of the timing of the payout. We recognize recoveries of costs from other parties, if any, as assets when their receipt is deemed probable. At December 31, 2017, we had not recognized any material receivables and at December 31, 2018, we have recognized $15.0 million of receivables for recoveries related to the California case discussed above.

We do not know and cannot estimate the exact time frame over which we will make payments for our accrued environmental and related costs. The timing of payments depends upon a number of factors, including but not limited to the timing of the actual remediation process; which in turn depends on factors outside of our control. At each balance sheet date, we estimate the amount of our accrued environmental and related costs which we expect to pay within the next twelve months, and we classify this estimate as a current liability. We classify the remaining accrued environmental costs as a noncurrent liability.

The table below presents a summary of the activity in our accrued environmental costs during 2016, 2017, and 2018 are presented below.

	Years ended December 31, 2016	2017	2018
	(In millions)		
Balance at the beginning of the year	$ 120.4	$ 122.6	**$ 117.5**
Additions charged to expense, net	5.9	4.1	**3.1**
Payments, net	(3.7)	(9.1)	**(17.2)**
Changes in currency exchange rates and other	—	(.1)	—
Balance at the end of the year	$ 122.6	$ 117.5	**$ 103.4**
Amounts recognized in our Consolidated Balance Sheet at the end of the year:			
Current liabilities	$ 15.3	$ 6.8	**$ 6.5**
Noncurrent liabilities	107.3	110.7	**96.9**
Total	$ 122.6	$ 117.5	**$ 103.4**

NL—On a quarterly basis, NL evaluates the potential range of its liability for environmental remediation and related costs at sites where it has been named as a PRP or defendant. At December 31, 2018, NL had accrued approximately $98 million related to approximately 35 sites associated with remediation and related matters that it believes are at the present time and/or in their current phase reasonably estimable. The upper end of the range of reasonably possible costs to NL for remediation and related matters for which we believe it is possible to estimate costs is approximately $117 million, including the amount currently accrued.

NL believes that it is not reasonably possible to estimate the range of costs for certain sites. At December 31, 2018, there were approximately 5 sites for which NL is not currently able to estimate a range of costs. For these sites, generally the investigation is in the early stages, and NL is unable to determine whether or not NL actually had any association with the site, the nature of its responsibility, if any, for the contamination at the site and the extent of contamination at and cost to remediate the site. The timing and availability of information on these sites is dependent on events outside of our control, such as when the party alleging liability provides information to us. At certain of these previously inactive sites, NL has received general and special notices of liability from the EPA and/or state agencies alleging that NL, sometimes with other PRPs, are liable for past and future costs of remediating environmental contamination allegedly caused by former operations. These notifications may assert that NL, along with any other alleged PRPs, are liable for past and/or future clean-up costs. As further information becomes available to us for any of these sites which would allow us to estimate a range of costs, we would at that time adjust our accruals. Any such adjustment could result in the recognition of an accrual that would have a material effect on our consolidated financial statements, results of operations and liquidity.

Other—We have also accrued approximately $5.4 million at December 31, 2018 for other environmental cleanup matters. This accrual is near the upper end of the range of our estimate of reasonably possible costs for such matters.

Insurance coverage claims

We are involved in certain legal proceedings with a number of our former insurance carriers regarding the nature and extent of the carriers' obligations to us under insurance policies with respect to certain lead pigment and asbestos lawsuits. The issue of whether insurance coverage for defense costs or indemnity or both will be found to exist for our lead pigment and asbestos litigation depends upon a variety of factors and we cannot assure you that such insurance coverage will be available.

We have agreements with three former insurance carriers pursuant to which the carriers reimburse us for a portion of our future lead pigment litigation defense costs, and one such carrier reimburses us for a portion of our future asbestos litigation defense costs. We are not able to determine how much we will ultimately recover from these carriers for defense costs incurred by us because of certain issues that arise regarding which defense costs qualify for reimbursement. While we continue to seek additional insurance recoveries, we do not know if we will be successful in obtaining reimbursement for either defense costs or indemnity. Accordingly, we recognize insurance recoveries in income only when receipt of the recovery is probable and we are able to reasonably estimate the amount of the recovery.

Other litigation

In addition to the litigation described above, we and our affiliates are involved in various other environmental, contractual, product liability, patent (or intellectual property), employment and other claims and disputes incidental to our present and former businesses. In certain cases, we have insurance coverage for these items, although we do not expect any additional material insurance coverage for our environmental claims. We currently believe that the disposition of all of these various other claims and disputes (including asbestos-related claims), individually or in the aggregate, should not have a material adverse effect on our consolidated financial position, results of operations or liquidity beyond the accruals already provided.

Other matters

Concentrations of credit risk—Sales of TiO_2 accounted for approximately 93% of our Chemicals Segment's sales in 2016, 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 TiO_2 production processes). TiO_2 is generally sold to the paint, plastics and paper industries. Such markets are generally considered "quality-of-life" markets whose demand for TiO_2 is influenced by the relative economic well-being of the various geographic regions. Our Chemicals Segment sells TiO_2 to over 4,000 customers, with the top ten customers approximating 33% of our Chemicals Segment's net sales in 2016, 34% in 2017 and 33% in 2018. In 2016 one customer, Behr Process Corporation, accounted for approximately 10% of our Chemicals Segment's net sales. The table below shows the approximate percentage of our TiO_2 sales by volume for our significant markets, Europe and North America, for the last three years.

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

Our Component Products Segment's products are sold primarily in North America to original equipment manufacturers. The ten largest customers related to our Component Product's Segment accounted for approximately 46% of our Component Products Segment's sales in 2016, 44% in each of 2017, and 2018. United States Postal Service, a customer of the security products reporting unit, accounted for approximately 14% of the Component Products Segment's total sales in 2016, 16% in 2017 and 13% in 2018. Harley Davidson, also a customer of the security products reporting unit, accounted for approximately 11% in 2016.

Our Real Estate Management and Development Segment's revenues are land sales income and water and electric delivery fees. During 2016 we had sales to three customers that each exceeded 10% of our Real Estate Management and Development Segment's net sales: Grey Stone Nevada LLC (34%), Richmond Homes of Nevada (15%) and Henderson Interchange Centers LLC (12%). During 2017 we had sales to three customers that each exceeded 10% of our Real Estate Management and Development Segment's net sales: Richmond Homes of Nevada (37%), Grey Stone Nevada LLC (22%) both related to land sales, and the City of Henderson (11%) related to water delivery sales. During 2018 we had sales to three customers that each exceeded 10% of our Real Estate Management and Development Segment's net sales: Richmond Homes of Nevada (29%), Woodside Homes of Nevada LLC (20%) and Toll Henderson LLC (17%) all related to land sales.

***Long-term contracts*—**Our Chemicals Segment has long-term supply contracts that provide for certain of our TiO_2 feedstock requirements through 2020. The agreements require Kronos 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, our Chemicals Segment has other long-term supply and service contracts that provide for various raw materials and services. These agreements require Kronos to purchase certain minimum quantities or services with minimum purchase commitments aggregating approximately $156 million at December 31, 2018.

Operating leases—Our Chemicals Segment's principal German operating subsidiary leases the land under its Leverkusen TiO_2 production facility pursuant to a lease with Bayer AG that expires in 2050. The Leverkusen facility itself, which our Chemicals Segment owns and which represents approximately one-third of its current TiO_2 production capacity, is located within Bayer's extensive manufacturing complex. Kronos periodically establishes 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 Kronos. 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 provides 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 $14.3 million in 2016 and $16.3 million in 2017 and

$14.8 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	$ **6.3**
2020	**5.1**
2021	**4.3**
2022	**3.2**
2023	**2.4**
2024 and thereafter	**21.5**
Total (1)	$ **42.8**

(1) Approximately $17 million of the $42.8 million aggregate future minimum rental commitments at December 31, 2018 relates to Kronos' 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 Kronos, 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—Prior to 2016, NL made certain pro-rata distributions to its stockholders in the form of shares of Kronos common stock. All of NL's distributions of Kronos common stock were taxable to NL and NL recognized a taxable gain equal to the difference between the fair market value of the Kronos shares distributed on the various dates of distribution and NL's adjusted tax basis in the shares at the dates of distribution. NL transferred shares of Kronos common stock to us in satisfaction of the tax liability related to NL's gain on the transfer or distribution of these shares of Kronos common stock and the tax liability generated from the use of Kronos shares to settle the tax liability. To date, we have not paid the liability to Contran because Contran has not paid the liability to the applicable tax authority. The income tax liability will become payable to Contran, and by Contran to the applicable tax authority, when the shares of Kronos transferred or distributed by NL to us are sold or otherwise transferred outside the Contran Tax Group or in the event of certain restructuring transactions involving us. We have recognized deferred income taxes for our investment in Kronos common stock.

We are a party to a tax sharing agreement with Contran providing for the allocation of tax liabilities and tax payments as described in Note 1. Under applicable law, we, as well as 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. Contran 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 19—Financial instruments:

The following table summarizes the valuation of our short-term investments and financial instruments by the ASC Topic 820 categories as of December 31, 2017 and 2018:

	Fair Value Measurements			
	Total	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(In millions)			
Asset (liability)				
December 31, 2017:				
Marketable securities:				
Current	$ 3.0	$ —	$ 3.0	$ —
Noncurrent	255.7	1.3	4.4	250.0
December 31, 2018:				
Marketable securities:				
Current	$ **2.5**	$ **—**	$ **2.5**	$ **—**
Noncurrent	**4.8**	**1.6**	**3.2**	**—**

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

Certain of our sales generated by Chemicals Segment's non-U.S. operations are denominated in U.S. dollars. Our Chemicals Segment periodically uses 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 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. 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 (loss) 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 transactions. 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, 2018, Kronos 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 Kronos 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 relates 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 of 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 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 receive under the receive-variable leg of the swap as part of interest expense, with the net effect that the amount of interest expense we recognize on our LIBOR-based variable rate debt each quarter, as it relates to the notional amount of the swap outstanding each quarter, to be 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 Kronos' term loan discussed in Note 8, Kronos voluntarily terminated this swap contract, as it 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 was paid to Wells Fargo concurrent with the termination. Such $3.3 million charge is classified as part of our loss on prepayment of debt discussed in Note 9. 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 income (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 Operations. 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.

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	
	Carrying amount	Fair value	Carrying amount	Fair value
	(In millions)			
Cash, cash equivalents and restricted cash equivalents	$ 461.7	$ 461.7	**$ 523.7**	**$ 523.7**
Deferred payment obligation	9.3	9.3	**9.6**	**9.6**
Long-term debt (excluding capitalized leases):				
Kronos Senior Notes	471.1	495.1	**452.4**	**412.9**
Snake River Sugar Company fixed rate loans	250.0	250.0	**—**	**—**
Valhi credit facility with Contran	284.3	284.3	**314.3**	**314.3**
Tremont promissory note payable	13.1	13.1	**9.4**	**9.4**
BMI bank note payable	18.8	19.7	**18.0**	**18.8**
LandWell note payable to the City of Henderson	2.5	2.5	**2.1**	**2.1**

At December 31, 2017, the estimated market price of Kronos' Senior Notes was €1,034 per €1,000 principal amount and at December 31, 2018, the estimated market price of Kronos' Senior Notes was €900 per €1,000 principal amount. The fair value of Kronos' term loan and Senior Notes was based on quoted market prices; however, these quoted market prices represent Level 2 inputs because the markets in which the term loan trades were not active. Fair values of variable interest rate notes receivable and debt and other fixed-rate debt are deemed to approximate book value. Due to their near-term maturities, the carrying amounts of accounts receivable and accounts payable are considered equivalent to fair value. See Notes 5 and 9.

Note 20—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 of our Chemicals and Component Products Segments 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 will record sales of our Chemicals and Component Products Segments 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 as it relates to sales of our Chemicals and Component Products Segments, and we believe adoption of this standard will have a minimal effect on our revenues of our Chemicals and Component Products Segments on an ongoing basis. See Note 12.

Revenues from our Real Estate Management and Development Segment are generally under long-term contracts. We collect certain fees from builders when the builder sells a home to a customer which we previously recognized when received and now beginning on January 1, 2018 we recognize these fees as revenue at the time we sell the parcels to the builder versus our previous practice which did not recognize revenue until the homes were sold. Accordingly, upon adoption of ASU 2014-09, such fees we collect from builders when the builder sells a home to a customer are now estimated at the time we sell a parcel to a builder, and such fees are part of the revenue we recognize over time using cost based input methods for our retail land sales in the case of the home participation fee or over the time the homes in the parcel are sold in the case of the marketing fee. Under the transition requirements for adopting this ASU, we recognized the cumulative amount of such revenue that we would have recognized through December 31, 2017, had we recognized such builder fees under this new accounting method ($6.1 million, or $2.7 million, net of applicable income taxes and noncontrolling interest), as a direct increase in our retained earnings as of January 1, 2018. A portion of such builder fees are expected to be collected more than twelve months from the balance sheet date, and such amounts are classified as a noncurrent asset (Land contract receivables), see Note 7. In addition to recognizing such $6.1 million receivable, we recognized a contract asset of $8.8 million and an offsetting liability for deferred revenue of $8.8 million upon the adoption of this ASU for the estimated amount of such builder fees which we expect to receive from future home sales by the builders, which builder fees are not yet recognizable as revenue (and a portion of such contract asset is also classified as a noncurrent receivable along with an equal amount of noncurrent deferred revenue). Had we recognized revenue in 2018 on the same basis we did in 2016 and 2017, our land sales revenue would have been lower by $.1 million.

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, 2018, our portfolio of marketable equity securities was not material.

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 2017-06 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 $ 3.8 million previously classified as part of cost of sales and selling, general and administrative expenses, respectively, in 2016 and $10.8 million and $6.8 million in 2017 respectively, to "Other components of net periodic pension and OPEB cost" in our Consolidated Statement of Operations. See Note 11.

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 will 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, 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 21—Quarterly results of operations (unaudited):

	Quarter ended March 31	Quarter ended June 30	Quarter ended Sept. 30	Quarter ended Dec. 31
	(In millions, except per share data)			
Year ended December 31, 2017				
Net sales	$ 405.3	$ 481.7	$ 496.5	$ 495.9
Gross margin	114.0	141.2	161.5	185.3
Operating income	64.1	83.1	103.1	130.0
Net income (loss) from continuing operations	$ 23.5	$ 163.3	$ 62.2	$ 162.8
Amounts attributable to Valhi stockholders:				
Income (loss) from continuing operations(2)	$ 14.4	$ 117.0	$ 44.2	$ 141.1
Loss from discontinued operations (2)	(1.7)	(108.2)	1.7	(1.0)
Net income (loss)	$ 12.7	$ 8.8	$ 45.9	$ 140.1
Earnings per share:				
Income (loss) from continuing operations	$ .04	$ .34	$ .13	$ .41
Loss from discontinued operations	—	(.31)	—	—
Basic and diluted income (loss) per share	$ .04	$ .03	$ .13	$ .41
Year ended December 31, 2018				
Net sales	**$ 466.0**	**$ 510.2**	**$ 455.2**	**$ 388.7**
Gross margin	**185.3**	**184.0**	**132.7**	**107.2**
Operating income	**118.8**	**130.0**	**69.2**	**52.7**
Net income from continuing operations	**$ 70.2**	**$ 20.0**	**$ 148.3**	**$ 28.4**
Amounts attributable to Valhi stockholders:				
Income from continuing operations(2)	**$ 51.7**	**$ 11.3**	**$ 142.8**	**$ 22.3**
Income (loss) from discontinued operations (2)	**37.6**	**.4**	**.7**	**(4.6)**
Net income	**$ 89.3**	**$ 11.7**	**$ 143.5**	**$ 17.7**
Earnings per share:				
Income from continuing operations	**$ .15**	**$ .03**	**$ .42**	**$ .07**
Loss from discontinued operations	**.11**	—	—	**(.01)**
Basic and diluted income per share	**$ .26**	**$ .03**	**$ .42**	**$ .06**

(1) We recognized the following amounts during 2017:

- 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 Chemicals Segment's German and Belgian operations, (see Note 14);
- a pre-tax charge of $7.1 million in the third quarter related to the loss on prepayment of debt (see Note 9);
- 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 ;
- 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 14);
- non-cash deferred income tax benefit of $77.1 million in the fourth quarter related to the revaluation of our net deferred income tax liability resulting from the reduction in the U.S. federal corporate income
- non-cash deferred income tax benefit of $18.7 million in the fourth quarter 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 14); and
- aggregate provisional non-cash deferred income tax expense of $5.3 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 14).

We recognized the following amounts during 2018:

- a pre-tax gain of $12.5 million in the first quarter related to the sale of land not used in our operations (see Note 13);
- a pre-tax charge of $62 million related to the litigation settlement expense recognized in the second quarter (see Note 18);
- a non-cash deferred income tax benefit of $112 million in the third quarter related to a change in the deferred income tax liability related to our investment in Kronos as a result of the 2017 Tax Act (see Note 14);
- a pre-tax gain of $12.5 related to a securities transaction gain recognized in the third quarter related to the sale of our interest in Amalgamated Sugar Company LLC (see Note 6);
- a current cash income tax expense of $4.0 million in the fourth quarter of 2018 related to GILTI (see Note 14).

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.

Exhibit 10.10

COLLATERAL AGREEMENT

Dated as of March 12, 2013

This Collateral Agreement (this *"Agreement")*, made as of March 12, 2013, is between Valhi, Inc., a Delaware corporation *("Valhi")*, and Contran Corporation, a Delaware corporation that is an indirect parent corporation of Valhi *("Contran")*.

Recitals

A. Contran, as borrower, is a party to a Credit Agreement dated as of October 2, 2009 with PlainsCapital Bank, a Texas state bank *("PlainsCapital")*, individually and as agent (in such capacity, the *"Agent")* for the Lenders and the L/C Issuer that are from time to time parties to such agreement, and as such agreement has been amended from time to time (the *"Credit Agreement")*. Capitalized terms used in this Agreement that are not defined herein shall have the meanings assigned to those terms in the Credit Agreement. The Lenders and the L/C Issuer are referred to herein collectively as the *"Credit Parties."*

B. Contran desires that Valhi enter into a Loan Modification Agreement dated as of March 12, 2013 among PlainsCapital (as a lender and as Agent), Contran, Guarantor, Valhi and First Southwest Company (the *"March 2013 Loan Modification Agreement")* pursuant to which, among other things, Valhi would assume and perform the obligations of the original pledgor under the Pledge Agreement and the other Loan Documents to which the original pledgor was a party (other than with respect to the Guaranty) and pledge initially 12 million shares (the *"Kronos Shares")* of the common stock, par value $0.01 per share *("Kronos Common Stock")*, of Kronos Worldwide, Inc., a Delaware corporation,.

C. The 2013 Loan Modification Agreement also provides that Valhi enter into a Securities Control Agreement dated as of March 12, 2013 among Valhi, First Southwest Company, as intermediary, PlainsCapital (as Agent) and Contran (the *"March 2013 Securities Control Agreement")* whereby First Southwest Company would become the custodian for the Collateral Account (as defined in the March 2013 Securities Control Agreement) holding the Kronos Shares or additional shares of Kronos Common Stock and any other marketable securities pledged under the Pledge Agreement.

D. Valhi is willing to enter into this Agreement, the March 2013 Loan Modification Agreement and the March 2013 Securities Control Agreement in consideration of, among other things, the direct and indirect economic benefits Valhi derives from (i) the making of the Loans and other financial accommodations provided to Contran by the Credit Parties pursuant to the Credit Agreement and (ii) the financial accommodations provided by Contran directly to Valhi under this Agreement.

Agreement

In consideration of the mutual premises, representations and covenants herein contained, the parties hereto mutually agree as follows.

Section 1. *The Pledge.* Valhi agrees to enter into the March 2013 Loan Modification Agreement and the March 2013 Securities Control Agreement and deposit the Kronos Shares into the Collateral Account.

Section 2. *The Pledge Fee.* As consideration for entering into the March 2013 Loan Modification Agreement and the March 2013 Securities Control Account Agreement, and as consideration for delivering (x) the Kronos Shares and (y) any other shares of Kronos Common Stock, or any other marketable securities, that Valhi may deposit into the Collateral Account in

Exhibit 10.10

the future upon the request of Contran (collectively, such Kronos Shares, additional shares of Kronos Common Stock and any other marketable securities, the *"Aggregate Collateral"),* and except as otherwise provided in this Section, beginning with the calendar quarter commencing on January **1,** 2013, Contran shall pay to Valhi on the first business day following March 31, June 30, September 30 and December 31 (each such day, a *"Fee Determination Date")* of each year a quarterly fee equal to 0.125% of the value of the Aggregate Collateral actually pledged by Valhi pursuant to the Pledge Agreement, based on the average daily closing sales price per share for such Kronos Shares or other marketable securities, as applicable, as reported on the New York Stock Exchange or such other principal exchange or other market quotation system on which securities may then trade for the quarter ended on such Fee Determination Date, and the average number of Kronos Shares or other marketable securities, as applicable, so pledged. Where applicable, including but not limited to the termination of this Agreement, the fee will be prorated based on the portion of the calendar quarter in which the Kronos Shares or other marketable securities, as applicable, have been pledged, and the average daily closing sales price per share for such Kronos Shares or other marketable securities, as applicable, for such partial quarter.

Section 3. ***Indemnification.*** Contran agrees to indemnify Valhi against any loss or incremental cost resulting from the pledge of the Aggregate Collateral, as applicable, under the Pledge Agreement or any other obligation of Valhi under the March 2013 Loan Modification Agreement and the March 2013 Securities Control Account Agreement.

Section 4. ***Termination.*** Upon the termination of the Pledge Agreement, the pledge of the Kronos Shares or other marketable securities, as applicable, shall terminate and the Contran shall cause all stock certificates representing the shares and the related stock powers to be returned to Valhi or returned to Valhi electronically.

Section 5. ***Applicable Law.*** This Agreement shall be governed by and construed in accordance with the domestic laws of the state of Texas, without giving effect to any choice of law or conflict of law provision or rule (whether of the state of Texas or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than the state of Texas.

Executed as of the date first above written.

CONTRAN CORPORATION	**VALHI, INC.**
By: /s/ Gregory M. Swalwell	/s/ John St. Wrba
Gregory M. Swalwell, Vice President	John St. Wrba, Vice President

ELEVENTH AMENDED AND RESTATED UNSECURED REVOLVING DEMAND PROMISSORY NOTE

$360,000,000.00 **December 31, 2017**

Section 1. ***Promise to Pay***. For and in consideration of value received, the undersigned, VALHI, INC., a corporation duly organized under the laws of the state of Delaware ("*Borrower*"), promises to pay, in lawful money of the United States of America, to the order of CONTRAN CORPORATION, a corporation duly organized under the laws of the state of Delaware ("*Contran*"), or the holder hereof (as applicable, Contran or such holder shall be referred to as the "*Noteholder*"), the principal sum of **THREE HUNDRED SIXTY MILLION** and NO/100ths United States Dollars ($360,000,000.00) or such lesser amount as shall equal the unpaid principal amount of the loan made by the Noteholder to Borrower together with accrued and unpaid interest on the unpaid principal balance from time to time pursuant to the terms of this Tenth Amended and Restated Unsecured Revolving Demand Promissory Note, as it may be amended from time to time (this "*Note*"). This Note shall be unsecured and will bear interest on the terms set forth in **Section 7** below. Capitalized terms not otherwise defined shall have the meanings given to such terms in **Section 19** of this Note.

Section 2. ***Amendment and Restatement***. This Note renews, replaces, amends and restates in its entirety the Tenth Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2016 in the original principal amount of $325,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Tenth Amended Note*"). The Tenth Amended Note renewed, replaced, amended and restated in its entirety the Ninth Amended and Restated Unsecured Revolving Demand Promissory Note dated December 3, 2015 in the original principal amount of $325,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Ninth Amended Note*"). The Ninth Amended Note renewed, replaced, amended and restated in its entirety the Eighth Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2014 in the original principal amount of $275,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Eighth Amended Note*"). The Eighth Amended Note renewed, replaced, amended and restated in its entirety the Seventh Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2013 in the original principal amount of $275,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Seventh Amended Note*"). The Seventh Amended Note renewed, replaced, amended and restated in its entirety the Sixth Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2012 in the original principal amount of $225,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Sixth Amended Note*"). The Sixth Amended Note renewed, replaced, amended and restated in its entirety the Fifth Amended and Restated Unsecured Revolving Demand Promissory Note dated December 31, 2011 in the original principal amount of $100,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Fifth Amended Note*"). The Fifth Amended Note renewed, replaced, amended and restated in its entirety the Fourth Amended and Restated Unsecured Revolving Demand Promissory Note dated November 10, 2010 in the original principal amount of $100,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Fourth Amended Note*"). The Fourth Amended Note renewed, replaced, amended and restated in its entirety the Third Amended and Restated Unsecured Revolving Demand Promissory Note dated July 1, 2010 in the original principal amount of $100,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Third Amended Note*"). The Third Amended Note renewed, replaced, amended and restated in its entirety the Second Amended and Restated Unsecured Revolving Demand Promissory Note dated March 31, 2010 in the original principal amount of $70,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Second Amended Note*"). The Second Amended Note renewed, replaced, amended and restated in its entirety the First Amended and Restated Unsecured Revolving Demand Promissory Note dated November 30, 2009 in the original principal amount of $70,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*First Amended Note*"). The First Amended Note renewed, replaced, amended and restated in its entirety the Unsecured Revolving Demand Promissory Note dated July 30, 2009 in the original principal amount of $70,000,000.00 payable to the order of the Noteholder and executed by the Borrower (the "*Original Note*"). This Note renews, replaces, amends and restates in its entirety the Tenth Amended Note, the Ninth Amended Note, the Eighth Amended Note, the Seventh Amended Note, the Sixth Amended Note, the Fifth Amended Note, the Fourth Amended Note, the Third Amended Note, the Second Amended Note, the First Amended Note and the Original Note (collectively, the "*Prior Notes*"); *provided* that such amendment and restatement shall operate to renew, amend and modify the rights and obligations of the parties under each Prior Note, as provided herein, but shall not extinguish the obligations under each Prior Note, nor effect a novation thereof. As of the close of business on December 31, 2017, the unpaid principal balance of the Ninth Amended Note was $284,300,000.00, the accrued and unpaid interest thereon was nil and the accrued and unpaid commitment fee thereon was nil, which is the unpaid principal, accrued and unpaid interest and accrued and unpaid commitment fee owed under this Note as of the close of business on the date of this Note. This Note contains the entire understanding between the Noteholder and the Borrower with respect to the transactions contemplated hereby and supersedes all other instruments, agreements and understandings between the Noteholder and the Borrower with respect to the subject matter of this Note.

Section 3. ***Place of Payment***. All payments will be made at Noteholder's address at Three Lincoln Centre, 5430 LBJ Freeway, Suite 1700, Dallas, Texas 75240-2697, Attention: Treasurer, or such other place as the Noteholder may from time to time appoint in writing.

Section 4. ***Payments***. The unpaid principal balance of this Note and any accrued and unpaid interest thereon shall be due and payable on the Final Payment Date. Prior to the Final Payment Date, any accrued and unpaid interest on an unpaid principal balance shall be paid in arrears quarterly on the last day of each March, June, September and December, commencing March 31, 2018. All payments on this Note shall be applied first to accrued and unpaid interest, next to accrued interest not yet payable and then to principal. If any payment of principal or interest on this Note shall become due on a day that is not a Business Day, such payment shall be made on the next succeeding Business Day and the payment shall be the amount owed on the original payment date.

Section 5. ***Prepayments***. This Note may be prepaid in part or in full at any time without penalty.

Section 6. ***Borrowings***. Prior to the Final Payment Date, Noteholder expressly authorizes Borrower to borrow, repay and re-borrow principal under this Note in increments of $100,000 on a daily basis so long as:

- the aggregate outstanding principal balance does not exceed $360,000,000.00; and
- no Event of Default has occurred and is continuing.

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

Section 7. ***Interest***. The unpaid principal balance of this Note shall bear interest at the rate per annum of the Prime Rate plus one percent (1.00%). In the event that an Event of Default occurs and is continuing, the unpaid principal amount shall bear interest from the Event of Default at the rate per annum of the Prime Rate plus four percent (4.00%) until such time as the Event of Default is cured. Accrued interest on the unpaid principal of this Note shall be computed on the basis of a 365- or 366-day year for actual days (including the first, but excluding the last day) elapsed, but in no event shall such computation result in an amount of accrued interest that would exceed accrued interest on the unpaid principal balance during the same period at the Maximum Rate. Notwithstanding anything to the contrary, this Note is expressly limited so that in no contingency or event whatsoever shall the amount paid or agreed to be paid to the Noteholder exceed the Maximum Rate. If, from any circumstances whatsoever, the Noteholder shall ever receive as interest an amount that would exceed the Maximum Rate, such amount that would be excessive interest shall be applied to the reduction of the unpaid principal balance and not to the payment of interest, and if the principal amount of this Note is paid in full, any remaining excess shall be paid to Borrower, and in such event, the Noteholder shall not be subject to any penalties provided by any laws for contracting for, charging, taking, reserving or receiving interest in excess of the highest lawful rate permissible under applicable law. All sums paid or agreed to be paid to Noteholder for the use, forbearance or detention of the indebtedness of the Borrower to Noteholder shall, to the extent permitted by applicable law, be amortized, prorated, allocated and spread throughout the full term of such indebtedness until payment in full of the principal (including the period of any renewal or extension thereof) so that the interest on account of such indebtedness shall not exceed the Maximum Rate. If at any time the Contract Rate is limited to the Maximum Rate, any subsequent reductions in the Contract Rate shall not reduce the rate of interest on this Note below the Maximum Rate until the total amount of interest accrued equals the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate. In the event that, upon the Final Payment Date, the total amount of interest paid or accrued on this Note is less than the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate, then at such time, to the extent permitted by law, in addition to the principal and any other amounts Borrower owes to the Noteholder, the Borrower shall pay to the Noteholder an amount equal to the difference between: (i) the lesser of the amount of interest that would have accrued if the Contract Rate had not been limited by the Maximum Rate or the amount of interest that would have accrued if the Maximum Rate had at all times been in effect; and (ii) the amount of interest actually paid on this Note.

Section 8. **Fees and Expenses**. On the last day of each March, June, September and December, commencing March 31, 2018, and on the Final Payment Date, Borrower shall pay to Noteholder the Unused Commitment Fee for such period, *provided, however*, Borrower will not owe any Unused Commitment Fee for any part of such period (prorated as applicable) that the Noteholder is a net borrower of money from the Borrower. In addition, Borrower and any guarantor jointly and severally agree to pay on the Final Payment Date to Noteholder any other cost or expense reasonably incurred by Noteholder in connection with Noteholder's commitment to Borrower pursuant to the terms of this Note, including without limitation any other cost reasonably incurred by Noteholder pursuant to the terms of any credit facility of Noteholder.

Section 9. ***Remedy***. Upon the occurrence and during the continuation of an Event of Default, the Noteholder shall have all of the rights and remedies provided in the applicable Uniform Commercial Code, this Note or any other agreement among Borrower and in favor of the Noteholder, as well as those rights and remedies provided by any other applicable law, rule or regulation. In conjunction with and in addition to the foregoing rights and remedies of the Noteholder, the Noteholder may declare all indebtedness due under this Note, although otherwise unmatured, to be due and payable immediately without notice or demand whatsoever. All rights and remedies of the Noteholder are cumulative and may be exercised singly or concurrently. The failure to exercise any right or remedy will not be a waiver of such right or remedy.

Section 10. ***Right of Offset***. The Noteholder shall have the right of offset against amounts that may be due by the Noteholder now or in the future to Borrower against amounts due under this Note.

Section 11. ***Record of Outstanding Indebtedness***. The date and amount of each repayment of principal outstanding under this Note or interest thereon shall be recorded by Noteholder in its records. The principal balance outstanding and all accrued or accruing interest owed under this Note as recorded by Noteholder in its records shall be the best evidence of the principal balance outstanding and all accrued or accruing interest owed under this Note; *provided* that the failure of Noteholder to so record or any error in so recording or computing any such amount owed shall not limit or otherwise affect the obligations of the Borrower under this Note to repay the principal balance outstanding and all accrued or accruing interest.

Section 12. ***Waiver***. Borrower and each surety, endorser, guarantor, and other party now or subsequently liable for payment of this Note, severally waive demand, presentment for payment, notice of nonpayment, notice of dishonor, protest, notice of protest, notice of the intention to accelerate, notice of acceleration, diligence in collecting or bringing suit against any party liable on this Note, and further agree to any and all extensions, renewals, modifications, partial payments, substitutions of evidence of indebtedness, and the taking or release of any collateral with or without notice before or after demand by the Noteholder for payment under this Note.

Section 13. ***Costs and Attorneys' Fees***. In addition to any other amounts payable to Noteholder pursuant to the terms of this Note, in the event the Noteholder incurs costs in collecting on this Note, this Note is placed in the hands of any attorney for collection, suit is filed on this Note or if proceedings are had in bankruptcy, receivership, reorganization, or other legal or judicial proceedings for the collection of this Note, Borrower and any guarantor jointly and severally agree to pay on demand to the Noteholder all expenses and costs of collection, including, but not limited to, reasonable attorneys' fees incurred in connection with any such collection, suit, or proceeding, in addition to the principal and interest then due.

Section 14. ***Time of Essence***. Time is of the essence with respect to all of Borrower's obligations and agreements under this Note.

Section 15. ***Jurisdiction and Venue***. THIS NOTE SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE DOMESTIC LAWS OF THE STATE OF TEXAS, WITHOUT GIVING EFFECT TO ANY CHOICE OF LAW OR CONFLICT OF LAW PROVISION OR RULE (WHETHER OF THE STATE OF TEXAS OR ANY OTHER JURISDICTION) THAT WOULD CAUSE THE APPLICATION OF THE LAWS OF ANY JURISDICTION OTHER THAN THE STATE OF TEXAS. BORROWER CONSENTS TO JURISDICTION IN THE COURTS LOCATED IN DALLAS, TEXAS.

Section 16. ***Notice***. Any notice or demand required by this Note shall be deemed to have been given and received on the earlier of **(i)** when the notice or demand is actually received by the recipient or **(ii)** 72 hours after the notice is deposited in the United States mail, certified or registered, with postage prepaid, and addressed to the recipient. The address for giving notice or demand under this Note **(i)** to the Noteholder shall be the place of payment specified in **Section 3** or such other place as the Noteholder may specify in writing to the Borrower and **(ii)** to Borrower shall be the address below the Borrower’s signature or such other place as the Borrower may specify in writing to the Noteholder.

Section 17. ***Amendment or Waiver of Provisions of this Note***. No amendment or waiver of any provision of this Note shall in any event be effective unless the same shall be in a writing referring to this Note and signed by the Borrower and the Noteholder. Such amendment or waiver shall be effective only in the specific instance and for the specific purpose for which given. No waiver of any of the provisions of this Note shall be deemed or shall constitute a waiver of any other provisions, whether or not similar, nor shall any waiver constitute a continuing waiver.

Section 18. ***Successors and Assigns***. All of the covenants, obligations, promises and agreements contained in this Note made by Borrower shall be binding upon its successors and permitted assigns, as applicable. Notwithstanding the foregoing, Borrower shall not assign this Note or its performance under this Note without the prior written consent of the Noteholder. Noteholder at any time may assign this Note without the consent of Borrower.

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

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

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

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

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

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

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

(iii) a case shall be commenced against Borrower, or Borrower shall file a petition commencing a case, under any provision of the Federal Bankruptcy Code of 1978, as amended, or shall seek relief under any provision of any other bankruptcy, reorganization, arrangement, insolvency, readjustment of debt, dissolution or liquidation law of any jurisdiction, whether now or hereafter in effect, or shall consent to the filing of any petition against it under such law, or Borrower shall make an assignment for the benefit of its creditors, or shall admit in writing its inability to pay its debts generally as they become due, or shall consent to the appointment of a receiver, trustee or liquidator of Borrower or all or any part of its property; or

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

(e) “***Final Payment Date***” shall mean the earlier of:

- written demand by the Noteholder for payment of all or part of the unpaid principal, the accrued and unpaid interest thereon and the accrued and unpaid commitment fee thereon, but in any event no earlier than December 31, 2019; or
- acceleration as provided herein.

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

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

(h) "***Unused Commitment Amount***" for any period on after the date of this Note shall mean the average on each day of such period of the difference between (A) $360,000,000.00 and (B) the amount of the unpaid principal balance of this Note.

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

BORROWER:

VALHI, INC.

By: /s/ Gregory M. Swalwell
Gregory M. Swalwell
Executive Vice President, Chief Financial Officer and Chief Accounting Officer

Address:

5430 LBJ Freeway, Suite 1700
Dallas, Texas 75240-2697

As of the date hereof, Contran Corporation, as the Noteholder, hereby agrees that this Note renews, replaces, amends and restates in its entirety each Prior Note (but shall not extinguish the obligations under each Prior Note, nor effect a novation thereof), and that the unpaid principal of $284,300,000.00, the accrued and unpaid interest thereon of nil and the accrued and unpaid commitment fee thereon of nil that was owed under the Tenth Amended Note as of the close of business on December 31, 2017 are the unpaid principal, the accrued and unpaid interest thereon and the accrued and unpaid commitment fee thereon, respectively, owed under this Note as of the close of business on the date of this Note.

CONTRAN CORPORATION

By: /s/ Bryan A. Hanley
Bryan A. Hanley
Vice President and Treasurer

Exhibit 10.23

COLLATERAL AGREEMENT
Dated as of March 12, 2013

This Collateral Agreement (this *"Agreement")*, made as of March 12, 2013, is between Valhi, Inc., a Delaware corporation *("Valhi")*, and Contran Corporation, a Delaware corporation that is an indirect parent corporation of Valhi *("Contran")*.

Recitals

A. Contran, as borrower, is a party to a Credit Agreement dated as of October 2, 2009 with PlainsCapital Bank, a Texas state bank *("PlainsCapital")*, individually and as agent (in such capacity, the *"Agent")* for the Lenders and the L/C Issuer that are from time to time parties to such agreement, and as such agreement has been amended from time to time (the *"Credit Agreement")*. Capitalized terms used in this Agreement that are not defined herein shall have the meanings assigned to those terms in the Credit Agreement. The Lenders and the L/C Issuer are referred to herein collectively as the *"Credit Parties."*

B. Contran desires that Valhi enter into a Loan Modification Agreement dated as of March 12, 2013 among PlainsCapital (as a lender and as Agent), Contran, Guarantor, Valhi and First Southwest Company (the *"March 2013 Loan Modification Agreement")* pursuant to which, among other things, Valhi would assume and perform the obligations of the original pledgor under the Pledge Agreement and the other Loan Documents to which the original pledgor was a party (other than with respect to the Guaranty) and pledge initially 12 million shares (the *"Kronos Shares")* of the common stock, par value $0.01 per share *("Kronos Common Stock")*, of Kronos Worldwide, Inc., a Delaware corporation,.

C. The 2013 Loan Modification Agreement also provides that Valhi enter into a Securities Control Agreement dated as of March 12, 2013 among Valhi, First Southwest Company, as intermediary, PlainsCapital (as Agent) and Contran (the *"March 2013 Securities Control Agreement")* whereby First Southwest Company would become the custodian for the Collateral Account (as defined in the March 2013 Securities Control Agreement) holding the Kronos Shares or additional shares of Kronos Common Stock and any other marketable securities pledged under the Pledge Agreement.

D. Valhi is willing to enter into this Agreement, the March 2013 Loan Modification Agreement and the March 2013 Securities Control Agreement in consideration of, among other things, the direct and indirect economic benefits Valhi derives from (i) the making of the Loans and other financial accommodations provided to Contran by the Credit Parties pursuant to the Credit Agreement and (ii) the financial accommodations provided by Contran directly to Valhi under this Agreement.

Agreement

In consideration of the mutual premises, representations and covenants herein contained, the parties hereto mutually agree as follows.

Section 1. ***The Pledge.*** Valhi agrees to enter into the March 2013 Loan Modification Agreement and the March 2013 Securities Control Agreement and deposit the Kronos Shares into the Collateral Account.

Section 2. ***The Pledge Fee.*** As consideration for entering into the March 2013 Loan Modification Agreement and the March 2013 Securities Control Account Agreement, and as consideration for delivering (x) the Kronos Shares and (y) any other shares of Kronos Common Stock, or any other marketable securities, that Valhi may deposit into the Collateral Account in the future upon the request of Contran (collectively, such Kronos Shares, additional shares of Kronos

Common Stock and any other marketable securities, the *"Aggregate Collateral")*, and except as otherwise provided in this Section, beginning with the calendar quarter commencing on January **1,** 2013, Contran shall pay to Valhi on the first business day following March 31, June 30, September 30 and December 31 (each such day, a *"Fee Determination Date")* of each year a quarterly fee equal to 0.125% of the value of the Aggregate Collateral actually pledged by Valhi pursuant to the Pledge Agreement, based on the average daily closing sales price per share for such Kronos Shares or other marketable securities, as applicable, as reported on the New York Stock Exchange or such other principal exchange or other market quotation system on which securities may then trade for the quarter ended on such Fee Determination Date, and the average number of Kronos Shares or other marketable securities, as applicable, so pledged. Where applicable, including but not limited to the termination of this Agreement, the fee will be prorated based on the portion of the calendar quarter in which the Kronos Shares or other marketable securities, as applicable, have been pledged, and the average daily closing sales price per share for such Kronos Shares or other marketable securities, as applicable, for such partial quarter.

Section 3. ***Indemnification.*** Contran agrees to indemnify Valhi against any loss or incremental cost resulting from the pledge of the Aggregate Collateral, as applicable, under the Pledge Agreement or any other obligation of Valhi under the March 2013 Loan Modification Agreement and the March 2013 Securities Control Account Agreement.

Section 4. ***Termination.*** Upon the termination of the Pledge Agreement, the pledge of the Kronos Shares or other marketable securities, as applicable, shall terminate and the Contran shall cause all stock certificates representing the shares and the related stock powers to be returned to Valhi or returned to Valhi electronically.

Section 5. ***Applicable Law.*** This Agreement shall be governed by and construed in accordance with the domestic laws of the state of Texas, without giving effect to any choice of law or conflict of law provision or rule (whether of the state of Texas or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than the state of Texas.

Executed as of the date first above written.

CONTRAN CORPORATION **VALHI, INC.**

By:/s/ Gregory M. Swalwell
Gregory M. Swalwell, Vice President

By:/s/ John St. Wrba
John St. Wrba, Vice President

EXHIBIT 21.1

SUBSIDIARIES OF THE REGISTRANT

Name of Corporation	Jurisdiction of Incorporation or Organization	% of Voting Securities Held at December 31, 2018 (1)
ASC Holdings, Inc.	Utah	100%
Kronos Worldwide, Inc. (2)	Delaware	50%
NL Industries, Inc. (2), (3), (4)	New Jersey	83%
CompX International Inc. (4)	Delaware	87%
Tremont LLC	Delaware	100%
TRECO LLC	Nevada	100%
Basic Management, Inc.	Nevada	63%
Basic Water Company	Nevada	100%
Basic Water Company SPE LLC	Nevada	100%
Basic Environmental Company LLC	Nevada	100%
Basic Power Company	Nevada	100%
Basic Remediation Company LLC	Nevada	100%
Basic Land Company	Nevada	100%
The LandWell Company LP (5)	Delaware	50%
Henderson Interchange Sign LLC	Nevada	100%
TRE Holding Corporation	Delaware	100%
TRE Management Company	Delaware	100%
Tall Pines Insurance Company	Vermont	100%
Medite Corporation	Delaware	100%

(1) Held by the Registrant or the indicated subsidiary of the Registrant.

(2) Subsidiaries of Kronos are incorporated by reference to Exhibit 21.1 of Kronos' Annual Report on Form 10-K for the year ended December 31, 2018 (File No. 333-100047). NL owns an additional 30% of Kronos directly.

(3) Subsidiaries of NL are incorporated by reference to Exhibit 21.1 of NL's Annual Report on Form 10-K for the year ended December 31, 2018 (File No. 1-640).

(4) Subsidiaries of CompX are incorporated by reference to Exhibit 21.1 of CompX's Annual Report on Form 10-K for the year ended December 31, 2087 (File No. 1-13905).

(5) TRECO LLC owns an additional 27% of The LandWell Company LP directly.

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 (No. 333-181791) of Valhi, Inc., of our report dated March 11, 2019, relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
PricewaterhouseCoopers LLP
Dallas, Texas
March 11, 2019

Exhibit 31.1

I, Robert D. Graham, certify that:

1) I have reviewed this Annual Report on Form 10-K of Valhi, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: March 11, 2019

/s/ Robert D. Graham
Robert D. Graham
Vice Chairman of the Board, President and Chief Executive Officer

Exhibit 31.2

I, Gregory M. Swalwell, certify that:

1) I have reviewed this Annual Report on Form 10-K of Valhi, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: March 11, 2019

/s/ Gregory M. Swalwell

Gregory M. Swalwell
Executive Vice President, Chief Financial Officer and Chief Accounting Officer

Exhibit 32.1

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

In connection with the Annual Report of Valhi, Inc. (the “Company”) on Form 10-K for the year ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), we, Robert D. Graham, Vice Chairman of the Board, President and Chief Executive Officer, and Gregory M. Swalwell, Executive Vice President, Chief Financial Officer and Chief Accounting Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

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

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

/s/ Robert D. Graham
Robert D. Graham
Vice Chairman of the Board, President and Chief Executive Officer
March 11, 2019

/s/ Gregory M. Swalwell
Gregory M. Swalwell
Executive Vice President, Chief Financial Officer and Chief Accounting Officer
March 11, 2019

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