

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
Form 10-K**

(Mark One)

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

For the fiscal year ended December 31, 2019

OR

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

For the transition period from _____ to _____

Commission file number 1-1070



OLIN CORPORATION

(Exact name of registrant as specified in its charter)

Virginia

13-1872319

(State or other jurisdiction of incorporation or organization)

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

190 Carondelet Plaza, Suite 1530, Clayton, MO

63105

(Address of principal executive offices)

(Zip code)

Registrant's telephone number, including area code: (314) 480-1400

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

Title of each class:	Trading symbol:	Name of each exchange on which registered:
Common Stock, \$1.00 par value per share	OLN	New York Stock Exchange

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

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

Indicate by check mark 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.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging growth company

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

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

As of June 30, 2019, the aggregate market value of registrant's common stock, \$1.00 par value per share, held by non-affiliates of registrant was approximately \$3,583,520,505 based on the closing sale price as reported on the New York Stock Exchange.

As of January 31, 2020, 157,722,254 shares of the registrant's common stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

**Portions of the following document are incorporated by reference in this Form 10-K
as indicated herein:**

Document	Part of 10-K into which incorporated
Proxy Statement relating to Olin's Annual Meeting of Shareholders to be held in 2020	Part III

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PART I

Item 1. BUSINESS

GENERAL

Olin Corporation (Olin) is a Virginia corporation, incorporated in 1892, having its principal executive offices in Clayton, MO. We are a manufacturer concentrated in three business segments: Chlor Alkali Products and Vinyls, Epoxy and Winchester. The Chlor Alkali Products and Vinyls segment manufactures and sells chlorine and caustic soda, ethylene dichloride and vinyl chloride monomer, methyl chloride, methylene chloride, chloroform, carbon tetrachloride, perchloroethylene, trichloroethylene and vinylidene chloride, hydrochloric acid, hydrogen, bleach products and potassium hydroxide, which represent 56% of 2019 sales. The Epoxy segment produces and sells a full range of epoxy materials, including allyl chloride, epichlorohydrin, liquid epoxy resins, solid epoxy resins and downstream products such as differentiated epoxy resins and additives, which represent 33% of 2019 sales. The Winchester segment produces and sells sporting ammunition, reloading components, small caliber military ammunition and components, and industrial cartridges, which represent 11% of 2019 sales. See our discussion of our segment disclosures contained in Item 7—“Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

GOVERNANCE

We maintain an Internet website at www.olin.com. Our reports on Form 10-K, Form 10-Q and Form 8-K, as well as amendments to those reports, are available free of charge on our website, as soon as reasonably practicable after we file the reports with the Securities and Exchange Commission (SEC). Also, a copy of our electronically filed materials can be obtained at www.sec.gov. Our Principles of Corporate Governance, Committee Charters and Code of Conduct are available on our website at www.olin.com in the Leadership & Governance Section under Governance Documents and Committees.

In May 2019, our Chief Executive Officer executed the annual Section 303A.12(a) CEO Certification required by the New York Stock Exchange (NYSE), certifying that he was not aware of any violation of the NYSE’s corporate governance listing standards by us. Additionally, our Chief Executive Officer and Chief Financial Officer executed the required Sarbanes-Oxley Act of 2002 Sections 302 and 906 certifications relating to this Annual Report on Form 10-K, which are filed with the SEC as exhibits to this Annual Report on Form 10-K.

PRODUCTS, SERVICES AND STRATEGIES

Chlor Alkali Products and Vinyls

Products and Services

We have been involved in the chlor alkali industry for more than 125 years and are a major participant in the global chlor alkali industry. Chlorine, caustic soda and hydrogen are co-produced commercially by the electrolysis of salt. These co-produced products are produced simultaneously, and in a fixed ratio of 1.0 ton of chlorine to 1.1 tons of caustic soda and 0.03 tons of hydrogen. The industry refers to this as an Electrochemical Unit or ECU. With a demonstrated capacity of 5.8 million ECUs as of the end of 2019, we have the largest global chlor alkali capacity, according to data from IHS Markit (IHS). IHS is a global information consulting company established in 1959 that provides information to a variety of industries.

Chlorine is used as a raw material in the production of thousands of products, including vinyls, urethanes, epoxy, water treatment chemicals and a variety of other organic and inorganic chemicals. A significant portion of chlorine production is consumed in the manufacture of ethylene dichloride (EDC) and vinyl chloride monomer (VCM), both of which our Chlor Alkali Products and Vinyls segment produces. A large portion of our EDC production is utilized in the production of VCM, but we are also one of the largest global participants in merchant EDC sales. EDC and VCM are precursors for polyvinyl chloride (PVC). PVC is a plastic used in applications such as vinyl siding, pipe, pipe fittings and automotive parts.

Our Chlor Alkali Products and Vinyls segment is one of the largest global marketers of caustic soda, including caustic soda produced by The Dow Chemical Company (Dow) in Brazil. The off-take arrangement with Dow in Brazil entitles the Chlor Alkali Products and Vinyls segment the right to market and sell the caustic soda produced at Dow’s Aratu, Brazil site. The diversity of caustic soda sourcing allows us to cost effectively supply customers worldwide. Caustic soda has a wide variety of end-use applications, the largest of which includes water treatment, alumina, pulp and paper, urethanes, detergents and soaps and a variety of other organic and inorganic chemicals.

Our Chlor Alkali Products and Vinyls segment also includes our chlorinated organics business which is the largest global producer of chlorinated organic products that include chloromethanes (methyl chloride, methylene chloride, chloroform and carbon tetrachloride) and chloroethenes (perchloroethylene, trichloroethylene, and vinylidene chloride). Chlorinated organics participates in both the solvent segment, as well as the intermediate segment of the global chlorocarbon industry with a focus on sustainable applications and in applications where we can benefit from our cost advantages. Intermediate products are used as feedstocks in the production of fluoropolymers, fluorocarbon refrigerants and blowing agents, silicones, cellulose and agricultural chemicals. Solvent products are sold into end uses such as surface preparation, dry cleaning, pharmaceuticals and regeneration of refining catalysts. This business's unique technology allows us to utilize both hydrochloric acid and chlorinated hydrocarbon byproducts (RCIs), produced by our other production processes, as raw materials in an integrated system. These manufacturing facilities also consume chlorine, which generates caustic soda production and sales.

We also manufacture and sell other chlor alkali-related products, including hydrochloric acid, sodium hypochlorite (bleach) and potassium hydroxide, which we refer to as co-products. The production of co-products, chlorinated organics products and epoxy resins generally consume chlorine as a raw material creating downstream applications that upgrade the value of chlorine and enable caustic soda production. Our industry leadership in the production of chlorinated organics and epoxy resins, as well as other co-products, offer us nineteen integrated outlets for our captive chlorine.

The Chlor Alkali Products and Vinyls segment's products are delivered by pipeline, marine vessel, deep-water and coastal barge, railcar and truck. Our logistics and terminal infrastructure provides us with geographically advantaged storage capacity and provides us with a private fleet of trucks, tankers and trailers that expands our geographic coverage and enhances our service capabilities. At our largest integrated product sites, our deep-water access enables us to reach global markets.

Our Chlor Alkali Products and Vinyls segment maintains strong relationships with Dow as both a customer and supplier. These relationships are maintained through long-term cost based contracts that provide us with a reliable supply of key raw materials and predictable and consistent demand for our end use products. Key products sold to Dow include chlorine, caustic soda, chlorinated organics and VCM. Key raw materials received from Dow include ethylene and electricity. Ethylene is supplied for the vinyls business under a long-term supply arrangement with Dow whereby we receive ethylene at integrated producer economics.

Electricity, salt, ethylene and methanol are the major purchased raw materials for our Chlor Alkali Products and Vinyls segment. Electricity is the single largest raw material component in the production of Chlor Alkali Products and Vinyls' products. Approximately 74% of our electricity is generated from natural gas or hydroelectric sources. Approximately 66% of our salt requirements are met by internal supply. Methanol is sourced domestically and internationally primarily from large producers. The high volume nature of the chlor alkali industry places an emphasis on cost management and we believe that our scale, integration and raw material positions make us one of the low cost producers in the industry.

The following table lists principal products and services of our Chlor Alkali Products and Vinyls segment.

<i>Products & Services</i>	<i>Major End Uses</i>	<i>Plants & Facilities</i>	<i>Major Raw Materials & Components for Products/ Services</i>
Chlorine/caustic soda	Pulp & paper processing, chemical manufacturing, water purification, vinyl chloride manufacturing, bleach, swimming pool chemicals and urethane chemicals	Becancour, Canada Charleston, TN Freeport, TX McIntosh, AL Niagara Falls, NY Plaquemine, LA St. Gabriel, LA	salt, electricity
Ethylene dichloride/vinyl chloride monomer	Precursor to polyvinyl chloride used in vinyl siding, plumbing and automotive parts	Freeport, TX Plaquemine, LA	chlorine, ethylene, ethylene dichloride
Chlorinated organics intermediates	Used as feedstocks in the production of fluoropolymers, fluorocarbon refrigerants and blowing agents, silicones, cellulose and agricultural chemicals	Freeport, TX Plaquemine, LA Stade, Germany	chlorine, ethylene dichloride, hydrochloric acid, methanol, RCl's
Chlorinated organics solvents	Surface preparation, dry cleaning and pharmaceuticals	Freeport, TX Plaquemine, LA Stade, Germany	chlorine, ethylene dichloride, hydrochloric acid, RCl's
Sodium hypochlorite (bleach)	Household cleaners, laundry bleaching, swimming pool sanitizers, semiconductors, water treatment, textiles, pulp & paper and food processing	Augusta, GA Becancour, Canada Charleston, TN Freeport, TX Henderson, NV Lemont, IL McIntosh, AL* Niagara Falls, NY* Santa Fe Springs, CA Tracy, CA	caustic soda, chlorine
Hydrochloric acid	Steel, oil & gas, plastics, organic chemical synthesis, water & wastewater treatment, brine treatment, artificial sweeteners, pharmaceuticals, food processing and ore & mineral processing	Becancour, Canada Charleston, TN Freeport, TX McIntosh, AL Niagara Falls, NY	chlorine, hydrogen
Potassium hydroxide	Fertilizer manufacturing, soaps, detergents & cleaners, battery manufacturing, food processing chemicals and deicers	Charleston, TN	electricity, potassium chloride
Hydrogen	Fuel source, hydrogen peroxide and hydrochloric acid	Becancour, Canada Charleston, TN Freeport, TX McIntosh, AL Niagara Falls, NY Plaquemine, LA St. Gabriel, LA	electricity, salt

* Includes low salt, high strength bleach manufacturing.

Strategies

Strengthen Our Role as Preferred Supplier in North America. Take maximum advantage of our world-scale integrated facilities on the U.S. Gulf Coast, our geographically-advantaged plants across North America and our extensive logistics and terminal network to provide a reliable and preferred supply position to our North American customers.

Capitalize on Our Low Cost Position. Our advantaged cost position is derived from low cost energy, scale, integration, and deep-water ports. We expect to maximize our low cost position to ship our products to customers worldwide.

Optimize the Breadth of Products and Pursue Incremental Expansion Opportunities. Fully utilize the portfolio of co-products and integrated derivatives to continually upgrade chlorine and caustic soda to the highest value applications and provide expansion opportunities.

Epoxy

Products and Services

The Epoxy business was one of the first major manufacturers of epoxy products, and has continued to build on more than half a century of history through product innovation and technical excellence. According to data from IHS, the Epoxy segment is one of the largest fully integrated global producers of epoxy resins, curing agents and intermediates. The Epoxy segment has a favorable manufacturing cost position which is driven by a combination of scale and integration into low cost feedstocks (including chlorine, caustic soda, allylics and aromatics). With its advantaged cost position, the Epoxy segment is among the lowest cost producers in the world. The Epoxy segment produces and sells a full range of epoxy materials, including upstream products such as allyl chloride (Allyl) and epichlorohydrin (EPI), midstream products such as liquid epoxy resins (LER) and solid epoxy resins (SER) and downstream products such as differentiated epoxy resins and additives.

The Epoxy segment serves a diverse array of applications, including wind energy, electrical laminates, consumer goods and composites, as well as numerous applications in civil engineering and protective coatings. The Epoxy segment has important relationships with established customers, some of which span decades. The Epoxy segment's primary geographies are North America and Western Europe. The segment's product is delivered primarily by marine vessel, deep-water and coastal barge, railcar and truck.

Allyl is used not only as a feedstock in the production of EPI, but also as a chemical intermediate in multiple industries and applications, including water purification chemicals. EPI is primarily produced as a feedstock for use in the business's epoxy resins, and also sold to epoxy producers globally who produce their own resins for end use segments such as coatings and adhesives. LER is manufactured in liquid form and cures with the addition of a hardener into a thermoset solid material offering a distinct combination of strength, adhesion and chemical resistance that is well-suited to coatings and composites applications. SER is processed further with bisphenol (BisA) to meet specific end market applications. While LER and SER are sold externally, a significant portion of LER production is further converted into differentiated epoxy resins where value-added modifications produce higher margin resins.

Our Epoxy segment maintains strong relationships with Dow as both a customer and supplier. These relationships are maintained through long-term cost based contracts that provide us with a reliable supply of key raw materials. Key products sold to Dow include aromatics and key raw materials received from Dow include benzene and propylene.

The Epoxy segment's production economics benefit from its integration into chlor alkali and aromatics which are key inputs in epoxy production. This fully integrated structure provides both access to low cost materials and significant operational flexibility. The Epoxy segment operates an integrated aromatics production chain producing cumene, phenol, acetone and BisA for internal consumption and external sale. The Epoxy segment's consumption of chlorine enables the Chlor Alkali Products and Vinyls segment to generate caustic soda production and sales. Chlorine used in our Epoxy segment is transferred at cost from the Chlor Alkali Products and Vinyls segment.

The following table lists principal products and services of our Epoxy segment.

<i>Products & Services</i>	<i>Major End Uses</i>	<i>Plants & Facilities</i>	<i>Major Raw Materials & Components for Products/Services</i>
Allylics (allyl chloride and epichlorohydrin) & aromatics (acetone, bisphenol, cumene and phenol)	Manufacturers of polymers, resins and other plastic materials, water purification, and pesticides	Freeport, TX Stade, Germany Terneuzen, Netherlands	benzene, caustic soda, chlorine, propylene
Liquid epoxy resin/solid epoxy resin	Adhesives, paint and coatings, composites and flooring	Freeport, TX Guaruja, Brazil Stade, Germany	bisphenol, caustic soda, epichlorohydrin
Differentiated epoxy resins	Electrical laminates, paint and coatings, wind blades, electronics and construction	Baltringen, Germany Freeport, TX Guaruja, Brazil Gumi, South Korea Pisticci, Italy Rheinmunster, Germany Roberta, GA Stade, Germany Zhangjiagang, China	liquid epoxy resins, solid epoxy resins

Strategies

Continue to Focus on Capturing the Full Value of Our Asset Base. The Epoxy segment continues to focus on fully utilizing our integrated asset base. We expect to optimize our production capabilities allowing us to more fully benefit from our access to low cost materials and significant operational flexibility.

Focus on Upgrading Our Sales Portfolio and Product Mix. The Epoxy segment will focus on improving product mix to drive more value-added product introductions and modifications that produce higher margin sales. This leverages our leading technology and quality positions.

Drive Productivity to Sustain Our Cost Advantage. The Epoxy segment continues to drive productivity cost improvements through the entire supply chain, enhancing reliability and delivering yield improvements.

Winchester

Products and Services

In 2020, Winchester is in its 154th year of operation and its 90th year as part of Olin. Winchester is a premier developer and manufacturer of small caliber ammunition for sale to domestic and international retailers (commercial customers), law enforcement agencies and domestic and international militaries. We believe we are a leading U.S. producer of ammunition for recreational shooters, hunters, law enforcement agencies and the U.S. Armed Forces. Winchester also manufactures industrial products that have various applications in the construction industry.

On September 27, 2019, Winchester was notified that it had been selected by the United States Army to operate and manage the Lake City Army Ammunition Plant (Lake City Plant) in Independence, MO. Following a one-year transition period, Winchester will assume full operational control of the Lake City Plant on October 1, 2020. The contract has an initial term of seven years and may be extended by the United States Army for up to three additional years. The contract is expected to increase Winchester’s annual revenue by \$450 million to \$550 million.

In September 2019, U.S. Customs and Border Protection, Department of Homeland Security awarded Winchester a \$10 million, one-year sole source contract for 9mm handgun duty ammunition.

In April 2019, Winchester was awarded a \$5 million, four-year contract from the U.S. Secret Service for 5.56mm rifle training ammunition.

In March 2019, the Canadian Border Services Agency awarded Winchester a \$5 million, four-year contract for 9mm handgun training ammunition.

In September 2018, the U.S. Immigration and Customs Enforcement, Department of Homeland Security awarded Winchester a \$12 million, five-year contract for 9mm “Readily Identifiable Training Ammunition.”

In April 2018, Winchester was awarded a \$5 million, five-year contract from the Federal Bureau of Investigation for 9mm duty and frangible training ammunition.

In May 2017, Winchester was awarded, along with one other company, a shared contract to provide small caliber ammunition non-recurring engineering services for the U.S. Army. The contract has the potential to generate approximately \$65 million of sales over the five-year contract.

In January 2017, SIG Sauer, Inc. was awarded a \$580 million, ten-year contract for the modular handgun system pistol contract by the U.S. Army. Winchester will supply the pistol ammunition as a subcontractor to SIG Sauer, Inc.

Our legendary Winchester® product line includes all major gauges and calibers of shotgun shells, rimfire and centerfire ammunition for pistols and rifles, reloading components and industrial cartridges. We believe we are a leading U.S. supplier of small caliber commercial ammunition.

Winchester has strong relationships throughout the sales and distribution chain and strong ties to traditional dealers and distributors. Winchester has also built its business with key high-volume mass merchants and specialty sporting goods retailers. Winchester has consistently developed industry-leading ammunition, which is recognized in the industry for manufacturing excellence, design innovation and consumer value. Winchester’s new ammunition products continue to receive awards from major industry publications and organizations, with recent awards including: *National Association of Sporting Goods Wholesalers* in partnership with the *Professional Outdoor Media Association’s* Caliber Award for “Best New Ammunition” in 2019; *American Hunter* magazine’s Golden Bullseye Award as “Ammunition Product of the Year” in 2018; *Guns & Ammo* magazine’s “Ammunition of the Year” award in 2019 and 2017; and *American Rifleman* magazine’s Golden Bullseye Award as “Ammunition Product of the Year” in 2017.

Winchester purchases raw materials such as copper-based strip and ammunition cartridge case cups and lead from vendors based on a conversion charge or premium. These conversion charges or premiums are in addition to the market prices for metal as posted on exchanges such as the Commodity Exchange, or COMEX, and London Metals Exchange, or LME. Winchester’s other main raw material is propellant, which is purchased predominantly from one of the U.S.’s largest propellant suppliers.

The following table lists principal products and services of our Winchester segment.

<i>Products & Services</i>	<i>Major End Uses</i>	<i>Plants & Facilities</i>	<i>Major Raw Materials & Components for Products/Services</i>
Winchester® sporting ammunition (shotshells, small caliber centerfire & rimfire ammunition)	Hunters & recreational shooters, law enforcement agencies	East Alton, IL Oxford, MS	brass, lead, steel, plastic, propellant, explosives
Small caliber military ammunition	Infantry and mounted weapons	East Alton, IL Oxford, MS	brass, lead, propellant, explosives
Industrial products (8 gauge loads & powder-actuated tool loads)	Maintenance applications in power & concrete industries, powder-actuated tools in construction industry	East Alton, IL Oxford, MS	brass, lead, plastic, propellant, explosives

Strategies

Maximize Existing Strengths. Winchester plans to seek new opportunities to fully utilize the legendary Winchester brand name and will continue to offer a full line of ammunition products to the markets we serve, with specific focus on investments that make Winchester ammunition the retail brand of choice.

Focus on Product Line Growth. With a long record of pioneering new product offerings, Winchester has built a strong reputation as an industry innovator. This includes the introduction of reduced-lead and non-lead products, which are growing in popularity for use in indoor shooting ranges and for outdoor hunting.

Cost Reduction Strategy. Winchester plans to continue to focus on strategies that will lower our costs. During 2018, we initiated a cost reduction plan which has permanently closed the ammunition assembly operations at our Winchester facility in Geelong, Australia. Subsequent to the facility's closure, product for customers in the region are sourced from Winchester manufacturing facilities located in the United States.

INTERNATIONAL OPERATIONS

Olin has an international presence, including the geographic regions of Europe, Asia Pacific and Latin America. Approximately 41% of Olin's 2019 sales were generated outside of the U.S., including 32% of our Chlor Alkali Products and Vinyls 2019 segment sales, 67% of our Epoxy 2019 segment sales and 9% of our Winchester 2019 segment sales. See Note 21 "Segment Information" of the notes to consolidated financial statements contained in Item 8, for geographic segment data. We are incorporating our segment information from that Note into this section of our Form 10-K.

CUSTOMERS AND DISTRIBUTION

Products we sell to industrial or commercial users or distributors for use in the production of other products constitute a major part of our total sales. We sell some of our products, such as epoxy resins, caustic soda and sporting ammunition, to a large number of users or distributors, while we sell other products, such as chlorine and chlorinated organics, in substantial quantities to a relatively small number of industrial users. Olin has significant relationships with a few customers including Dow, who was our largest customer by revenue in 2019, representing approximately 15% of our total sales. We expect this relationship to continue to be significant to Olin and to represent more than 10% of our annual sales in the future. No other single customer accounted for more than 5% of sales. We discuss the customers for each of our three business segments in more detail above under "Products and Services."

We market most of our products and services primarily through our sales force and sell directly to various industrial customers, mass merchants, retailers, wholesalers, other distributors and the U.S. Government and its prime contractors.

Sales to all U.S. Government agencies and sales under U.S. Government contracting activities in total accounted for approximately 3% of sales in 2019. Because we engage in some government contracting activities and make sales to the U.S. Government, we are subject to extensive and complex U.S. Government procurement laws and regulations. These laws and regulations provide for ongoing government audits and reviews of contract procurement, performance and administration. Failure to comply, even inadvertently, with these laws and regulations and with laws governing the export of munitions and other controlled products and commodities could subject us or one or more of our businesses to civil and criminal penalties, and under certain circumstances, suspension and debarment from future government contracts and the exporting of products for a specified period of time.

BACKLOG

The total amount of estimated backlog was approximately \$151 million and \$224 million as of January 31, 2020 and 2019, respectively. The backlog orders are associated with contractual orders in our Winchester business. Backlogs in our other businesses are not significant. Backlog is comprised of all open customer orders which have been received, but not yet shipped. The backlog was estimated based on expected volume to be shipped from firm contractual orders, which are subject to customary terms and conditions, including cancellation and modification provisions. Approximately 96% of contracted backlog as of January 31, 2020 is expected to be fulfilled during 2020, with the remainder expected to be fulfilled during 2021.

COMPETITION

We are in active competition with businesses producing or distributing the same or similar products, as well as, in some instances, with businesses producing or distributing different products designed for the same uses.

Chlor alkali manufacturers in North America, with approximately 17 million tons of chlorine and 18 million tons of caustic soda capacity, accounted for approximately 17% of worldwide chlor alkali production capacity. In 2019, according to IHS, we have the largest chlor alkali capacity in North America and globally. While the technologies to manufacture and transport chlorine and caustic soda are widely available, the production facilities require large capital investments, and are

subject to significant regulatory and permitting requirements. Approximately 76% of the total North American chlor alkali capacity is located in the U.S. Gulf Coast region. There is a worldwide market for caustic soda, which attracts imports and allows exports depending on market conditions. Other large chlor alkali producers in North America include The Occidental Petroleum Corporation (Oxy) and Westlake Chemical Corporation (Westlake).

We are also a leading integrated global producer of chlorinated organic products with a strong cost position due to our scale and access to chlor alkali feedstocks. This industry includes large diversified producers such as Oxy, Westlake and Solvay S.A., as well as multiple producers located in China.

We are a major global fully integrated epoxy producer, with access to key low cost feedstocks and a cost advantaged infrastructure. With its advantaged cost position, the Epoxy segment is among the lowest cost producers in the world. The markets in which our Epoxy segment operates are highly competitive and are dependent on significant capital investment, the development of proprietary technology and maintenance of product research and development. Among our competitors are Huntsman Corporation (Huntsman) and Hexion, Inc., as well as multiple producers located in Asia.

We are among the largest manufacturers in the U.S. of commercial small caliber ammunition based on independent market research sponsored by the National Shooting Sports Foundation (NSSF). Formed in 1961, NSSF has a membership of more than 12,000 manufacturers, distributors, firearms retailers, shooting ranges, sportsmen's organizations and publishers. According to NSSF-sponsored research, our Winchester business, Vista Outdoor Inc. (Vista), and Remington Outdoor Company, Inc. (Remington) are the three largest commercial ammunition manufacturers in the U.S. The ammunition industry is highly competitive with Olin, Vista, Remington, numerous smaller domestic manufacturers and foreign producers competing for sales to the commercial ammunition customers. Many factors influence our ability to compete successfully, including price, delivery, service, performance, product innovation and product recognition and quality, depending on the product involved.

EMPLOYEES

As of December 31, 2019, we had approximately 6,500 employees, with 5,300 working in the U.S. and 1,200 working in foreign countries. Various labor unions represent a significant number of our hourly-paid employees for collective bargaining purposes.

The following labor contract will be required to be negotiated in 2020:

<i>Location</i>	<i>Number of Employees</i>	<i>Expiration Date</i>
Lake City Army Ammunition Plant (Winchester)	1,447*	October 2020

*Lake City Plant personnel are not employees of Olin as of December 31, 2019.

While we believe our relations with our employees and their various representatives are generally satisfactory, we cannot assure that we can conclude this labor contract or any other labor agreements without work stoppages and cannot assure that any work stoppages will not have a material adverse effect on our business, financial condition or results of operations.

RESEARCH ACTIVITIES; PATENTS

Our research activities are conducted on a product-group basis at a number of facilities. Company-sponsored research expenditures were \$16.5 million in 2019, \$14.9 million in 2018 and \$14.5 million in 2017.

We own or license a number of patents, patent applications and trade secrets covering our products and processes. We believe that, in the aggregate, the rights under our patents and licenses are important to our operations, but we do not consider any individual patent, license or group of patents and licenses related to a specific process or product to be of material importance to our total business.

SEASONALITY

Our sales are affected by the cyclicity of the economy and the seasonality of several industries we serve, including building and construction, coatings, infrastructure, electronics, automotive, bleach, refrigerants and ammunition. The seasonality of the ammunition business is typically driven by the U.S. fall hunting season. Our chlor alkali businesses generally experience their highest level of activity during the spring and summer months, particularly when construction, refrigerants, coatings and infrastructure activity is higher. The chlor alkali industry is cyclical, both as a result of changes in demand for each of the co-produced products and as a result of the large increments in which new capacity is added and

removed. Because chlorine and caustic soda are produced in a fixed ratio, the supply of one product can be constrained both by the physical capacity of the production facilities and/or by the ability to sell the co-produced product. Prices for both products respond rapidly to changes in supply and demand. The cyclical nature of the chlor alkali industry has further impacts on downstream products. We have significant diversification of our chlorine outlets, which allow us to better manage the cyclical nature of the industry.

RAW MATERIALS AND ENERGY

Basic raw materials are processed through an integrated manufacturing process to produce a number of products that are sold at various points throughout the process. We purchase a portion of our raw material requirements and also utilize internal resources, co-products and finished goods as raw materials for downstream products. We believe we have reliable sources of supply for our raw materials under normal market conditions. However, we cannot predict the likelihood or impact of any future raw material shortages.

The principal basic raw materials for our production of Chlor Alkali Products and Vinyls' products are electricity, salt, ethylene and methanol. Electricity is the predominant energy source for our manufacturing facilities. Approximately 74% of our electricity is generated from natural gas or hydroelectric sources. We have long-term power supply contracts with Dow in addition to utilizing our own power assets, which allow for cost differentiation at specific U.S. manufacturing sites. A portion of our purchases of raw materials, including ethylene, are made under long-term supply agreements, while approximately 66% of the salt used in our Chlor Alkali Products and Vinyls segment is produced from internal resources. Methanol is sourced domestically and internationally primarily from large producers.

The Epoxy segment's principal raw materials are chlorine, benzene, propylene and aromatics, which consist of cumene, phenol, acetone and BisA. A portion of our purchases of raw materials, including benzene, propylene and a portion of our aromatics requirements, are made under long-term supply agreements, while a portion of our aromatics requirements are produced from our integrated production chain. Chlorine is predominately sourced from our Chlor Alkali Products and Vinyls segment.

Lead, brass and propellant are the principal raw materials used in the Winchester business. We typically purchase our ammunition cartridge case cups and copper-based strip, and propellants pursuant to multi-year contracts.

We provide additional information with respect to specific raw materials in the tables set forth under "Products and Services."

ENVIRONMENTAL AND TOXIC SUBSTANCES CONTROLS

As is common in our industry, we are subject to environmental laws and regulations related to the use, storage, handling, generation, transportation, emission, discharge, disposal and remediation of, and exposure to, hazardous and non-hazardous substances and wastes in all of the countries in which we do business.

The establishment and implementation of national, state or provincial and local standards to regulate air, water and land quality affect substantially all of our manufacturing locations around the world. Laws providing for regulation of the manufacture, transportation, use and disposal of hazardous and toxic substances, and remediation of contaminated sites have imposed additional regulatory requirements on industry, particularly the chemicals industry. In addition, implementation of environmental laws has required and will continue to require new capital expenditures and will increase operating costs.

We are a party to various government and private environmental actions associated with former waste disposal sites and past manufacturing facilities. Charges to income for investigatory and remedial efforts were \$25.3 million, \$7.3 million and \$10.3 million for the years ended December 31, 2019, 2018 and 2017, respectively. These charges may be material to operating results in future years. These charges do not include insurance recoveries for costs incurred and expensed in prior periods.

In connection with the October 5, 2015 acquisition of Dow's U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities relating to releases of hazardous materials and violations of environmental law to the extent arising prior to October 5, 2015.

See our discussion of our environmental matters contained in Item 3—"Legal Proceedings" below, Note 22 "Environmental" of the notes to consolidated financial statements contained in Item 8 and Item 7—"Management's Discussion and Analysis of Financial Condition and Results of Operations."

CORPORATE RESPONSIBILITY

At Olin, we are committed to corporate responsibility to ensure the long-term success of our business, our collective global society and the well-being of our environment. We focus our corporate responsibility efforts on the areas of: (1) environment, health, safety and security, (2) sustainability and responsibility and (3) product responsibility. We value collaboration and commit to working with other organizations to encourage collective action for improving corporate responsibility. Additional information related to our corporate responsibility initiatives, practices, activities, goals and related information, as well as future updates, can be found in the Corporate Responsibility section of our website at www.olin.com.

Environment, Health, Safety and Security

Olin is strongly committed to excellence in protecting the environment, health, safety and security of our employees and those who live and work around our plants. Our operations worldwide comply with all local requirements and implement other standards as required to protect the environment, health, safety and security of our operations. We are committed to the guiding principles of the chemical industry's Responsible Care® initiative around the globe to drive continuous improvement and achieve excellence in environmental, health, safety and security performance. Our safety, health and environmental strategy and goals are designed to sustain our drive to zero incidents. Relentlessly and responsibly, we constantly emphasize the importance of monitoring the safety, security and environmental impact of our plants. Through our day-to-day vigilance, Olin strives to continue to be recognized as one of the industry's best performers.

Our corporate values of Integrity, Helping Customers Succeed, Continuous Improvement and our People are part of our culture. These values are also reflected in our Environment, Health, Safety and Security (EHS&S) policy and practice. Olin leadership visibly performs and guides the organization to conduct business in a manner that protects and increasingly benefits our employees, business partners and the communities in which we live. All employees have responsibilities within our management systems necessary to sustain our drive to zero incidents. Full year 2019 was the second consecutive year that Olin achieved a decline for total safety and environmental events, which includes reportable injuries, process safety events, environmental events, and distribution events. We also experienced a decline for the third consecutive year for recordable injuries and the third consecutive year with zero severity safety events.

Sustainability and Responsibility

We strongly believe in meeting the needs of the present without compromising the needs of future generations. We recognize the impact our company has on our natural resources and are committed to the guiding principles of Responsible Care®. This also means striving for a company culture responsible to the ongoing economic goals of our employees and shareholders.

At Olin, we integrate sustainability in everything we do as a Responsible Corporate Citizen. We value and respect our people, the communities in which we operate, our customers and the environment. We commit to making a contribution to the protection of the world and its future condition through the safety and efficiency of our business practices - from supply to manufacture to delivery and ultimately the end-use of our products. Our focus on continuous improvement throughout our history drives our business. Focused on four sustainability pillars, we are challenging ourselves to advance those opportunities where our impact on the planet, our operations and our people and communities is most meaningful:

Energy and Climate Mindfulness

Olin systematically and strategically manages our energy and carbon footprint, driving greater efficiency and increasing utilization of renewable resources.

Resource Efficiency

Olin effectively manages critical resources to minimize consumption and waste, increase reuse and recycle of materials and drive operations efficiency.

Product Sustainability and Commercial Outreach

Olin's products and processes contribute to sustainable opportunities and innovation, enabling safe handling and distribution throughout the supply chain.

Employee and Community Care

Olin provides equal opportunities to employees and ensures the ongoing safety and livelihood of our people and communities.

We have developed a strategy and global initiative to track our greenhouse gas (GHG) emissions, water usage, waste disposal and energy consumption and efficiency at our facilities. We are committed to improving our use of resources, acting on opportunities to reduce our environmental footprint and setting targets for improvement. We understand that maintaining safe, sustainable operations has an impact on us, our communities, the environment and our collective future. We continue to invest to develop safer, cleaner and more efficient products and processes.

Product Responsibility

We take great pride in distributing and handling our products safely and enabling our customers to do the same. Our product stewardship and quality practices are aligned with our core values, the American Chemistry Council's Product Safety Code under Responsible Care®, and other globally recognized standards. We apply these standards to our chemical business segments and relevant subsidiaries to ensure compliance with applicable global regulations, evaluation, continuous improvement and transparency of relevant production information. Additionally, Winchester ammunition is designed and manufactured in accordance with the voluntary industry standards published by the Sporting Arms and Ammunition Manufacturers' Institute. We are deeply committed to ammunition education and advocate strongly for the belief that it is important to take the necessary steps to be trained and educated when handling and using a firearm for recreational purposes, both for experienced and novice participants. Our goal is to meet or exceed guidelines in every instance. Olin Leadership demonstrates its commitment to these standards through active participation and communication concerning product safety, within our organization and to external stakeholders.

Item 1A. RISK FACTORS

In addition to the other information in this Form 10-K, the following factors should be considered in evaluating Olin and our business. All of our forward-looking statements should be considered in light of these factors. Additional risks and uncertainties that we are unaware of or that we currently deem immaterial also may become important factors that affect us.

Sensitivity to Global Economic Conditions and Cyclicity—Our operating results could be negatively affected during economic and industry downturns.

The businesses of most of our customers, particularly our vinyls, urethanes and pulp and paper customers are, to varying degrees, cyclical and have historically experienced periodic downturns. These economic and industry downturns have been characterized by diminished product demand, excess manufacturing capacity and, in some cases, lower average selling prices. Therefore, any significant downturn in our customers' businesses or in global economic conditions could result in a reduction in demand for our products and could adversely affect our results of operations or financial condition.

Although a majority of our sales are within North America, a large part of our financial performance is dependent upon a healthy economy beyond North America because we have a significant amount of sales abroad and our customers sell their products abroad. As a result, our business is and will continue to be affected by general economic conditions and other factors in Europe, Asia Pacific, particularly China, and Latin America, including fluctuations in interest rates, customer demand, labor and energy costs, currency changes and other factors beyond our control, such as public health epidemics. The demand for our products and our customers' products is directly affected by such fluctuations. In addition, our customers could decide to move some or all of their production to locations that are more remote from our facilities, and this could reduce demand for our products. We cannot assure you that events having an adverse effect on the industries in which we operate will not occur or continue, such as a downturn in the European, Asian Pacific, particularly Chinese, Latin American, or world economies, increases in interest rates or unfavorable currency fluctuations. Economic conditions in other regions of the world, predominantly Asia and Europe, can increase the amount of caustic soda produced and available for export to North America. The increased caustic soda supply can put downward pressure on our caustic soda prices, negatively impacting our profitability.

Cyclical Pricing Pressure—Our profitability could be reduced by declines in average selling prices of our products, particularly chlorine and caustic soda.

Our historical operating results reflect the cyclical and sometimes volatile nature of the chemical and ammunition industries. We experience cycles of fluctuating supply and demand in each of our business segments, particularly in our Chlor Alkali Products and Vinyls segment, which result in changes in selling prices. Periods of high demand, tight supply and increasing operating margins tend to result in increases in capacity and production until supply exceeds demand, generally followed by periods of oversupply and declining prices. Another factor influencing demand and pricing for chlorine and caustic soda is the price of natural gas. Higher natural gas prices increase our customers' and competitors' manufacturing costs, and depending on the ratio of crude oil to natural gas prices, could make them less competitive in world markets.

In the chlor alkali industry, price is the major supplier selection criterion. We have little or no ability to influence prices in these large commodity markets. Decreases in the average selling prices of our products could have a material adverse effect on our profitability. While we strive to maintain or increase our profitability by reducing costs through improving production efficiency, emphasizing higher margin products and by controlling transportation, selling and administration expenses, we cannot assure you that these efforts will be sufficient to fully offset the effect of possible decreases in pricing on operating results.

Because of the cyclical nature of our businesses, we cannot assure you that pricing or profitability in the future will be comparable to any particular historical period, including the most recent period shown in our operating results. We cannot assure you that the chlor alkali industry will not experience adverse trends in the future, or that our business, financial condition and results of operations will not be adversely affected by them.

Our Winchester and Epoxy segments are also subject to changes in operating results as a result of cyclical pricing pressures, but to a lesser extent than our Chlor Alkali Products and Vinyls segment. Selling prices of ammunition and epoxy materials are affected by changes in raw material costs and availability, customer demand, industry production capacity and declines in average selling prices of products of our Winchester and Epoxy segments could adversely affect our profitability.

Suppliers—We rely on a limited number of third-party suppliers for specified feedstocks and services.

We obtain a significant portion of our raw materials from a few key suppliers. If any of these suppliers fail to meet their obligations under present or any future supply agreements, we may be forced to pay higher prices or incur higher costs to obtain the necessary raw materials. Any interruption of supply or any price increase of raw materials could have a material adverse effect on our business, financial condition and results of operations. We have entered into long-term agreements with Dow to provide specified feedstocks and services for a number of our facilities. These facilities are dependent upon Dow's infrastructure for services such as wastewater and ground water treatment. Any failure of Dow to perform its obligations under those agreements could adversely affect the operation of the affected facilities and our business, financial condition and results of operations. Most of these agreements are automatically renewable after their initial terms, but may be terminated by us or Dow after specified notice periods. If we are required to obtain an alternate source for these feedstocks or services, we may not be able to obtain pricing on as favorable terms. Additionally, we may be forced to pay additional transportation costs or to invest in capital projects for pipelines or alternate facilities to accommodate railcar or other delivery methods or to replace other services.

A vendor may choose, subject to existing contracts, to modify its relationship due to general economic concerns or concerns relating to the vendor or us, at any time. Any significant change in the terms that we have with our key suppliers could materially and adversely affect our business, financial condition and results of operations, as could significant additional requirements from suppliers that we provide them additional security in the form of prepayments or posting letters of credit.

Raw Materials—Availability of purchased feedstocks and energy, and the volatility of these costs, impact our operating costs and add variability to earnings.

Purchased feedstock and energy costs account for a substantial portion of our total production costs and operating expenses. We purchase certain raw materials as feedstocks.

Feedstock and energy costs generally follow price trends in crude oil and natural gas, which are sometimes volatile. Ultimately, the ability to pass on underlying cost increases in a timely manner or at all is dependent on market conditions. Conversely, when feedstock and energy costs decline, selling prices generally decline as well. As a result, volatility in these costs could impact our business, financial condition and results of operations.

If the availability of any of our principal feedstocks is limited or we are unable to obtain natural gas or energy from any of our energy sources, we may be unable to produce some of our products in the quantities demanded by our customers, which could have a material adverse effect on plant utilization and our sales of products requiring such raw materials. We have long-term supply contracts with various third parties for certain raw materials, including ethylene, electricity, propylene and benzene. As these contracts expire, we may be unable to renew these contracts or obtain new long-term supply agreements on terms comparable or as favorable to us, depending on market conditions, which may have a material adverse effect on our business, financial condition and results of operations. In addition, many of our long-term contracts contain provisions that allow our suppliers to limit the amount of raw materials shipped to us below the contracted amount in force majeure or similar circumstances. If we are required to obtain alternate sources for raw materials because our suppliers are unwilling or unable to perform under raw material supply agreements or if a supplier terminates its agreements with us, we may not be able to obtain these raw materials from alternative suppliers or obtain new long-term supply agreements on terms comparable or as favorable to us.

Cost Control—Our profitability could be reduced if we experience increasing raw material, utility, transportation or logistics costs, or if we fail to achieve targeted cost reductions.

Our operating results and profitability are dependent upon our continued ability to control, and in some cases reduce, our costs. If we are unable to do so, or if costs outside of our control, particularly our costs of raw materials, utilities, transportation and similar costs, increase beyond anticipated levels, our profitability will decline.

For example, if our feedstock and energy costs increase, and we are unable to control those costs or pass the increased costs on to customers, our profitability in our Chlor Alkali Products and Vinyls and Epoxy segments would be negatively affected. Similarly, costs of commodity metals and other materials used in our Winchester business, such as copper and lead, can vary. If we experience significant increases in these costs and are unable to raise our prices to offset the higher costs, the profitability in our Winchester business would be negatively affected.

Third-Party Transportation—We rely heavily on third-party transportation, which subjects us to risks and costs that we cannot control, and which risks and costs may have a material adverse effect on our financial position or results of operations.

We rely heavily on railroad, truck, marine vessel, barge and other shipping companies to transport finished products to customers and to transport raw materials to the manufacturing facilities used by each of our businesses. These transport operations are subject to various hazards and risks, including extreme weather conditions, work stoppages and operating hazards, as well as domestic and international transportation and maritime regulations. In addition, the methods of transportation we utilize, including shipping chlorine and other chemicals by railroad and by barge, may be subject to additional, more stringent and more costly regulations in the future. If we are delayed or unable to ship finished products or unable to obtain raw materials as a result of any such new or modified regulations or public policy changes related to transportation safety, or these transportation companies' failure to operate properly, or if there are significant changes in the cost of these services due to new additional regulations, or otherwise, we may not be able to arrange efficient alternatives and timely means to obtain raw materials or ship goods, which could result in a material adverse effect on our business, financial position or results of operations. If any third-party railroad that we utilize to transport chlorine and other chemicals ceases to transport certain hazardous materials, or if there are significant changes in the cost of shipping hazardous materials by rail or otherwise, we may not be able to arrange efficient alternatives and timely means to deliver our products or at all, which could result in a material adverse effect on our business, financial position or results of operations.

Security and Chemicals Transportation—New regulations on the transportation of hazardous chemicals and/or the security of chemical manufacturing facilities and public policy changes related to transportation safety could result in significantly higher operating costs.

The transportation of our products and feedstocks, including transportation by pipeline, and the security of our chemical manufacturing facilities are subject to extensive regulation. Government authorities at the local, state and federal levels could implement new or stricter regulations that would impact the security of chemical plant locations and the transportation of hazardous chemicals. Our Chlor Alkali Products and Vinyls and Epoxy segments could be adversely impacted by the cost of complying with any new regulations. Our business also could be adversely affected if an incident were to occur at one of our facilities or while transporting products. The extent of the impact would depend on the requirements of future regulations and the nature of an incident, which are unknown at this time.

Production Hazards—Our facilities are subject to operating hazards, which may disrupt our business.

We are dependent upon the continued safe and reliable operation of our production facilities. Our production facilities are subject to hazards associated with the manufacture, handling, storage and transportation of chemical materials and products and ammunition, including leaks and ruptures, explosions, fires, inclement weather and natural disasters, unexpected utility disruptions or outages, unscheduled downtime, equipment failure, terrorism, transportation interruptions, transportation accidents involving our chemical products, chemical spills and other discharges or releases of toxic or hazardous substances or gases and environmental hazards. Due to the integrated nature of our large chemical sites, an incident at one plant could impact production across multiple plants at a facility. From time to time in the past, we have had incidents that have temporarily shut down or otherwise disrupted our manufacturing, causing production delays and resulting in liability for workplace injuries and fatalities. Some of our products involve the manufacture and/or handling of a variety of explosive and flammable materials. Use of these products by our customers could also result in liability if an explosion, fire, spill or other accident were to occur. We cannot assure you that we will not experience these types of incidents in the future or that these incidents will not result in production delays or otherwise have a material adverse effect on our business, financial condition or results of operations. Major hurricanes have caused significant disruption in our operations on the U.S. Gulf Coast, logistics across the region and the supply of certain raw materials, which have had an adverse impact on volume and cost for some of our products. Due to the substantial presence we have on the U.S. Gulf Coast, similar severe weather conditions or other natural phenomena in the future could negatively affect our results of operations, for which we may not be fully insured.

Credit Facility—Weak industry conditions could affect our ability to comply with the financial maintenance covenants in our senior credit facility.

Our senior credit facility includes certain financial maintenance covenants requiring us to not exceed a maximum leverage ratio and to maintain a minimum coverage ratio.

Depending on the magnitude and duration of economic or industry downturns affecting our businesses, including deterioration in prices and volumes, there can be no assurance that we will continue to be in compliance with these ratios. If we failed to comply with either of these covenants in a future period and were not able to obtain waivers from the lenders, we would need to refinance our current senior credit facility. However, there can be no assurance that such refinancing would be available to us on terms that would be acceptable to us or at all.

Information Security—A failure of our information technology systems, or an interruption in their operation due to internal or external factors including cyber-attacks, could have a material adverse effect on our business, financial condition or results of operations.

Our operations are dependent on our ability to protect our information systems, computer equipment and information databases from systems failures. We rely on both internal information technology systems and certain external services and service providers to manage the day-to-day operation of our business, operate elements of our manufacturing facilities, manage relationships with our employees, customers and suppliers, fulfill customer orders and maintain our financial and accounting records. Failure of any one or more than one of our information technology systems could be caused by internal or external events, such as incursions by intruders or hackers, computer viruses, cyber-attacks, failures in hardware or software, or power or telecommunication fluctuations or failures. The failure of our information technology systems to perform as anticipated for any reason or any significant breach of security could disrupt our business and result in numerous adverse consequences, including reduced effectiveness and efficiency of operations, increased costs or loss of important information, any of which could have a material adverse effect on our business, financial condition or results of operations. We have technology and information security processes, periodic external service and service provider reviews, insurance policies and disaster recovery plans in place to mitigate our risk to these vulnerabilities. However, these measures may not be adequate to ensure that our operations will not be disrupted or our financial impact minimized, should such an event occur.

Integration of Information Technology Systems—Operation on multiple Enterprise Resource Planning (ERP) information systems, and the conversion to a new system, may negatively impact our operations.

We are highly dependent on our information systems infrastructure in order to process orders, track inventory, ship products in a timely manner, prepare invoices to our customers, make payments to our suppliers, maintain regulatory compliance and otherwise carry on our business in the ordinary course. We currently operate on multiple ERP information systems. Since we are required to process and reconcile our information from multiple systems, the chance of errors is greater. Inconsistencies in the information from multiple ERP systems could adversely impact our ability to manage our business efficiently and may result in heightened risk to our ability to maintain our books and records and comply with regulatory requirements. In 2017, we began a multi-year implementation of new enterprise resource planning, manufacturing, and engineering systems. The project includes the required information technology infrastructure (collectively, the Information Technology Project). The project is planned to standardize business processes across the chemicals businesses with the objective of maximizing cost effectiveness, efficiency and control across our global operations. At the end of 2019, Olin had successfully converted approximately 35% of our chemical business users to the new enterprise resource planning systems. The project is anticipated to be substantially completed during 2020. The transition to a new ERP system involves numerous risks, including:

- diversion of management's attention away from normal daily business operations;
- loss of, or delays in accessing, data;
- increased demand on our operations support personnel;
- increased costs;
- initial dependence on unfamiliar systems while training personnel to use new systems; and
- increased operating expenses resulting from training, conversion and transition support activities.

Any of the foregoing could result in a material increase in information technology compliance or other related costs, and could materially and negatively impact our business, financial condition or results of operations.

Imbalance in Demand for Our Chlor Alkali Products—A loss of a substantial customer for either our chlorine or caustic soda could cause an imbalance in customer demand for these products, which could have an adverse effect on our results of operations.

Chlorine and caustic soda are produced simultaneously and in a fixed ratio of 1.0 ton of chlorine to 1.1 tons of caustic soda. The loss of a substantial chlorine or caustic soda customer could cause an imbalance in customer demand for either our chlorine and caustic soda products. An imbalance in customer demand may require Olin to reduce production of both chlorine and caustic soda or take other steps to correct the imbalance. Since Olin cannot store large quantities of chlorine, we may not be able to respond to an imbalance in customer demand for these products quickly or efficiently. If a substantial imbalance occurred, we would need to reduce prices or take other actions that could have a material adverse impact on our business, results of operations and financial condition.

Indebtedness—Our indebtedness could adversely affect our financial condition.

As of December 31, 2019, we had \$3,340.8 million of indebtedness outstanding. Outstanding indebtedness does not include amounts that could be borrowed under our \$800.0 million senior revolving credit facility, under which \$796.5 million was available for borrowing as of December 31, 2019 because we had issued \$3.5 million of letters of credit. As of December 31, 2019, our indebtedness represented 58.0% of our total capitalization. At December 31, 2019, \$2.1 million of our indebtedness was due within one year. Despite our level of indebtedness, we expect to continue to have the ability to borrow additional debt.

Our indebtedness could have important consequences, including but not limited to:

- limiting our ability to fund working capital, capital expenditures, and other general corporate purposes;
- limiting our ability to accommodate growth by reducing funds otherwise available for other corporate purposes and to compete, which in turn could prevent us from fulfilling our obligations under our indebtedness;
- limiting our operational flexibility due to the covenants contained in our debt agreements;

- to the extent that our debt is subject to floating interest rates, increasing our vulnerability to fluctuations in market interest rates;
- limiting our ability to pay cash dividends;
- limiting our flexibility for, or reacting to, changes in our business or industry or economic conditions, thereby limiting our ability to compete with companies that are not as highly leveraged; and
- increasing our vulnerability to economic downturns.

Our ability to generate sufficient cash flow from operations to make scheduled payments on our debt will depend on a range of economic, competitive and business factors, many of which are outside our control. There can be no assurance that our business will generate sufficient cash flow from operations to make these payments. If we are unable to meet our expenses and debt obligations, we may need to refinance all or a portion of our indebtedness before maturity, sell assets or issue additional equity. We may not be able to refinance any of our indebtedness, sell assets or issue additional equity on commercially reasonable terms or at all, which could cause us to default on our obligations and impair our liquidity. Our inability to generate sufficient cash flow to satisfy our debt obligations, or to refinance our debt obligations on commercially reasonable terms, would have a material adverse effect on our business, financial condition and results of operations, as well as on our ability to satisfy our debt obligations.

Litigation and Claims—We are subject to litigation and other claims, which could cause us to incur significant expenses.

We are regularly a defendant in legal proceedings relating to our present and former operations. These include contract disputes, product liability claims, including ammunition and firearms, and proceedings alleging injurious exposure of plaintiffs to various chemicals and other substances (including proceedings based on alleged exposures to asbestos). Frequently, the proceedings alleging injurious exposure involve claims made by numerous plaintiffs against many defendants. Because of the inherent uncertainties of litigation, we are unable to predict the outcome of these proceedings and therefore cannot determine whether the financial impact, if any, will be material to our financial position, cash flows or results of operations.

Effects of Regulation—Changes in or failure to comply with legislation or government regulations or policies could have a material adverse effect on our financial position or results of operations.

Legislation or regulations that may be adopted or modified by U.S. or foreign governments, including legislation or regulations intended to address climate change, import and export duties and quotas, anti-dumping measures and related tariffs, and tax regulation could significantly affect the sales, costs and profitability of our business. The chemical and ammunition industries are subject to legislative and regulatory actions, which could have a material adverse effect on our business, financial position or results of operations. Existing and future government regulations and laws may reduce the demand for our products or impact our ability to use or manufacture certain products, which could have a material adverse effect on our business, financial condition and results of operations. A material change in tax laws, treaties or regulations in the jurisdictions in which we operate or a change in their interpretation or application could have a material adverse effect on our business, financial condition and results of operations.

Environmental Costs—We have ongoing environmental costs, which could have a material adverse effect on our financial position or results of operations.

Our operations and assets are subject to extensive environmental, health and safety regulations, including laws and regulations related to air emissions, water discharges, waste disposal and remediation of contaminated sites. The nature of our operations and products, including the raw materials we handle, exposes us to the risk of liabilities, obligations or claims under these laws and regulations due to the production, storage, use, transportation and sale of materials that can adversely impact the environment or cause personal injury, including, in the case of chemicals, unintentional releases into the environment. Environmental laws may have a significant effect on the costs of use, transportation, handling and storage of raw materials and finished products, as well as the costs of storage, handling, treatment, transportation and disposal of wastes. In addition, we are party to various government and private environmental actions associated with past manufacturing facilities and former waste disposal sites. We have incurred, and expect to incur, significant costs and capital expenditures in complying with environmental laws and regulations.

The ultimate costs and timing of environmental liabilities are difficult to predict. Liabilities under environmental laws relating to contaminated sites can be imposed retroactively and on a joint and several basis. One liable party could be held responsible for all costs at a site, regardless of fault, percentage of contribution to the site or the legality of the original disposal. We could incur significant costs, including clean-up costs, natural resource damages, civil or criminal fines and sanctions and

third-party lawsuits claiming, for example, personal injury and/or property damage, as a result of past or future violations of, or liabilities under, environmental or other laws.

In addition, future events, such as changes to or more rigorous enforcement of environmental laws or new information about the extent of remediation required, could require us to make additional expenditures, modify or curtail our operations and/or install additional pollution control equipment. It is possible that regulatory agencies may identify new chemicals of concern or enact new or more stringent clean-up standards for existing chemicals of concern. This could lead to expenditures for environmental remediation in the future that are additional to existing estimates.

Accordingly, it is possible that some of the matters in which we are involved or may become involved may be resolved unfavorably to us, which could materially and adversely affect our business, financial position, cash flows or results of operations. See “Environmental Matters” contained in Item 7—“Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

Ability to Attract and Retain Qualified Employees—We must attract, retain and motivate key employees, and the failure to do so may adversely affect our business, financial condition or results of operations.

We feel our success depends on hiring, retaining and motivating key employees, including executive officers. We may have difficulty locating and hiring qualified personnel. In addition, we may have difficulty retaining such personnel once hired, and key people may leave and compete against us. The loss of key personnel or our failure to attract and retain other qualified and experienced personnel could disrupt or materially adversely affect our business, financial condition or results of operations. In addition, our operating results could be adversely affected by increased costs due to increased competition for employees or higher employee turnover, which may result in the loss of significant customer business or increased costs.

Pension Plans—The impact of declines in global equity and fixed income markets on asset values and any declines in interest rates and/or improvements in mortality assumptions used to value the liabilities in our pension plans may result in higher pension costs and the need to fund the pension plans in future years in material amounts.

We sponsor domestic and foreign defined benefit pension plans for eligible employees and retirees. Substantially all domestic defined benefit pension plan participants are no longer accruing benefits. However, a portion of our bargaining hourly employees continue to participate in our domestic qualified defined benefit pension plans under a flat-benefit formula. Our funding policy for the qualified defined benefit pension plans is consistent with the requirements of federal laws and regulations. Our foreign subsidiaries maintain pension and other benefit plans, which are consistent with local statutory practices. The determinations of pension expense and pension funding are based on a variety of rules and regulations. Changes in these rules and regulations could impact the calculation of pension plan liabilities and the valuation of pension plan assets. They may also result in higher pension costs, additional financial statement disclosure, and the need to fund the pension plan.

At December 31, 2019, the projected benefit obligation of \$2,992.0 million exceeded the market value of assets in our qualified defined benefit pension plans by \$792.7 million, as calculated under Accounting Standards Codification (ASC) 715 “Compensation—Retirement Benefits” (ASC 715). During 2019, we made a discretionary cash contribution to our domestic qualified defined benefit pension plan of \$12.5 million. Based on our plan assumptions and estimates, we will not be required to make any cash contributions to the domestic qualified defined benefit pension plan at least through 2020.

We have international qualified defined benefit pension plans to which we made cash contributions of \$2.4 million, \$2.6 million and \$1.7 million in 2019, 2018 and 2017, respectively, and we anticipate less than \$5 million of cash contributions to international qualified defined benefit pension plans in 2020.

The impact of declines in global equity and fixed income markets on asset values may result in higher pension costs and may increase and accelerate the need to fund the pension plans in future years. For example, holding all other assumptions constant, a 100-basis point decrease or increase in the assumed long-term rate of return on plan assets for our domestic qualified defined benefit pension plan would have decreased or increased, respectively, the 2019 defined benefit pension plan income by approximately \$19.8 million. Holding all other assumptions constant for our domestic qualified defined benefit pension plan, a 50-basis point decrease in the discount rate used to calculate pension income for 2019 and the projected benefit obligation as of December 31, 2019 would have decreased pension income by \$0.4 million and increased the projected benefit obligation by \$160.0 million. A 50-basis point increase in the discount rate used to calculate pension income for 2019 and the projected benefit obligation as of December 31, 2019 for our domestic qualified defined benefit pension plan would have increased pension income by \$0.6 million and decreased the projected benefit obligation by \$145.0 million.

International Sales and Operations—We are subject to risks associated with our international sales and operations that could have a material adverse effect on our business or results of operations.

Olin has an international presence, including the geographic regions of Europe, Asia Pacific and Latin America. In 2019, approximately 41% of our sales were generated outside of the United States. These international sales and operations expose us to risks, including:

- difficulties and costs associated with complying with complex and varied laws, treaties, and regulations;
- tariffs and trade barriers;
- outbreaks of pandemic disease, such as coronavirus, which could cause us and our suppliers and/or customers to temporarily suspend operations in affected areas, restrict the ability of Olin to distribute our products or cause economic downturns that could affect demand for our products;
- changes in laws and regulations, including the imposition of economic or trade sanctions affecting international commercial transactions;
- risk of non-compliance with anti-bribery laws and regulations, such as the U.S. Foreign Corrupt Practices Act;
- restrictions on, or difficulties and costs associated with, the repatriation of cash from foreign countries to the United States;
- unfavorable currency fluctuations;
- changes in local economic conditions;
- unexpected changes in political or regulatory environments;
- labor compliance and costs associated with a global workforce;
- data privacy regulations;
- difficulties in maintaining overseas subsidiaries and international operations; and
- challenges in protecting intellectual property rights.

Any one or more of the above factors could have a material adverse effect on our business, financial condition or results of operations.

Asset Impairment—If our goodwill, other intangible assets or property, plant and equipment become impaired in the future, we may be required to record non-cash charges to earnings, which could be significant.

The process of impairment testing for our goodwill involves a number of judgments and estimates made by management including future cash flows, discount rates, profitability assumptions and terminal growth rates with regards to our reporting units. Our internally generated long-range plan includes cyclical assumptions regarding pricing and operating forecasts for the chlor alkali industry. If the judgments and estimates used in our analysis are not realized or are affected by external factors, then actual results may not be consistent with these judgments and estimates, and we may be required to record a goodwill impairment charge in the future, which could be significant and have an adverse effect on our financial position and results of operations.

We review long-lived assets, including property, plant and equipment and identifiable amortizing intangible assets, for impairment whenever changes in circumstances or events may indicate that the carrying amounts are not recoverable. If the fair value is less than the carrying amount of the asset, an impairment is recognized for the difference. Factors which may cause an impairment of long-lived assets include significant changes in the manner of use of these assets, negative industry or market trends, a significant underperformance relative to historical or projected future operating results, extended period of idleness or a likely sale or disposal of the asset before the end of its estimated useful life. If our property, plant and equipment and identifiable amortizing intangible assets are determined to be impaired in the future, we may be required to record non-cash charges to earnings during the period in which the impairment is determined, which could be significant and have an adverse effect on our financial position and results of operations.

Credit and Capital Market Conditions—Adverse conditions in the credit and capital markets may limit or prevent our ability to borrow or raise capital.

While we believe we have facilities in place that should allow us to borrow funds as needed to meet our ordinary course business activities, adverse conditions in the credit and financial markets could prevent us from obtaining financing, if the need arises. Our ability to invest in our businesses and refinance or repay maturing debt obligations could require access to the credit and capital markets and sufficient bank credit lines to support cash requirements. If we are unable to access the credit and capital markets on commercially reasonable terms, we could experience a material adverse effect on our business, financial position or results of operations.

Lake City Plant Contract—Various risks associated with our transition and subsequent operation of the Lake City Army Ammunition Plant could adversely affect our business, financial condition and results of operations.

In 2019, our Winchester business was selected by the United States Army to operate and manage the Lake City Army Ammunition Plant in Independence, MO. Our bid for this contract was developed using assumptions about the operating conditions of the facility and the future demand of ammunition produced from that facility. These assumptions were based upon our knowledge of the facility and the market at the time of the bid as well as information that was provided to us by the United States Army during the solicitation process. If our assumptions were incorrect, we may experience additional costs or lower revenues than expected as a result of this contract.

The Lake City Plant contract is a fixed-price contract under which we have limited ability to pass along cost overruns.

Beginning on October 1, 2019 and continuing until October 1, 2020, we are working with the incumbent contractor at the Lake City Plant to transition the plant to our management and control. We have developed a transition plan that involves transition of the workforce, negotiation of new labor contracts, implementation of information technology and operating systems and start-up of manufacturing processes. If we do not meet our timelines or otherwise fail to complete portions of our transition plan, we may incur additional costs or fail to meet the anticipated financial results associated with this contract.

Labor Matters—We cannot assure that we can conclude future labor contracts or any other labor agreements without work stoppages.

Various labor unions represent a significant number of our hourly paid employees for collective bargaining purposes. The following labor contract will be required to be negotiated in 2020:

<i>Location</i>	<i>Number of Employees</i>	<i>Expiration Date</i>
Lake City Army Ammunition Plant (Winchester)	1,447	October 2020

While we believe our relations with our employees and their various representatives are generally satisfactory, we cannot assure that we can conclude any labor agreements without work stoppages and cannot assure that any work stoppages will not have a material adverse effect on our business, financial condition or results of operations.

Item 1B. UNRESOLVED STAFF COMMENTS

Not applicable.

Item 2. PROPERTIES

Information concerning our principal locations from which our products and services are manufactured, distributed or marketed are included in the tables set forth under the caption “Products and Services” contained in Item 1—“Business.” Generally, these facilities are well maintained, in good operating condition, and suitable and adequate for their use. Our two largest facilities are co-located with Dow. The land in which these facilities are located is leased with a 99-year initial term that commenced in 2015. Additionally, we lease warehouses, terminals and distribution offices and space for executive and branch sales offices and service departments. We believe our current facilities are adequate to meet the requirements of our present operations.

Item 3. LEGAL PROCEEDINGS

Saltville

We have completed all work in connection with remediation of mercury contamination at the site of our former mercury cell chlor alkali plant in Saltville, VA required to date. In mid-2003, the Trustees for natural resources in the North Fork Holston River, the Main Stem Holston River and associated floodplains, located in Smyth and Washington Counties in Virginia and in Sullivan and Hawkins Counties in Tennessee notified us of, and invited our participation in, an assessment of alleged damages to natural resources resulting from the release of mercury. The Trustees also notified us that they had made a preliminary determination that we are potentially liable for natural resource damages in said rivers and floodplains. We agreed to participate in the assessment. We and the Trustees have entered into discussions concerning a resolution of this matter. In light of the ongoing discussions and inherent uncertainties of the assessment, we cannot at this time determine whether the financial impact, if any, of this matter will be material to our financial position or results of operations. See “Environmental Matters” contained in Item 7—“Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

Other

As part of the continuing environmental investigation by federal, state and local governments of waste disposal sites, we have entered into a number of settlement agreements requiring us to participate in the investigation and cleanup of a number of sites. Under the terms of such settlements and related agreements, we may be required to manage or perform one or more elements of a site cleanup, or to manage the entire remediation activity for a number of parties, and subsequently seek recovery of some or all of such costs from other Potentially Responsible Parties (PRPs). In many cases, we do not know the ultimate costs of our settlement obligations at the time of entering into particular settlement agreements, and our liability accruals for our obligations under those agreements are often subject to significant management judgment on an ongoing basis. Those cost accruals are provided for in accordance with generally accepted accounting principles and our accounting policies set forth in “Environmental Matters” contained in Item 7—“Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

We, and our subsidiaries, are defendants in various legal actions (including proceedings based on alleged exposures to asbestos) incidental to our past and current business activities. At December 31, 2019 and 2018, our consolidated balance sheets included liabilities for these legal actions of \$12.4 million and \$15.6 million, respectively. These liabilities do not include costs associated with legal representation. Based on our analysis, and considering the inherent uncertainties associated with litigation, we do not believe that it is reasonably possible that these legal actions will materially and adversely affect our financial position, cash flows or results of operations.

In connection with the October 5, 2015 acquisition of Dow’s U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities relating to litigation, releases of hazardous materials and violations of environmental law to the extent arising prior to October 5, 2015.

Item 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

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

As of January 31, 2020, we had 3,566 record holders of our common stock.

Our common stock is traded on the NYSE under the “OLN” ticker symbol.

A dividend of \$0.20 per common share was paid during each of the four quarters in 2019 and 2018.

Issuer Purchases of Equity Securities

<i>Period</i>	<i>Total Number of Shares (or Units) Purchased ⁽¹⁾</i>	<i>Average Price Paid per Share (or Unit)</i>	<i>Total Number of Shares (or Units) Purchased as Part of Publicly Announced Plans or Programs ⁽²⁾</i>	<i>Maximum Dollar Value of Shares (or Units) that May Yet Be Purchased Under the Plans or Programs</i>
October 1-31, 2019	1,961,684	\$ 18.46	1,961,684	
November 1-30, 2019	11,000	18.54	11,000	
December 1-31, 2019	—	—	—	
Total				\$ 304,075,829 ⁽¹⁾

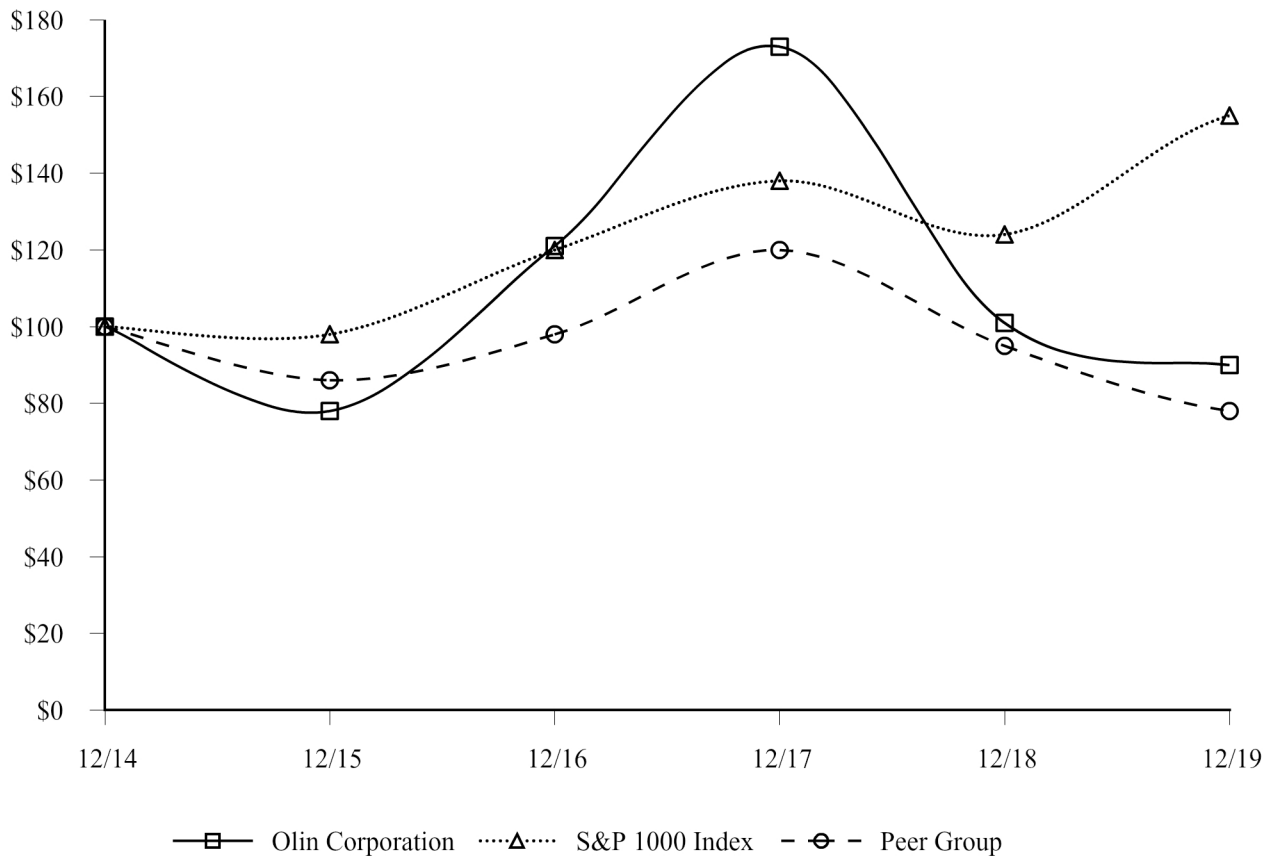
- (1) On April 26, 2018, our board of directors authorized a share repurchase program for the purchase of shares of common stock at an aggregate price of up to \$500.0 million. This program will terminate upon the purchase of \$500.0 million of our common stock. Through December 31, 2019, 10,072,741 shares had been repurchased at a total value of \$195,924,171 and \$304,075,829 of common stock remained available for purchase under the program.
- (2) On August 5, 2019, we entered into an accelerated share repurchase (ASR) agreement with Goldman Sachs & Co. LLC, a third-party financial institution, to repurchase \$100.0 million of Olin’s common stock. This authorization was granted under the April 26, 2018 share repurchase program and reduced the remaining authorized repurchase amount under that program by \$100.0 million. In connection with this agreement, we initially received 4,333,694 shares in August 2019. The agreement settled on October 7, 2019 at which time we received 1,414,520 additional shares which have been included in the October 2019 share repurchase total and resulted in a total of 5,748,214 shares repurchased under this ASR agreement.

Performance Graph

This graph compares the total shareholder return on our common stock with the cumulative total return of the Standard & Poor’s 1000 Index (the S&P 1000 Index) and our current peer group of four companies comprised of: Huntsman, Trinseo S.A., Oxy and Westlake (collectively, the Peer Group).

COMPARISON OF FIVE YEAR CUMULATIVE TOTAL RETURN

Among Olin Corporation, the S&P 1000 Index,
and the Peer Group



	12/14	12/15	12/16	12/17	12/18	12/19
Olin Corporation	100	78	121	173	101	90
S&P 1000 Index	100	98	120	138	124	155
Peer Group	100	86	98	120	95	78

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Data is for the five-year period from December 31, 2014 through December 31, 2019. The cumulative return includes reinvestment of dividends. The Peer Group is weighted in accordance with market capitalization (closing stock price multiplied by the number of shares outstanding) as of the beginning of each of the five years covered by the performance graph. We calculated the weighted return for each year by multiplying (a) the percentage that each corporation’s market capitalization represented of the total market capitalization for all corporations in the Peer Group for such year by (b) the total shareholder return for that corporation for such year.

Item 6. SELECTED FINANCIAL DATA
FIVE-YEAR SUMMARY

	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>
Operations	<i>(\$ and shares in millions, except per share data)</i>				
Sales	\$ 6,110	\$ 6,946	\$ 6,268	\$ 5,551	\$ 2,854
Cost of goods sold	5,439	5,822	5,555	4,945	2,499
Selling and administration	417	431	369	347	201
Restructuring charges	76	22	38	113	3
Acquisition-related costs	—	1	13	49	76
Other operating income	—	6	3	11	46
Earnings (losses) of non-consolidated affiliates	—	(20)	2	2	2
Interest expense	243	243	217	192	97
Interest income and other income	12	2	2	3	1
Non-operating pension income (expense)	16	22	34	45	(20)
Income (loss) before taxes	(37)	437	117	(34)	7
Income tax (benefit) provision	(26)	109	(432)	(30)	8
Net (loss) income	<u>\$ (11)</u>	<u>\$ 328</u>	<u>\$ 549</u>	<u>\$ (4)</u>	<u>\$ (1)</u>
Financial position					
Cash and cash equivalents	\$ 221	\$ 179	\$ 218	\$ 185	\$ 392
Working capital, excluding cash and cash equivalents	411	410	527	439	395
Property, plant and equipment, net	3,324	3,482	3,576	3,705	3,953
Total assets	9,188	8,997	9,218	8,763	9,289
Capitalization:					
Short-term debt	2	126	1	81	205
Long-term debt	3,339	3,104	3,611	3,537	3,644
Shareholders' equity	2,418	2,832	2,754	2,273	2,419
Total capitalization	<u>\$ 5,759</u>	<u>\$ 6,062</u>	<u>\$ 6,366</u>	<u>\$ 5,891</u>	<u>\$ 6,268</u>
Per share data					
Net (loss) income:					
Basic	<u>\$ (0.07)</u>	<u>\$ 1.97</u>	<u>\$ 3.31</u>	<u>\$ (0.02)</u>	<u>\$ (0.01)</u>
Diluted	<u>\$ (0.07)</u>	<u>\$ 1.95</u>	<u>\$ 3.26</u>	<u>\$ (0.02)</u>	<u>\$ (0.01)</u>
Common cash dividends	\$ 0.80	\$ 0.80	\$ 0.80	\$ 0.80	\$ 0.80
Other					
Capital expenditures	\$ 386	\$ 385	\$ 294	\$ 278	\$ 131
Depreciation and amortization	597	601	559	534	229
Common dividends paid	129	134	133	132	80
Repurchases of common stock	146	50	—	—	—
Current ratio	1.6	1.5	1.8	1.7	1.7
Total debt to total capitalization	58.0%	53.3%	56.7 %	61.4%	61.4%
Effective tax rate	69.4%	25.0%	(368.9)%	88.6%	120.9%
Average common shares outstanding - diluted	162.3	168.4	168.5	165.2	103.4
Shareholders	3,500	3,700	3,900	4,200	4,500
Employees	6,500	6,500	6,400	6,400	6,200

On October 5, 2015 (the Closing Date), we acquired from Dow its U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses (collectively, the Acquired Business) using a Reverse Morris Trust Structure (collectively, the Acquisition). Since the Closing Date, our Selected Financial Data reflects the operating results of the Acquired Business.

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

BUSINESS BACKGROUND

We are a leading vertically-integrated global manufacturer and distributor of chemical products and a leading U.S. manufacturer of ammunition. Our operations are concentrated in three business segments: Chlor Alkali Products and Vinyls, Epoxy and Winchester. All of our business segments are capital intensive manufacturing businesses. Chlor Alkali Products and Vinyls operating rates are closely tied to the general economy. Each segment has a commodity element to it, and therefore, our ability to influence pricing is quite limited on the portion of the segment's business that is strictly commodity.

Our Chlor Alkali Products and Vinyls segment is a commodity business where all supplier products are similar and price is the major supplier selection criterion. We have little or no ability to influence prices in the large, global commodity markets. Our Chlor Alkali Products and Vinyls segment produces some of the most widely used chemicals in the world that can be upgraded into a wide variety of downstream chemical products used in many end-markets. Cyclical price swings, driven by changes in supply/demand, can be abrupt and significant and, given capacity in our Chlor Alkali Products and Vinyls segment, can lead to significant changes in our overall profitability.

The Epoxy segment consumes products manufactured by the Chlor Alkali Products and Vinyls segment. The Epoxy segment's upstream and midstream products are predominately commodity markets. We have little or no ability to influence prices in these large, global commodity markets. While competitive differentiation exists through downstream customization and product development opportunities, pricing is extremely competitive with a broad range of competitors across the globe.

Winchester also has a commodity element to its business, but a majority of Winchester ammunition is sold as a branded consumer product where there are opportunities to differentiate certain offerings through innovative new product development and enhanced product performance. While competitive pricing versus other branded ammunition products is important, it is not the only factor in product selection.

RECENT DEVELOPMENTS AND HIGHLIGHTS

2019 Overview

Net loss was \$11.3 million for the year ended December 31, 2019 compared to net income of \$327.9 million for 2018. The decrease in results from the prior year was primarily due to lower Chlor Alkali Products and Vinyls segment results, non-cash restructuring charges of \$58.9 million, the 2018 pretax insurance recoveries of \$111.0 million for environmental costs incurred and expensed in prior years and increased costs associated with the Information Technology Project. In 2017, we began a multi-year implementation of new enterprise resource planning, manufacturing and engineering systems, and related infrastructure (collectively, the Information Technology Project).

On December 11, 2019, we announced that we had made the decision to permanently close a chlor alkali plant with a capacity of 230,000 tons and our Vinylidene Chloride (VDC) production facility, both in Freeport, TX. These closures are expected to be completed before the end of 2020. For the year ended December 31, 2019, we recorded pretax restructuring charges of \$58.9 million for the impairment of equipment and facilities related to these actions.

Chlor Alkali Products and Vinyls generated segment income of \$336.7 million for 2019 compared to \$637.1 million for 2018. Chlor Alkali Products and Vinyls segment income was lower than in the prior year primarily due to lower caustic soda pricing partially offset by lower raw material and operating costs. The year ended December 31, 2019 also included lower maintenance turnaround costs. Chlor Alkali Products and Vinyls segment income included depreciation and amortization expense of \$470.4 million and \$473.1 million in 2019 and 2018, respectively.

During 2018, North America caustic soda price contract indices increased \$40 per ton while the caustic soda export price indices decreased approximately \$270 per metric ton. During 2019, North America caustic soda price contract indices decreased \$90 per ton and caustic soda export price indices decreased \$160 per metric ton.

Epoxy reported segment income of \$53.9 million for 2019 compared to \$52.8 million for 2018. Epoxy segment income was higher than in the prior year primarily due to lower maintenance costs and unabsorbed fixed manufacturing costs associated with maintenance turnarounds and lower raw material costs, primarily benzene and propylene, substantially offset by lower product prices. Epoxy segment income included depreciation and amortization expense of \$100.1 million and \$102.4 million in 2019 and 2018, respectively.

Winchester reported segment income of \$40.1 million for 2019 compared to \$38.4 million for 2018. Winchester segment income was higher than in the prior year primarily due to higher sales volumes and lower costs, primarily commodity and other material costs, partially offset by lower product prices. Winchester segment income included depreciation and amortization expense of \$20.1 million and \$20.0 million in 2019 and 2018, respectively.

On January 1, 2019, we sold our 9.1% limited partnership interest in Bay Gas for \$20.0 million. The sale closed on February 7, 2019 which resulted in a pretax gain of approximately \$11.2 million for the year ended December 31, 2019. For the year ended December 31, 2018, Chlor Alkali Products and Vinyls recorded a \$21.5 million non-cash impairment charge related to an adjustment to the value of our interest in Bay Gas.

On July 16, 2019, Olin issued \$750.0 million aggregate principal amount of 5.625% senior notes due August 1, 2029 (2029 Notes), which were registered under the Securities Act of 1933, as amended. Proceeds from the 2029 Notes were used to redeem the remaining balance of the \$1,375.0 million Term Loan Facility of \$493.0 million and \$150.0 million of the Receivables Financing Agreement.

On July 16, 2019, Olin also entered into a new five-year, \$2,000.0 million senior credit facility (2019 Senior Credit Facility), which replaces the existing \$1,975.0 million senior credit facility. The 2019 Senior Credit Facility will mature in July 2024. In December 2019, Olin amended the 2019 Senior Credit Facility which amended the restrictive covenants of the agreement, including expanding the coverage and leverage ratios to be less restrictive over the next two and a half years. The 2019 Senior Credit Facility includes a senior unsecured delayed-draw term loan facility in an aggregate principal amount of up to \$1,200.0 million (Delayed Draw Term Loan Facility) and an \$800.0 million senior unsecured revolving credit facility (2019 Senior Revolving Credit Facility). The Delayed Draw Term Loan Facility will be available on a delayed basis in up to three draws to be made on or prior to November 29, 2020. We expect the proceeds from the Delayed Draw Term Loan Facility will be used to redeem the 9.75% senior notes due 2023 and the 10.00% senior notes due 2025 on or about October 15, 2020.

On September 27, 2019, Winchester was notified that it had been selected by the United States Army to operate and manage the Lake City Plant in Independence, MO. Following a one-year transition period, Winchester will assume full operational control of the Lake City Plant on October 1, 2020. The contract has an initial term of seven years and may be extended by the United States Army for up to three additional years. The contract is expected to increase Winchester's annual revenue by \$450 million to \$550 million.

CONSOLIDATED RESULTS OF OPERATIONS

	<i>Years ended December 31,</i>		
	2019	2018	2017
	<i>(\$ in millions, except per share data)</i>		
Sales	\$ 6,110.0	\$ 6,946.1	\$ 6,268.4
Cost of goods sold	5,439.2	5,822.1	5,554.9
Gross margin	670.8	1,124.0	713.5
Selling and administration	416.9	430.6	369.8
Restructuring charges	76.5	21.9	37.6
Acquisition-related costs	—	1.0	12.8
Other operating income	0.4	6.4	3.3
Operating income	177.8	676.9	296.6
Earnings (losses) of non-consolidated affiliates	—	(19.7)	1.8
Interest expense	243.2	243.2	217.4
Interest income	1.0	1.6	1.8
Non-operating pension income	16.3	21.7	34.4
Other income	11.2	—	—
Income (loss) before taxes	(36.9)	437.3	117.2
Income tax (benefit) provision	(25.6)	109.4	(432.3)
Net (loss) income	\$ (11.3)	\$ 327.9	\$ 549.5
Net (loss) income per common share:			
Basic	\$ (0.07)	\$ 1.97	\$ 3.31
Diluted	\$ (0.07)	\$ 1.95	\$ 3.26

2019 Compared to 2018

Sales for 2019 were \$6,110.0 million compared to \$6,946.1 million in 2018, a decrease of \$836.1 million, or 12%. Chlor Alkali Products and Vinyls sales decreased by \$566.6 million primarily due to lower caustic soda pricing. Epoxy sales decreased by \$278.7 million primarily due to lower product prices and an unfavorable effect of foreign currency translation. Winchester sales increased by \$9.2 million primarily due to higher ammunition sales to commercial customers.

Gross margin decreased \$453.2 million, or 40%, from 2018. Chlor Alkali Products and Vinyls gross margin decreased by \$342.1 million, primarily due to lower caustic soda pricing, partially offset by lower raw material and operating costs. Epoxy gross margin decreased \$20.6 million primarily due to lower product prices, partially offset by lower raw material costs, primarily benzene and propylene, and lower maintenance and unabsorbed fixed manufacturing costs associated with maintenance turnarounds. Winchester gross margin increased \$1.2 million primarily due to lower costs, partially offset by lower product prices. Gross margin in 2018 was positively impacted by insurance recoveries for environmental costs incurred and expensed in prior periods of \$111.0 million. Gross margin as a percentage of sales decreased to 11% in 2019 from 16% in 2018.

Selling and administration expenses in 2019 decreased \$13.7 million, or 3%, from 2018. The years ended December 31, 2019 and 2018 included costs associated with the Information Technology Project of \$77.0 million and \$36.5 million, respectively, an increase of \$40.5 million. More than offsetting this increase were lower legal and legal-related settlement expenses of \$19.3 million, primarily due to the legal fees associated with the environmental recovery actions in 2018, lower consulting and contract services of \$13.7 million, lower management incentive compensation expense of \$10.2 million, which includes mark-to-market adjustments on stock-based compensation expense, and a favorable foreign currency impact of \$8.5 million. Selling and administration expenses as a percentage of sales were 7% in 2019 and 6% in 2018.

Restructuring charges in 2019 included \$58.9 million of non-cash impairment charges for equipment and facilities associated with the closure of a chlor alkali plant and a VDC production facility, both in Freeport, TX. Restructuring charges in 2019 and 2018 were also associated with the March 2016 closure of 433,000 tons of chlor alkali capacity across three separate locations and the December 2018 decision to permanently close the ammunition assembly operations at our Winchester facility in Geelong, Australia.

Other operating income for the year ended December 31, 2018 included an \$8.0 million insurance recovery for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility partially offset by a \$1.7 million loss on the sale of land.

Earnings (losses) of non-consolidated affiliates for the year ended December 31, 2018 reflect a \$21.5 million non-cash impairment charge.

Interest expense for the year ended December 31, 2019 was impacted by a lower level of average debt outstanding partially offset by higher interest rates compared to the year ended December 31, 2018. Interest expense for the years ended December 31, 2019 and 2018 included \$17.0 million and \$16.0 million, respectively, of accretion expense related to the ethylene payment discount expected to be paid on or about the fourth quarter of 2020. Interest expense was reduced by capitalized interest of \$10.8 million and \$6.0 million for 2019 and 2018, respectively.

Non-operating pension income includes all components of pension and other postretirement income (costs) other than service costs. Non-operating pension income was lower for the year ended December 31, 2019, primarily due to an increase in Pension Benefit Guaranty Corporation fees associated with our domestic qualified defined benefit pension plan.

The effective tax rate for 2019 included benefits associated with the finalization of the Internal Revenue Service (IRS) review of years 2013 to 2015 U.S. income tax claims, stock-based compensation, prior year tax positions, foreign tax law changes, a remeasurement of deferred taxes due to a decrease in our state effective tax rates and a change in tax contingencies. The effective tax rate also included expenses associated with a net increase in the valuation allowance primarily related to foreign deferred tax assets and liabilities. These factors resulted in a net \$19.4 million tax benefit. After giving consideration to these items, the effective tax rate for 2019 of 16.8% was lower than the 21% U.S. federal statutory rate primarily due to state taxes and a net increase in the valuation allowance related to losses in foreign jurisdictions, partially offset by foreign income taxes and favorable permanent salt depletion deductions. The effective tax rate for 2018 included benefits associated with the U.S. Tax Cuts & Jobs Act (2017 Tax Act), stock-based compensation, changes in tax contingencies, a foreign dividend payment, changes associated with prior year tax positions and the remeasurement of deferred taxes due to a decrease in our state effective tax rates. The effective tax rate also included expenses associated with a net increase in the valuation allowance related to deferred tax assets in foreign jurisdictions and the remeasurement of deferred taxes due to changes in our foreign tax rates. These factors resulted in a net \$2.9 million tax benefit, of which \$3.8 million related to the increase of the 2017 Tax Act benefit. After giving consideration to these items, the effective tax rate for 2018 of 25.7% was higher than the 21% U.S. federal statutory rate primarily due to state and foreign income taxes, foreign income inclusions and a net increase in the valuation allowance related to current year losses in foreign jurisdictions, partially offset by favorable permanent salt depletion deductions.

2018 Compared to 2017

Sales for 2018 were \$6,946.1 million compared to \$6,268.4 million in 2017, an increase of \$677.7 million, or 11%. Chlor Alkali Products and Vinyls sales increased by \$485.9 million primarily due to increased pricing for caustic soda, EDC, chlorine and other chlorine-derivatives, partially offset by lower caustic soda volumes and a less favorable product mix. Epoxy sales increased by \$216.7 million primarily due to higher product prices, partially offset by lower volumes and a less favorable product mix. Winchester sales decreased by \$24.9 million primarily due to lower sales to commercial customers, partially offset by higher sales to military customers and law enforcement agencies.

Gross margin increased \$410.5 million, or 58%, from 2017. Gross margin was positively impacted by insurance recoveries for environmental costs incurred and expensed in prior periods of \$111.0 million. Chlor Alkali Products and Vinyls gross margin increased by \$263.8 million, primarily due to higher product pricing partially offset by increased costs, lower caustic soda volumes and a less favorable product mix. Epoxy gross margin increased \$78.3 million primarily due to higher product prices partially offset by increased raw material costs, primarily benzene and propylene. Epoxy gross margin was also negatively impacted by the cost of an approximately two-month planned maintenance turnaround at our production facilities in Freeport, TX, which also reduced volumes. Both Chlor Alkali Products and Vinyls and Epoxy 2017 gross margins were negatively impacted by incremental costs to continue operations and unabsorbed fixed manufacturing costs associated with Hurricane Harvey. Winchester gross margin decreased \$34.0 million primarily due to increased commodity and other material costs, lower commercial sales volumes and a less favorable product mix and lower selling prices. Gross margin as a percentage of sales increased to 16% in 2018 from 11% in 2017.

Selling and administration expenses in 2018 increased \$60.8 million, or 16%, from 2017. The increase was primarily due to higher costs associated with the Information Technology Project of \$31.2 million, higher legal and legal-related settlement expenses of \$15.6 million, primarily associated with environmental recovery actions, increased incentive compensation expense of \$11.6 million, an unfavorable foreign currency impact of \$10.9 million and higher consulting and contract services of \$10.4 million, which include transition service fees from Dow. These increased costs were partially offset by lower stock-based compensation expense of \$15.0 million, which includes mark-to-market adjustments. Selling and administration expenses as a percentage of sales were 6% in both 2018 and 2017.

Restructuring charges in 2018 and 2017 were primarily associated with the March 2016 closure of 433,000 tons of chlor alkali capacity across three separate locations. Restructuring charges in 2018 were also associated with a December 2018 decision to permanently close the ammunition assembly operations at our Winchester facility in Geelong, Australia.

Acquisition-related costs for the years ended December 31, 2018 and 2017 were related to the integration of the Acquired Business, and consisted of advisory, legal, accounting and other professional fees.

Other operating income for the year ended December 31, 2018 included an \$8.0 million insurance recovery for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility partially offset by a \$1.7 million loss on the sale of land. Other operating income for the year ended December 31, 2017 included a gain of \$3.3 million from the sale of a former manufacturing facility.

Earnings (losses) of non-consolidated affiliates decreased by \$21.5 million for the year ended December 31, 2018, which reflect a \$21.5 million non-cash impairment charge recorded during 2018.

Interest expense increased by \$25.8 million for the year ended December 31, 2018 primarily due to higher interest rates and an increase of \$12.1 million of accretion expense related to the ethylene payment discount expected to be paid on or about the fourth quarter of 2020, partially offset by a lower level of debt outstanding for the year ended December 31, 2018 compared to 2017.

Non-operating pension income includes all components of pension and other postretirement income (costs) other than service costs. Non-operating pension income was lower for the year ended December 31, 2018, primarily due to an increase in the amortization of actuarial losses and higher Pension Benefit Guaranty Corporation fees associated with our domestic qualified defined benefit pension plan.

The effective tax rate for 2018 included benefits associated with the 2017 Tax Act, stock-based compensation, changes in tax contingencies, a foreign dividend payment, changes associated with prior year tax positions and the remeasurement of deferred taxes due to a decrease in our state effective tax rates. The effective tax rate also included expenses associated with a net increase in the valuation allowance related to deferred tax assets in foreign jurisdictions and the remeasurement of deferred taxes due to changes in our foreign tax rates. These factors resulted in a net \$2.9 million tax benefit, of which \$3.8 million related to the increase of the 2017 Tax Act benefit. After giving consideration to these items, the effective tax rate for 2018 of 25.7% was higher than the 21% U.S. federal statutory rate primarily due to state and foreign income taxes, foreign income inclusions and a net increase in the valuation allowance related to current year losses in foreign jurisdictions, partially offset by favorable permanent salt depletion deductions. The effective tax rate for 2017 included benefits associated with the 2017 Tax Act, an agreement with the Internal Revenue Service on prior period tax examinations, stock based compensation, U.S. federal tax credits, changes to prior year tax positions and a reduction to the deferred tax liability on unremitted foreign earnings. The effective tax rate also included an expense associated with a net increase in the valuation allowance, primarily related to foreign net operating losses and remeasurement of deferred taxes due to an increase in our state effective tax rates. These factors resulted in a net \$452.3 million tax benefit, of which \$437.9 million was a provisional benefit from the 2017 Tax Act. After giving consideration to these items, the effective tax rate for 2017 of 17.1% was lower than the 35% U.S. federal statutory rate, primarily due to favorable permanent salt depletion deductions.

SEGMENT RESULTS

We define segment results as income (loss) before interest expense, interest income, other operating income (expense), non-operating pension income, other income (expense) and income taxes, and includes the operating results of non-consolidated affiliates. Consistent with the guidance in ASC 280 “Segment Reporting,” we have determined it is appropriate to include the operating results of non-consolidated affiliates in the relevant segment financial results. We have three operating segments: Chlor Alkali Products and Vinyls, Epoxy and Winchester. The three operating segments reflect the organization used by our management for purposes of allocating resources and assessing performance. Chlorine used in our Epoxy segment is transferred at cost from the Chlor Alkali Products and Vinyls segment. Sales and profits are recognized in the Chlor Alkali Products and Vinyls segment for all caustic soda generated and sold by Olin.

	<i>Years ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Sales:	<i>(\$ in millions)</i>		
Chlor Alkali Products and Vinyls	\$ 3,420.1	\$ 3,986.7	\$ 3,500.8
Epoxy	2,024.4	2,303.1	2,086.4
Winchester	665.5	656.3	681.2
Total sales	<u>\$ 6,110.0</u>	<u>\$ 6,946.1</u>	<u>\$ 6,268.4</u>
Income (loss) before taxes:			
Chlor Alkali Products and Vinyls ⁽¹⁾	\$ 336.7	\$ 637.1	\$ 405.8
Epoxy	53.9	52.8	(11.8)
Winchester	40.1	38.4	72.4
Corporate/Other:			
Environmental (expense) income ⁽²⁾	(20.5)	103.7	(8.5)
Other corporate and unallocated costs ⁽³⁾	(156.3)	(158.3)	(112.4)
Restructuring charges ⁽⁴⁾	(76.5)	(21.9)	(37.6)
Acquisition-related costs ⁽⁵⁾	—	(1.0)	(12.8)
Other operating income ⁽⁶⁾	0.4	6.4	3.3
Interest expense ⁽⁷⁾	(243.2)	(243.2)	(217.4)
Interest income	1.0	1.6	1.8
Non-operating pension income ⁽⁸⁾	16.3	21.7	34.4
Other income ⁽⁹⁾	11.2	—	—
Income (loss) before taxes	<u>\$ (36.9)</u>	<u>\$ 437.3</u>	<u>\$ 117.2</u>

- (1) Earnings (losses) of non-consolidated affiliates are included in the Chlor Alkali Products and Vinyls segment results consistent with management’s monitoring of the operating segment. The losses of non-consolidated affiliates were \$19.7 million for the year ended December 31, 2018, which reflect a \$21.5 million non-cash impairment charge recorded during 2018. The earnings of non-consolidated affiliates were \$1.8 million for the year ended December 31, 2017.
- (2) Environmental (expense) income for the year ended December 31, 2019 included \$4.8 million of an environmental insurance-related settlement gain. Environmental (expense) income for the year ended December 31, 2018 included pre-tax insurance recoveries for environmental costs incurred and expensed in prior periods of \$111.0 million. Environmental (expense) income is included in cost of goods sold in the consolidated statements of operations.
- (3) Other corporate and unallocated costs for the years ended December 31, 2019, 2018 and 2017 included costs associated with the implementation of the Information Technology Project of \$77.0 million, \$36.5 million and \$5.3 million, respectively.
- (4) Restructuring charges for the year ended December 31, 2019 included \$58.9 million of non-cash impairment charges for equipment and facilities associated with the closure of a chlor alkali plant and a VDC production facility, both in Freeport, TX. Restructuring charges for the year ended December 31, 2019 and 2018 included costs associated with permanently closing the ammunition assembly operations at our Geelong, Australia facility in December 2018. Restructuring charges for the years ended December 31, 2019, 2018 and 2017 also included costs associated with the

March 2016 closure of 433,000 tons of chlor alkali capacity across three separate locations and permanently closing a portion of the Becancour, Canada chlor alkali facility in 2014.

- (5) Acquisition-related costs for the years ended December 31, 2018 and 2017 were related to the integration of the Acquired Business and consisted of advisory, legal, accounting and other professional fees.
- (6) Other operating income for the year ended December 31, 2018 included an \$8.0 million insurance recovery for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility partially offset by a \$1.7 million loss on the sale of land. Other operating income for the year ended December 31, 2017 included a gain of \$3.3 million from the sale of a former manufacturing facility.
- (7) Interest expense for the years ended December 31, 2019, 2018 and 2017 included \$17.0 million, \$16.0 million and \$3.9 million, respectively, of accretion expense related to the ethylene payment discount expected to be paid on or about the fourth quarter of 2020. Interest expense was reduced by capitalized interest of \$10.8 million, \$6.0 million and \$3.0 million for the years ended December 31, 2019, 2018 and 2017, respectively.
- (8) Non-operating pension income reflects the adoption of ASU 2017-07 and includes all components of pension and other postretirement income (costs) other than service costs, which are allocated to the operating segments based on their respective estimated census data. Operating segment results for 2017 have been restated to reflect this accounting change.
- (9) Other income for the year ended December 31, 2019 included a gain of \$11.2 million on the sale of our equity interest in a non-consolidated affiliate.

Chlor Alkali Products and Vinyls

2019 Compared to 2018

Chlor Alkali Products and Vinyls sales for 2019 were \$3,420.1 million compared to \$3,986.7 million for 2018, a decrease of \$566.6 million, or 14%. The sales decrease was primarily due to lower product pricing, primarily caustic soda, and lower volumes.

Chlor Alkali Products and Vinyls generated segment income of \$336.7 million for 2019 compared to \$637.1 million for 2018, a decrease of \$300.4 million, or 47%. The decrease in Chlor Alkali Products and Vinyls segment income was primarily due to lower product prices (\$449.4 million), primarily caustic soda, and lower volumes (\$53.0 million), partially offset by lower raw material and operating costs (\$138.1 million) and lower maintenance turnaround costs (\$42.4 million). Chlor Alkali Products and Vinyls 2018 segment income was also negatively impacted by a non-cash impairment charge associated with our investment in a non-consolidated affiliate (\$21.5 million). Chlor Alkali Products and Vinyls segment income included depreciation and amortization expense of \$470.4 million and \$473.1 million in 2019 and 2018, respectively.

2018 Compared to 2017

Chlor Alkali Products and Vinyls sales for 2018 were \$3,986.7 million compared to \$3,500.8 million for 2017, an increase of \$485.9 million, or 14%. The sales increase was primarily due to increased caustic soda, EDC, chlorine and other chlorine-derivatives pricing. The higher product prices were partially offset by lower caustic soda volumes and a less favorable product mix. Chlor Alkali Products and Vinyls 2017 sales volumes were negatively impacted by lost sales associated with Hurricane Harvey.

Chlor Alkali Products and Vinyls generated segment income of \$637.1 million for 2018 compared to \$405.8 million for 2017, an increase of \$231.3 million, or 57%. The increase in Chlor Alkali Products and Vinyls segment income was primarily due to higher product prices (\$502.9 million) and lower ethylene costs associated with the acquisition of additional cost-based ethylene from Dow in late September 2017, partially offset by higher ethane prices (\$8.0 million). Partially offsetting these benefits were higher raw material and freight costs (\$147.5 million), lower volumes, primarily caustic soda, and a less favorable product mix (\$71.1 million), increased depreciation and amortization expense (\$40.9 million) and increased operating costs (\$25.6 million), primarily maintenance to improve reliability. Chlor Alkali Products and Vinyls 2018 segment income was also negatively impacted by a non-cash impairment charge associated with our investment in a non-consolidated affiliate (\$21.5 million). Chlor Alkali Products and Vinyls 2017 segment income was negatively impacted by incremental costs to continue operations and unabsorbed fixed manufacturing costs associated with Hurricane Harvey (\$27.0 million). Chlor Alkali Products and Vinyls segment income included depreciation and amortization expense of \$473.1 million and \$432.2 million in 2018 and 2017, respectively.

Epoxy

2019 Compared to 2018

Epoxy sales were \$2,024.4 million for 2019 compared to \$2,303.1 million for 2018, a decrease of \$278.7 million, or 12%. The sales decrease was primarily due to lower product prices (\$258.9 million) and an unfavorable effect of foreign currency translation (\$62.5 million), partially offset by increased volumes (\$42.7 million).

Epoxy reported segment income of \$53.9 million for 2019 compared to \$52.8 million for 2018, an increase of \$1.1 million, or 2%. The increase in segment income was primarily due to lower maintenance costs and unabsorbed fixed manufacturing costs associated with maintenance turnarounds (\$40.0 million), decreased operating costs (\$18.1 million) and lower raw material costs (\$214.1 million), primarily benzene and propylene, partially offset by lower product prices (\$258.9 million) and an unfavorable product mix (\$12.2 million). A significant percentage of our Euro denominated sales are of products manufactured within Europe. As a result, the impact of foreign currency translation on revenue is primarily offset by the impact of foreign currency translation on raw materials and manufacturing costs also denominated in Euros. Epoxy segment results included depreciation and amortization expense of \$100.1 million and \$102.4 million in 2019 and 2018, respectively.

2018 Compared to 2017

Epoxy sales were \$2,303.1 million for 2018 compared to \$2,086.4 million for 2017, an increase of \$216.7 million, or 10%. The sales increase was primarily due to higher product prices (\$322.4 million) and a favorable effect of foreign currency translation (\$48.2 million), partially offset by lower volumes (\$153.9 million). Epoxy 2018 sales volumes were negatively impacted by lost sales associated with planned maintenance turnarounds, while 2017 Epoxy sales volumes were negatively impacted by Hurricane Harvey.

Epoxy reported segment income of \$52.8 million for 2018 compared to a segment loss of \$11.8 million for 2017, an increase of \$64.6 million. The increase in Epoxy segment results was primarily due to higher product prices (\$322.4 million) partially offset by higher raw material costs (\$190.8 million), primarily benzene and propylene. Epoxy results were also negatively impacted by lower volumes and a less favorable product mix (\$42.2 million), higher maintenance costs and unabsorbed fixed manufacturing costs associated with turnarounds and outages (\$23.1 million), increased operating costs, including utilities (\$21.3 million) and higher depreciation and amortization expense (\$8.1 million). Additionally, Epoxy 2017 segment results were negatively impacted by incremental costs to continue operations and unabsorbed fixed manufacturing costs associated with Hurricane Harvey (\$27.7 million). Epoxy segment results included depreciation and amortization expense of \$102.4 million and \$94.3 million in 2018 and 2017, respectively.

Winchester

2019 Compared to 2018

Winchester sales were \$665.5 million for 2019 compared to \$656.3 million for 2018, an increase of \$9.2 million, or 1%. The sales increase was primarily due to higher ammunition sales to commercial customers (\$13.7 million), partially offset by decreased sales to military customers and law enforcement agencies (\$4.5 million).

Winchester reported segment income of \$40.1 million for 2019 compared to \$38.4 million for 2018, an increase of \$1.7 million, or 4%. The increase in segment income was primarily due to lower costs (\$8.7 million), primarily commodity and other material costs, partially offset by lower product prices (\$6.6 million) and a less favorable product mix (\$0.4 million). Winchester segment income included depreciation and amortization expense of \$20.1 million and \$20.0 million in 2019 and 2018, respectively.

2018 Compared to 2017

Winchester sales were \$656.3 million for 2018 compared to \$681.2 million for 2017, a decrease of \$24.9 million, or 4%. The sales decrease was primarily due to lower ammunition sales to commercial customers (\$43.4 million), partially offset by higher sales to military customers and law enforcement agencies (\$18.5 million).

Winchester reported segment income of \$38.4 million for 2018 compared to \$72.4 million for 2017, a decrease of \$34.0 million, or 47%. The decrease in segment income was due to higher commodity and other material costs (\$19.6 million), lower commercial sales volumes and a less favorable product mix (\$9.4 million) and lower product prices (\$8.0 million). These decreases were partially offset by lower operating costs (\$3.0 million), including depreciation and amortization expense. Winchester segment income included depreciation and amortization expense of \$20.0 million and \$19.5 million in 2018 and 2017, respectively.

Corporate/Other

2019 Compared to 2018

For the year ended December 31, 2019, net charges to income for environmental investigatory and remedial activities were \$20.5 million, which include \$4.8 million of an environmental insurance-related settlement gain. For the year ended December 31, 2018, net credits to income for environmental investigatory and remedial activities were \$103.7 million, which include \$111.0 million of insurance recoveries for environmental costs incurred and expensed in prior periods. Without these recoveries, charges to income for environmental investigatory and remedial activities in 2019 and 2018 would have been \$25.3 million and \$7.3 million, respectively. The increase in environmental expense from the prior year primarily relates to a \$20.0 million increase in costs at a former manufacturing site resulting from revised remediation estimates as a result of agency action. These charges related primarily to expected future investigatory and remedial activities associated with past manufacturing operations and former waste disposal sites.

For 2019, other corporate and unallocated costs were \$156.3 million compared to \$158.3 million for 2018, a decrease of \$2.0 million, or 1%. The decrease was primarily due to lower legal and legal-related settlement expenses of \$17.7 million, primarily due to the legal fees associated with the environmental recovery actions in 2018, decreased management incentive expense of \$9.4 million, which includes mark-to-market adjustments on stock-based compensation expense, a favorable foreign currency impact of \$8.2 million and lower consulting charges of \$6.4 million. These decreases were partially offset by higher costs associated with the Information Technology Project of \$40.5 million.

2018 Compared to 2017

Net credits to income for environmental investigatory and remedial activities were \$103.7 million for 2018, which include \$111.0 million of insurance recoveries for environmental costs incurred and expensed in prior periods. Without these recoveries, charges to income for environmental investigatory and remedial activities would have been \$7.3 million for the year ended December 31, 2018 compared with \$8.5 million for the year ended December 31, 2017. These charges related primarily to expected future investigatory and remedial activities associated with past manufacturing operations and former waste disposal sites.

For 2018, other corporate and unallocated costs were \$158.3 million compared to \$112.4 million for 2017, an increase of \$45.9 million, or 41%. The increase was primarily due to higher costs associated with the Information Technology Project of \$31.2 million, higher legal and legal-related settlement expenses of \$18.0 million and an unfavorable foreign currency impact of \$10.6 million. The increases were partially offset by lower stock-based compensation expense of \$15.0 million, which includes mark-to-market adjustments. The higher legal and legal-related settlement expenses were primarily due to legal fees associated with environmental recovery actions.

Restructurings

On December 11, 2019, we announced that we had made the decision to permanently close a chlor alkali plant with a capacity of 230,000 tons and our VDC production facility, both in Freeport, TX. These closures are expected to be completed before the end of 2020. For the year ended December 31, 2019, we recorded pretax restructuring charges of \$58.9 million for non-cash impairment of equipment and facilities related to these actions.

On December 10, 2018, we announced that we had made the decision to permanently close the ammunition assembly operations at our Winchester facility in Geelong, Australia. Subsequent to the facility's closure, products for customers in the region are sourced from Winchester manufacturing facilities located in the United States. For the years ended December 31, 2019 and 2018, we recorded pretax restructuring charges of \$0.4 million and \$4.1 million, respectively for the write-off of equipment and facility costs, employee severance and related benefit costs and lease and other contract termination costs related to this action.

2020 OUTLOOK

Olin continues to face a challenging pricing environment as we enter 2020 within our chemicals businesses. In 2019, the Chlor Alkali Products and Vinyls business experienced weaker demand from urethane, agricultural, refrigerant, alumina, and pulp and paper customers. The Epoxy business also has experienced weaker product demand from automotive, electrical laminate, and industrial coatings customers throughout 2019. The lower demand environment put downward pressure on pricing in both chemical businesses. We expect the weak underlying demand and pricing fundamentals in our chemical businesses to persist through at least first quarter 2020. We expect lower raw material costs in both our Chlor Alkali Products and Vinyls and Epoxy segments in 2020 compared to 2019 to partially offset the pricing impact of lower demand.

We expect our Winchester segment to benefit from the Lake City U.S. Army Ammunition Plant contract beginning in the fourth quarter of 2020. We expect to incur approximately \$25 million in transition costs and \$80 million associated with an initial working capital investment in 2020 for the Lake City Plant contract. The contract is expected to increase Winchester's annual revenue by \$450 million to \$550 million.

Other Corporate and Unallocated costs in 2020 are expected to be higher than the \$156.3 million in 2019, primarily due to higher management incentive expense, including mark-to-market adjustments on stock-based compensation expense. Costs associated with the Information Technology Project in 2020 are expected to be comparable to 2019. The Information Technology Project will be substantially completed during 2020.

During 2020, we anticipate environmental expenses in the \$25 million to \$30 million range compared to \$25.3 million, excluding the \$4.8 million of insurance recoveries, in 2019. We do not believe that there will be additional recoveries of environmental costs incurred and expensed in prior periods during 2020.

We expect non-operating pension income in 2020 to be in the \$13 million to \$18 million range compared to \$16.3 million in 2019. Based on our plan assumptions and estimates, we will not be required to make any cash contributions to our domestic qualified defined benefit pension plan in 2020. We have several international qualified defined benefit pension plans for which we anticipate cash contributions of less than \$5 million in 2020.

In 2020, we currently expect our capital spending to be in the \$250 million to \$300 million range, including the investment associated with the Information Technology Project of approximately \$40 million. We expect 2020 depreciation and amortization expense to be in the \$550 million to \$575 million range.

We currently believe the 2020 effective tax rate will be in the 27% to 33% range, while we expect cash taxes will be in the range of \$30 million to \$40 million, which primarily relates to earnings in foreign jurisdictions.

PENSION AND POSTRETIREMENT BENEFITS

Under ASC 715, we recorded an after-tax charge of \$150.2 million (\$183.9 million pretax) to shareholders' equity as of December 31, 2019 for our pension and other postretirement plans. This charge primarily reflected a 100-basis point decrease in the domestic pension plans' discount rate, partially offset by favorable performance on plan assets during 2019. In 2018, we recorded an after-tax charge of \$74.9 million (\$98.5 million pretax) to shareholders' equity as of December 31, 2018 for our pension and other postretirement plans. This charge primarily reflected unfavorable performance on plan assets during 2018, partially offset by a 60-basis point increase in the domestic pension plans' discount rate. In 2017, we recorded an after-tax charge of \$21.6 million (\$27.3 million pretax) to shareholders' equity as of December 31, 2017 for our pension and other postretirement plans. This charge primarily reflected a 50-basis point decrease in the domestic pension plans' discount rate, partially offset by favorable performance on plan assets during 2017. These non-cash charges to shareholders' equity do not affect our ability to borrow under our senior credit facility.

During 2019, we made a discretionary cash contribution to our domestic qualified defined benefit pension plan of \$12.5 million. Based on our plan assumptions and estimates, we will not be required to make any cash contributions to the domestic qualified defined benefit pension plan at least through 2020.

In connection with international qualified defined benefit pension plans, we made cash contributions of \$2.4 million, \$2.6 million and \$1.7 million in 2019, 2018 and 2017, respectively, and we anticipate less than \$5 million of cash contributions to international qualified defined benefit pension plans in 2020.

At December 31, 2019, the projected benefit obligation of \$2,992.0 million exceeded the market value of assets in our qualified defined benefit pension plans by \$792.7 million, as calculated under ASC 715.

Components of net periodic benefit (income) costs were:

	<i>Years ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<i>(\$ in millions)</i>		
Pension benefits	\$ (8.8)	\$ (14.5)	\$ (26.4)
Other postretirement benefit costs	4.9	5.2	2.5

The service cost component of net periodic benefit (income) costs related to employees of the operating segments are allocated to the operating segments based on their respective estimated census data.

ENVIRONMENTAL MATTERS

	<i>Years ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<i>(\$ in millions)</i>		
Cash outlays:			
Remedial and investigatory spending (charged to reserve)	\$ 12.2	\$ 13.0	\$ 16.5
Capital spending	1.2	2.3	1.7
Plant operations (charged to cost of goods sold)	188.4	197.6	199.7
Total cash outlays	<u>\$ 201.8</u>	<u>\$ 212.9</u>	<u>\$ 217.9</u>

Cash outlays for remedial and investigatory activities associated with former waste sites and past operations were not charged to income but instead were charged to reserves established for such costs identified and expensed to income in prior years. Cash outlays for normal plant operations for the disposal of waste and the operation and maintenance of pollution control equipment and facilities to ensure compliance with mandated and voluntarily imposed environmental quality standards were charged to income.

Total environmental-related cash outlays for 2020 are estimated to be approximately \$210 million, of which approximately \$17 million is expected to be spent on investigatory and remedial efforts, approximately \$3 million on capital projects and approximately \$190 million on normal plant operations. Remedial and investigatory spending is anticipated to be higher in 2020 than 2019 due to the timing of continuing remedial action plans and investigations. Historically, we have funded our environmental capital expenditures through cash flow from operations and expect to do so in the future.

Annual environmental-related cash outlays for site investigation and remediation, capital projects and normal plant operations are expected to range between \$200 million to \$220 million over the next several years, \$15 million to \$25 million of which is for investigatory and remedial efforts, which are expected to be charged against reserves recorded on our consolidated balance sheet. While we do not anticipate a material increase in the projected annual level of our environmental-related cash outlays for site investigation and remediation, there is always the possibility that such an increase may occur in the future in view of the uncertainties associated with environmental exposures.

Our liabilities for future environmental expenditures were as follows:

	<i>December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<i>(\$ in millions)</i>		
Beginning balance	\$ 125.6	\$ 131.6	\$ 137.3
Charges to income	25.3	7.3	10.3
Remedial and investigatory spending	(12.2)	(13.0)	(16.5)
Foreign currency translation adjustments	0.3	(0.3)	0.5
Ending balance	<u>\$ 139.0</u>	<u>\$ 125.6</u>	<u>\$ 131.6</u>

As is common in our industry, we are subject to environmental laws and regulations related to the use, storage, handling, generation, transportation, emission, discharge, disposal and remediation of, and exposure to, hazardous and non-hazardous substances and wastes in all of the countries in which we do business.

The establishment and implementation of national, state or provincial and local standards to regulate air, water and land quality affect substantially all of our manufacturing locations around the world. Laws providing for regulation of the manufacture, transportation, use and disposal of hazardous and toxic substances, and remediation of contaminated sites, have imposed additional regulatory requirements on industry, particularly the chemicals industry. In addition, implementation of environmental laws has required and will continue to require new capital expenditures and will increase plant operating costs. We employ waste minimization and pollution prevention programs at our manufacturing sites.

In connection with the October 5, 2015 acquisition of Dow's U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities relating to releases of hazardous materials and violations of environmental law to the extent arising prior to October 5, 2015.

We are party to various government and private environmental actions associated with past manufacturing facilities and former waste disposal sites. Associated costs of investigatory and remedial activities are provided for in accordance with generally accepted accounting principles governing probability and the ability to reasonably estimate future costs. Our ability to estimate future costs depends on whether our investigatory and remedial activities are in preliminary or advanced stages. With respect to unasserted claims, we accrue liabilities for costs that, in our experience, we expect to incur to protect our interests against those unasserted claims. Our accrued liabilities for unasserted claims amounted to \$8.6 million at December 31, 2019. With respect to asserted claims, we accrue liabilities based on remedial investigation, feasibility study, remedial action and operation, maintenance and monitoring (OM&M) expenses that, in our experience, we expect to incur in connection with the asserted claims. Required site OM&M expenses are estimated and accrued in their entirety for required periods not exceeding 30 years, which reasonably approximates the typical duration of long-term site OM&M.

Environmental provisions charged (credited) to income, which are included in cost of goods sold, were as follows:

	<i>Years ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<i>(\$ in millions)</i>		
Provisions charged to income	\$ 25.3	\$ 7.3	\$ 10.3
Insurance recoveries for costs incurred and expensed	(4.8)	(111.0)	(1.8)
Environmental expense (income)	<u>\$ 20.5</u>	<u>\$ (103.7)</u>	<u>\$ 8.5</u>

These charges relate primarily to remedial and investigatory activities associated with past manufacturing operations and former waste disposal sites and may be material to operating results in future years.

Provisions charged to income for the year ended December 31, 2019 include a \$20.0 million increase in costs at a former manufacturing site resulting from revised remediation estimates as a result of agency action during the second quarter of 2019.

During 2018, we settled certain disputes with respect to insurance coverage for costs at various environmental remediation sites for \$121.0 million. Environmental expense (income) for the year ended December 31, 2018 include insurance recoveries for environmental costs incurred and expensed in prior periods of \$111.0 million. The recoveries are reduced by estimated liabilities of \$10.0 million associated with claims by subsequent owners of certain of the settled environmental sites. Environmental expense (income) for the year ended December 31, 2019 included \$4.8 million of recoveries associated with resolving the outstanding third party claims against the proceeds from the 2018 environmental insurance settlement.

Our total estimated environmental liability at the end of 2019 was attributable to 59 sites, 14 of which were United States Environmental Protection Agency National Priority List sites. Nine sites accounted for 81% of our environmental liability and, of the remaining 50 sites, no one site accounted for more than 3% of our environmental liability. At seven of the nine sites, part of the site is in the long-term OM&M stage. At six of the nine sites, a remedial action plan is being developed for part of the site. At five of the nine sites, a remedial design is being developed at part of the site and at four of the nine sites, part of the site is subject to a remedial investigation. All nine sites are either associated with past manufacturing operations or former waste disposal sites. None of the nine largest sites represents more than 20% of the liabilities reserved on our consolidated balance sheet at December 31, 2019 for future environmental expenditures.

Our consolidated balance sheets included liabilities for future environmental expenditures to investigate and remediate known sites amounting to \$139.0 million at December 31, 2019, and \$125.6 million at December 31, 2018, of which \$122.0 million and \$108.6 million, respectively, were classified as other noncurrent liabilities. Our environmental liability amounts do not take into account any discounting of future expenditures or any consideration of insurance recoveries or advances in technology. These liabilities are reassessed periodically to determine if environmental circumstances have changed and/or remediation efforts and our estimate of related costs have changed. As a result of these reassessments, future charges to income may be made for additional liabilities. Of the \$139.0 million included on our consolidated balance sheet at December 31, 2019 for future environmental expenditures, we currently expect to utilize \$87.3 million of the reserve for future environmental expenditures over the next 5 years, \$20.5 million for expenditures 6 to 10 years in the future, and \$31.2 million for expenditures beyond 10 years in the future. These estimates are subject to a number of risks and uncertainties, as described in “Environmental Costs” contained in Item 1A—“Risk Factors.”

Environmental exposures are difficult to assess for numerous reasons, including the identification of new sites, developments at sites resulting from investigatory studies, advances in technology, changes in environmental laws and regulations and their application, changes in regulatory authorities, the scarcity of reliable data pertaining to identified sites, the difficulty in assessing the involvement and financial capability of other PRPs, our ability to obtain contributions from other parties and the lengthy time periods over which site remediation occurs. It is possible that some of these matters (the outcomes of which are subject to various uncertainties) may be resolved unfavorably to us, which could materially adversely affect our financial position or results of operations. At December 31, 2019, we estimate it is reasonably possible that we may have additional contingent environmental liabilities of \$80 million in addition to the amounts for which we have already recorded as a reserve.

LEGAL MATTERS AND CONTINGENCIES

We are party to a dispute relating to a contract at our Plaquemine, LA facility. The other party to the contract filed a demand for arbitration alleging, among other things, that Olin breached the contract, and claims damages in excess of the amount Olin believes it is obligated to pay under the contract. Olin asserted a counterclaim alleging it has been charged a fee in excess of what the contract permits. The arbitration hearing was held during the fourth quarter 2019. Although the timing is uncertain, we currently anticipate receiving a ruling during the first half of 2020. Any additional losses related to this contract dispute are not currently estimable because of unresolved questions of fact and law but, if resolved unfavorably to Olin, they could have a material adverse effect on our financial position, cash flows or results of operations.

Olin and Oxy Vinyls, L.P. (Oxy) have a long-term chlorine supply agreement, which is the subject of a pricing dispute. The dispute is pending in the United States District Court for the Southern District of Texas. Although the timing is uncertain, we currently anticipate that the case will proceed to trial during 2020. Any additional losses related to this contract dispute are not currently estimable because of unresolved questions of fact and law but, if resolved unfavorably to Olin, they could have a material adverse effect on our financial position, cash flows or results of operations.

Olin, K.A. Steel Chemicals (a wholly owned subsidiary of Olin) and other caustic soda producers were named as defendants in six purported class action civil lawsuits filed March 22, 25 and 26, 2019 and April 12, 2019 in the U.S. District Court for the Western District of New York on behalf of the respective named plaintiffs and a putative class comprised of all persons and entities who purchased caustic soda in the U.S. directly from one or more of the defendants, their parents, predecessors, subsidiaries or affiliates at any time between October 1, 2015 and the present. Olin, K.A. Steel Chemicals and other caustic soda producers were also named as defendants in two purported class action civil lawsuits filed July 25 and 29, 2019 in the U.S. District Court for the Western District of New York on behalf of the respective named plaintiffs and a putative class comprised of all persons and entities who purchased caustic soda in the U.S. indirectly from distributors at any time between October 1, 2015 and the present. The other defendants named in the lawsuits are Occidental Petroleum Corporation, Occidental Chemical Corporation d/b/a OxyChem, Westlake Chemical Corporation, Shin-Etsu Chemical Co., Ltd., Shintech Incorporated, Formosa Plastics Corporation, and Formosa Plastics Corporation, U.S.A. The lawsuits allege the defendants conspired to fix, raise, maintain and stabilize the price of caustic soda, restrict domestic (U.S.) supply of caustic soda and allocate caustic soda customers. Plaintiffs seek an unspecified amount of damages and injunctive relief. We believe we have meritorious legal positions and will continue to represent our interests vigorously in this matter. Any losses related to this matter are not currently estimable because of unresolved questions of fact and law, but, if resolved unfavorably to Olin, could have a material adverse effect on our financial position, cash flows or results of operations.

We, and our subsidiaries, are defendants in various other legal actions (including proceedings based on alleged exposures to asbestos) incidental to our past and current business activities. We describe some of these matters in Item 3 —“Legal Proceedings.” At December 31, 2019 and 2018, our consolidated balance sheets included liabilities for these other legal actions of \$12.4 million and \$15.6 million, respectively. These liabilities do not include costs associated with legal representation. Based on our analysis, and considering the inherent uncertainties associated with litigation, we do not believe that it is reasonably possible that these other legal actions will materially adversely affect our financial position, cash flows or results of operations. In connection with the October 5, 2015 acquisition of Dow’s U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities related to litigation to the extent arising prior to October 5, 2015.

During the ordinary course of our business, contingencies arise resulting from an existing condition, situation or set of circumstances involving an uncertainty as to the realization of a possible gain contingency. In certain instances such as environmental projects, we are responsible for managing the clean-up and remediation of an environmental site. There exists the possibility of recovering a portion of these costs from other parties. We account for gain contingencies in accordance with the provisions of ASC 450 “Contingencies” and therefore do not record gain contingencies and recognize income until it is earned and realizable.

For the year ended December 31, 2018, we recognized an insurance recovery of \$8.0 million in other operating income for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility.

LIQUIDITY, INVESTMENT ACTIVITY AND OTHER FINANCIAL DATA

Cash Flow Data

<i>Provided by (used for)</i>	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(\$ in millions)</i>		
Net operating activities	\$ 617.3	\$ 907.8	\$ 648.8
Capital expenditures	(385.6)	(385.2)	(294.3)
Payments under long-term supply contracts	—	—	(209.4)
Proceeds from disposition of non-consolidated affiliate	20.0	—	—
Net investing activities	(365.6)	(382.3)	(498.5)
Long-term debt borrowings (repayments), net	80.8	(376.1)	(2.4)
Common stock repurchased and retired	(145.9)	(50.0)	—
Stock options exercised	1.7	3.4	29.8
Debt issuance costs	(16.6)	(8.5)	(11.2)
Net financing activities	(209.3)	(564.8)	(116.8)

Operating Activities

For 2019, cash provided by operating activities decreased by \$290.5 million from 2018, primarily due to a decrease in operating results partially offset by a decrease in the investment in working capital from the prior year. For 2019, working capital decreased \$11.0 million compared to an increase of \$71.6 million in 2018. Receivables decreased from December 31, 2018 by \$12.3 million primarily as a result of lower sales in the fourth quarter of 2019 compared to the fourth quarter of 2018 partially offset by a decrease in receivables sold under the accounts receivable factoring arrangement. In 2019, inventories decreased by \$13.0 million and accounts payable and accrued liabilities decreased by \$11.0 million. The decreases in inventories and accounts payable were primarily due to lower raw material costs.

For 2018, cash provided by operating activities increased by \$259.0 million from 2017, primarily due to an increase in operating results, partially offset by an increase in working capital. For 2018, working capital increased \$71.6 million compared to a decrease of \$9.8 million in 2017. Receivables increased from December 31, 2017 by \$46.3 million primarily as a result of higher sales in the fourth quarter of 2018 compared to the fourth quarter of 2017 and a decrease in receivables sold under the accounts receivable factoring arrangement. In 2018, inventories increased by \$35.5 million and accounts payable and accrued liabilities increased by \$14.5 million. The increases in inventories and accounts payable were primarily due to higher raw material costs. The increase in accrued liabilities was primarily related to the Information Technology Project.

Capital Expenditures

Capital spending was \$385.6 million and \$385.2 million in 2019 and 2018, respectively. Capital spending was 78% and 77% of depreciation in 2019 and 2018, respectively.

In 2017, we began a multi-year implementation of the Information Technology Project. The project is planned to standardize business processes across the chemicals businesses with the objective of maximizing cost effectiveness, efficiency and control across our global operations. At the end of 2019, Olin had successfully converted approximately 35% of our chemical business users to the new enterprise resource planning systems. The project is anticipated to be substantially completed during 2020. Total capital spending is forecast to be \$220 million and associated expenses are forecast to be \$190 million, including duplicate information technology costs being incurred during the transition. Our results for the years ended December 31, 2019, 2018 and 2017 include \$56.0 million, \$84.5 million and \$35.8 million, respectively, of capital spending and \$77.0 million, \$36.5 million and \$5.3 million, respectively, of expenses associated with this project.

In 2020, we expect our capital spending to be in the \$250 million to \$300 million range, which includes approximately \$40 million of capital spending related to the Information Technology Project.

Investing Activities

On January 1, 2019, we sold our 9.1% limited partnership interest in Bay Gas for \$20.0 million. The sale closed on February 7, 2019 which resulted in a gain of \$11.2 million.

Financing Activities

For the year ended December 31, 2019, our long-term debt borrowings, net of long-term repayments, were \$80.8 million, which included repayments of \$543.0 million related to the \$1,375.0 million Term Loan Facility and \$150.0 million related to the Receivables Financing Agreement.

On July 16, 2019, Olin issued \$750.0 million aggregate principal amount of 5.625% senior notes due August 1, 2029, which were registered under the Securities Act of 1933, as amended. Proceeds from the 2029 Notes were used to redeem the remaining balance of the \$1,375.0 million Term Loan Facility of \$493.0 million and \$150.0 million of the Receivables Financing Agreement.

On July 16, 2019, Olin entered into a new five-year, \$2,000.0 million senior credit facility, which replaces the existing \$1,975.0 million senior credit facility. The 2019 Senior Credit Facility will mature in July 2024. In December 2019, Olin amended the 2019 Senior Credit Facility which amended the restrictive covenants of the agreement, including expanding the coverage and leverage ratios to be less restrictive over the next two and a half years. The 2019 Senior Credit Facility includes a senior unsecured delayed-draw term loan facility in an aggregate principal amount of up to \$1,200.0 million and an \$800.0 million senior unsecured revolving credit facility. The Delayed Draw Term Loan Facility will be available on a delayed basis in up to three draws to be made on or prior to November 29, 2020. We expect the proceeds from the Delayed Draw Term

Loan Facility will be used to redeem the 9.75% senior notes due 2023 and the 10.00% senior notes due 2025 on or about October 15, 2020.

For the year ended December 31, 2018, our long-term debt repayments, net of long-term debt borrowings, were \$376.1 million, which included \$780.4 million related to the \$1,375.0 million Term Loan Facility, \$124.7 million related to the Receivables Financing Agreement and \$20.0 million related to the 2017 Senior Revolving Credit Facility.

On January 19, 2018, Olin issued \$550.0 million aggregate principal amount of 5.00% senior notes due February 1, 2030 (2030 Notes), which were registered under the Securities Act of 1933, as amended. Interest on the 2030 Notes began accruing from January 19, 2018 and is paid semi-annually beginning on August 1, 2018. Proceeds from the 2030 Notes were used to redeem \$550.0 million of debt under the \$1,375.0 million Term Loan Facility.

In 2019 and 2018, we repurchased and retired 8.0 million and 2.1 million shares, respectively, with a total value of \$145.9 million and \$50.0 million, respectively.

In 2019 and 2018, we issued 0.1 million and 0.2 million shares, respectively, with a total value of \$1.7 million and \$3.4 million, respectively, representing stock options exercised.

In 2019, we paid debt issuance costs of \$16.6 million, primarily for the issuance of the 2029 Notes and the 2019 Senior Credit Facility. In 2018, we paid debt issuance costs of \$8.5 million relating to the 2030 Notes.

The percent of total debt to total capitalization increased to 58.0% at December 31, 2019 compared to 53.3% at December 31, 2018, primarily resulting from lower shareholders' equity as a result of the payment of quarterly cash dividends and share repurchases.

Dividends per common share were \$0.80 in 2019 and 2018. Total dividends paid on common stock amounted to \$129.3 million and \$133.6 million in 2019 and 2018, respectively. On January 24, 2020, our board of directors declared a dividend of \$0.20 per share on our common stock, payable on March 10, 2020 to shareholders of record on February 10, 2020.

The payment of cash dividends is subject to the discretion of our board of directors and will be determined in light of then-current conditions, including our earnings, our operations, our financial condition, our capital requirements and other factors deemed relevant by our board of directors. In the future, our board of directors may change our dividend policy, including the frequency or amount of any dividend, in light of then-existing conditions.

LIQUIDITY AND OTHER FINANCING ARRANGEMENTS

Our principal sources of liquidity are from cash and cash equivalents, cash flow from operations and borrowings under our Delayed Draw Term Loan Facility, 2019 Senior Revolving Credit Facility, Receivables Financing Agreement and AR Facilities. Additionally, we believe that we have access to the debt and equity markets.

The overall cash increase of \$42.1 million in 2019 primarily reflects our operating results and long-term debt borrowings, net of repayments, partially offset by dividend payments, capital spending and share repurchases. We believe, based on current and projected levels of cash flow from our operations, together with our cash and cash equivalents on hand and the availability to borrow under our 2019 Senior Revolving Credit Facility, Delayed Draw Term Loan Facility, Receivables Financing Agreement and AR Facilities, we have sufficient liquidity to meet our short-term and long-term needs to make required payments of interest on our debt, fund our operating needs, working capital, the payment to Dow for our ethylene investment on or about the fourth quarter of 2020, and capital expenditure requirements and comply with the financial ratios in our debt agreements.

On April 26, 2018, our board of directors authorized a share repurchase program for the purchase of shares of common stock at an aggregate price of up to \$500.0 million. This program will terminate upon the purchase of \$500.0 million of our common stock. For the years ended December 31, 2019 and 2018, 8.0 million and 2.1 million shares, respectively, were repurchased and retired at a cost of \$145.9 million and \$50.0 million, respectively. As of December 31, 2019, a total of 10.1 million shares were repurchased and retired at a cost of \$195.9 million and \$304.1 million of common stock remained authorized to be repurchased.

For the year ended December 31, 2019, our long-term debt borrowings, net of long-term repayments, were \$80.8 million, which included repayments of \$543.0 million related to the \$1,375.0 million Term Loan Facility and \$150.0 million related to the Receivables Financing Agreement.

On July 16, 2019, Olin issued \$750.0 million aggregate principal amount of 5.625% senior notes due August 1, 2029, which were registered under the Securities Act of 1933, as amended. Proceeds from the 2029 Notes were used to redeem the remaining balance of the \$1,375.0 million Term Loan Facility of \$493.0 million and \$150.0 million of the Receivables Financing Agreement.

On July 16, 2019, Olin also entered into a new five-year, \$2,000.0 million senior credit facility, which replaces the existing 2017 Senior Credit Facility. The 2019 Senior Credit Facility will mature in July 2024. In December 2019, Olin amended the 2019 Senior Credit Facility which amended the restrictive covenants of the agreement, including expanding the coverage and leverage ratios to be less restrictive over the next two and a half years. The 2019 Senior Credit Facility includes a senior unsecured delayed-draw term loan facility in an aggregate principal amount of up to \$1,200.0 million and an \$800.0 million senior unsecured revolving credit facility. The 2019 Senior Revolving Credit Facility includes a \$100.0 million letter of credit subfacility. For the year ended December 31, 2019, we had \$796.5 million available under our \$800.0 million 2019 Senior Revolving Credit Facility because we had issued \$3.5 million of letters of credit. The Delayed Draw Term Loan Facility will be available on a delayed basis in up to three draws to be made on or prior to November 29, 2020. We expect the proceeds from the Delayed Draw Term Loan Facility will be used to redeem the 9.75% senior notes due 2023 and the 10.00% senior notes due 2025 on or about October 15, 2020. If redeemed, Olin will be required to pay a call premium associated with the 2023 and 2025 senior notes of approximately \$42 million.

Under the 2019 Senior Credit Facility, we may select various floating rate borrowing options. The actual interest rate paid on borrowings under the 2019 Senior Credit Facility is based on a pricing grid which is dependent upon the leverage ratio as calculated under the terms of the applicable facility for the prior fiscal quarter. The facility includes various customary restrictive covenants, including restrictions related to the ratio of debt to earnings before interest expense, taxes, depreciation and amortization (leverage ratio) and the ratio of earnings before interest expense, taxes, depreciation and amortization to interest expense (coverage ratio). Compliance with these covenants is determined quarterly based on operating cash flows. We were in compliance with all covenants and restrictions under all our outstanding credit agreements as of December 31, 2019, and no event of default had occurred that would permit the lenders under our outstanding credit agreements to accelerate the debt if not cured. In the future, our ability to generate sufficient operating cash flows, among other factors, will determine the amounts available to be borrowed under these facilities. As of December 31, 2019, there were no covenants or other restrictions that would have limited our ability to borrow under these facilities.

On January 19, 2018, Olin issued \$550.0 million aggregate principal amount of 5.00% senior notes due February 1, 2030, which were registered under the Securities Act of 1933, as amended. Interest on the 2030 Notes began accruing from January 19, 2018 and is paid semi-annually beginning on August 1, 2018. Proceeds from the 2030 Notes were used to redeem \$550.0 million of debt under the \$1,375.0 million Term Loan Facility.

For the year ended December 31, 2018, long-term debt repayments included \$780.4 million related to the \$1,375.0 million Term Loan Facility, \$124.7 million related to the Receivables Financing Agreement and \$20.0 million related to the 2017 Senior Revolving Credit Facility.

In connection with the Acquisition, Olin and Dow entered into arrangements for the long-term supply of ethylene by Dow to Olin, pursuant to which, among other things, Olin made upfront payments in order to receive ethylene at producer economics and for certain reservation fees and for the option to obtain additional future ethylene supply at producer economics. On February 27, 2017, we exercised the remaining option to obtain additional ethylene at producer economics from Dow. In connection with the exercise of this option, we also secured a long-term customer arrangement. As a result, an additional payment will be made to Dow that is not to exceed \$493 million on or about the fourth quarter of 2020.

On July 16, 2019, our existing \$250.0 million Receivables Financing Agreement was extended to July 15, 2022 and downsized to \$10.0 million with the option to expand to \$300.0 million. The administrative agent for our Receivables Financing Agreement is PNC Bank, National Association. Under the Receivables Financing Agreement, our eligible trade receivables are used for collateralized borrowings and continue to be serviced by us. In addition, the Receivables Financing Agreement incorporates the leverage and coverage covenants that are contained in the \$2,000.0 million senior credit facility. As of December 31, 2019 and 2018, we had zero and \$125.0 million, respectively, drawn under the agreement. As of December 31, 2019, we had \$10.0 million of additional borrowing capacity under the Receivables Financing Agreement.

Olin also has trade accounts receivable factoring arrangements (AR Facilities) and pursuant to the terms of the AR Facilities, certain of our subsidiaries may sell their accounts receivable up to a maximum of \$315.0 million. We will continue to service the outstanding accounts sold. These receivables qualify for sales treatment under ASC 860 "Transfers and Servicing" and, accordingly, the proceeds are included in net cash provided by operating activities in the consolidated

statements of cash flows. The gross amount of receivables sold for the years ended December 31, 2019 and 2018 totaled \$984.8 million and \$1,372.3 million, respectively. The factoring discount paid under the AR Facilities is recorded as interest expense on the consolidated statements of operations. The factoring discount for the years ended December 31, 2019 and 2018 was \$2.9 million and \$4.3 million, respectively. The agreements are without recourse and therefore no recourse liability has been recorded as of December 31, 2019. As of December 31, 2019 and 2018, \$63.1 million and \$132.4 million, respectively, of receivables qualifying for sales treatment were outstanding and will continue to be serviced by us.

Cash flow from operations is variable as a result of both the seasonal and the cyclical nature of our operating results, which have been affected by seasonal and economic cycles in many of the industries we serve, such as vinyls, urethanes, bleach, ammunition and pulp and paper. Cash flow from operations is affected by changes in chlorine, caustic soda and EDC selling prices caused by the changes in the supply/demand balance of these products, resulting in the Chlor Alkali Products and Vinyls segment having significant leverage on our earnings and cash flow. For example, assuming all other costs remain constant, internal consumption remains approximately the same and we are operating at full capacity, a \$10 selling price change per ton of chlorine equates to an approximate \$10 million annual change in our revenues and pretax profit, a \$10 selling price change per ton of caustic soda equates to an approximate \$30 million annual change in our revenues and pretax profit, and a \$0.01 selling price change per pound of EDC equates to an approximate \$20 million annual change in our revenues and pretax profit.

For 2019, cash provided by operating activities decreased by \$290.5 million from 2018, primarily due to a decrease in operating results partially offset by a decrease in the investment in working capital from the prior year. For 2019, working capital decreased \$11.0 million compared to an increase of \$71.6 million in 2018. Receivables decreased from December 31, 2018 by \$12.3 million primarily as a result of lower sales in the fourth quarter of 2019 compared to the fourth quarter of 2018 partially offset by a decrease in receivables sold under the accounts receivable factoring arrangement. In 2019, inventories decreased by \$13.0 million and accounts payable and accrued liabilities decreased by \$11.0 million. The decreases in inventories and accounts payable were primarily due to lower raw material costs.

Capital spending was \$385.6 million and \$385.2 million in 2019 and 2018, respectively. Capital spending was 78% and 77% of depreciation in 2019 and 2018, respectively.

In 2017, we began a multi-year implementation of the Information Technology Project. The project is planned to standardize business processes across the chemicals businesses with the objective of maximizing cost effectiveness, efficiency and control across our global operations. At the end of 2019, Olin had successfully converted approximately 35% of our chemical business users to the new enterprise resource planning systems. The project is anticipated to be substantially completed during 2020. Total capital spending is forecast to be \$220 million and associated expenses are forecast to be \$190 million, including duplicate information technology costs being incurred during the transition. Our results for the years ended December 31, 2019, 2018 and 2017 include \$56.0 million, \$84.5 million and \$35.8 million, respectively, of capital spending and \$77.0 million, \$36.5 million and \$5.3 million, respectively, of expenses associated with this project.

In 2020, we expect our capital spending to be in the \$250 million to \$300 million range, which includes approximately \$40 million of capital spending related to the Information Technology Project.

At December 31, 2019, we had total letters of credit of \$68.7 million outstanding, of which \$3.5 million were issued under our 2019 Senior Revolving Credit Facility. The letters of credit were used to support certain long-term debt, certain workers compensation insurance policies, certain plant closure and post-closure obligations and certain international pension funding requirements.

Our current debt structure is used to fund our business operations. As of December 31, 2019, we had long-term borrowings, including the current installment and finance lease obligations, of \$3,340.8 million, of which \$155.9 million was at variable rates. Annual maturities of long-term debt, including capital lease obligations, are \$2.1 million in 2020, \$1.0 million in 2021, \$200.7 million in 2022, \$720.6 million in 2023, \$70.7 million in 2024 and a total of \$2,386.1 million thereafter. Commitments from banks under our Delayed Draw Term Loan Facility, 2019 Senior Revolving Credit Facility, Receivables Financing Agreement and AR Facilities are an additional source of liquidity. Included within the \$3,340.8 million of long-term borrowings on the consolidated balance sheet as of December 31, 2019 were unamortized deferred debt issuance costs and deferred losses on fair value interest rate swaps of \$40.4 million.

We use interest rate swaps as a means of minimizing cash flow fluctuations that may arise from volatility in interest rates of our variable-rate borrowings. In April 2016, we entered into three tranches of forward starting interest rate swaps whereby we agreed to pay fixed rates to the counterparties who, in turn, pay us floating rates on \$1,100.0 million, \$900.0 million and \$400.0 million of our underlying floating-rate debt obligations. Each tranche's term length was for twelve months beginning on December 31, 2016, 2017 and 2018, respectively. The swaps were designated as cash flow hedges of the risk of changes in interest payments associated with our variable-rate borrowings. In July 2019, we terminated the remaining interest rate swap which resulted in a gain of \$1.8 million that was recognized in interest expense. For the years ended December 31, 2019 and 2018, \$4.3 million and \$8.9 million, respectively, of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

In April 2016, we entered into interest rate swaps on \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. In October 2016, we entered into interest rate swaps on an additional \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. We designated the April 2016 and October 2016 interest rate swap agreements as fair value hedges of the risk of changes in the value of fixed rate debt due to changes in interest rates for a portion of our fixed rate borrowings. In August 2019, we terminated the April 2016 and October 2016 interest rate swaps which resulted in a loss of \$2.3 million that will be deferred as an offset to the carrying value of the related debt and will be recognized to interest expense through October 2025. As of December 31, 2019, \$2.2 million of this loss was included in long-term debt. For the years ended December 31, 2019 and 2018, \$2.6 million and \$2.1 million, respectively, of expense was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

We have registered an undetermined amount of securities with the SEC, so that, from time-to-time, we may issue debt securities, preferred stock and/or common stock and associated warrants in the public market under that registration statement.

CONTRACTUAL OBLIGATIONS AND OFF-BALANCE SHEET ARRANGEMENTS

Our long-term contractual commitments, including the on and off-balance sheet arrangements, consisted of the following:

	<i>Payments Due by Period</i>				
	<i>Total</i>	<i>Less than 1 Year</i>	<i>1-3 Years</i>	<i>3-5 Years</i>	<i>More than 5 Years</i>
<i>Contractual Obligations</i>					
<i>(\$ in millions)</i>					
Debt obligations, including finance lease obligations ⁽¹⁾	\$ 3,381.2	\$ 2.1	\$ 201.7	\$ 791.3	\$ 2,386.1
Interest payments under debt obligations ⁽²⁾	1,513.3	230.9	457.7	353.7	471.0
Contingent tax liability	22.4	3.8	8.6	4.4	5.6
Domestic qualified pension plan contributions ⁽³⁾	—	—	—	—	—
International qualified pension plan contributions ⁽⁴⁾	298.4	4.5	13.3	14.4	266.2
Non-qualified pension plan payments	5.8	0.8	0.9	0.6	3.5
Postretirement benefit payments	52.7	3.7	6.6	6.0	36.4
Long-term supply contracts	493.0	—	493.0	—	—
Operating leases	446.1	88.8	126.0	77.7	153.6
Off-Balance Sheet Commitments:					
Purchasing commitments:					
Raw materials	5,962.2	623.6	1,312.2	1,260.2	2,766.2
Capital expenditures	4.0	4.0	—	—	—
Utilities	0.7	0.4	0.3	—	—
Total	\$ 12,179.8	\$ 962.6	\$ 2,620.3	\$ 2,508.3	\$ 6,088.6

- (1) Excludes unamortized debt issuance costs and deferred losses on fair value interest rate swaps of \$40.4 million at December 31, 2019. All debt obligations are assumed to be held until maturity.
- (2) For the purposes of this table, we have assumed for all periods presented that there are no changes in the rates from those in effect at December 31, 2019 which ranged from 1.70% to 10.00% and excludes \$15.7 million of remaining accretion expense related to the ethylene payment discount expected to be paid on or about the fourth quarter of 2020.
- (3) Given the inherent uncertainty as to actual minimum funding requirements for qualified defined benefit pension plans, no amounts are included in this table for any period beyond one year. Based on the current funding requirements, we will not be required to make any cash contributions to the domestic qualified defined benefit pension plan at least through 2020. During 2019, we made a discretionary cash contribution to our domestic qualified defined benefit pension plan of \$12.5 million.
- (4) These amounts are only estimated payments assuming for our foreign qualified pension plans a weighted average annual expected rate of return on pension plan assets of 5.2% and a discount rate on pension plan obligations of 1.4%. These estimated payments are subject to significant variation and the actual payments may be more than the amounts estimated. In connection with international qualified defined benefit pension plans we made cash contributions of \$2.4 million, \$2.6 million and \$1.7 million in 2019, 2018 and 2017, respectively, and we anticipate less than \$5 million of cash contributions to international qualified defined benefit pension plans in 2020.

Non-cancelable operating leases and purchasing commitments are utilized in our normal course of business for our projected needs. Our operating lease commitments are primarily for railroad cars, but also include logistics, manufacturing, office and storage facilities and equipment, information technology equipment and land. Virtually none of our lease agreements contain escalation clauses or step rent provisions. We have supply contracts with various third parties for certain raw materials, including ethylene, electricity, propylene and benzene. These contracts have initial terms ranging from several to 20 years. For losses that we believe are probable and which are estimable, we have accrued for such amounts in our consolidated balance sheets. In addition to the table above, we have various commitments and contingencies including: defined benefit and postretirement healthcare plans (as described below), environmental matters (see discussion above under “Environmental Matters”) and litigation claims (see Item 3—“Legal Proceedings”).

We have several defined benefit pension and defined contribution plans, as described in Note 14 “Pension Plans” and Note 18 “Contributing Employee Ownership Plan” in the notes to consolidated financial statements contained in Item 8. We fund the defined benefit pension plans based on the minimum amounts required by law plus such amounts we deem appropriate. We have postretirement healthcare plans that provide health and life insurance benefits to certain retired employees and their beneficiaries, as described in Note 15 “Postretirement Benefits” in the notes to consolidated financial statements contained in Item 8. The defined contribution and other postretirement plans are not pre-funded and expenses are paid by us as incurred.

We also have standby letters of credit of \$68.7 million of which \$3.5 million have been issued through our 2019 Senior Revolving Credit Facility. At December 31, 2019, we had \$796.5 million available under our 2019 Senior Revolving Credit Facility because we had issued \$3.5 million of letters of credit.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, sales and expenses, and related disclosure of contingent assets and liabilities. Significant estimates in our consolidated financial statements include goodwill recoverability, environmental, restructuring and other unusual items, litigation, income tax reserves including deferred tax asset valuation allowances, pension, postretirement and other benefits and allowance for doubtful accounts. We base our estimates on prior experience, current facts and circumstances and other assumptions. Actual results may differ from these estimates.

We believe the following critical accounting policies affect the more significant judgments and estimates used in the preparation of the consolidated financial statements.

Goodwill

Goodwill is not amortized, but is reviewed for impairment annually in the fourth quarter and/or when circumstances or other events indicate that impairment may have occurred. ASC 350 “Intangibles—Goodwill and Other” (ASC 350) permits entities to make a qualitative assessment of whether it is more likely than not that a reporting unit’s fair value is less than its carrying amount before applying the two-step goodwill impairment test. Circumstances that are considered as part of the qualitative assessment and could trigger the two-step impairment test include, but are not limited to: a significant adverse change in the business climate; a significant adverse legal judgment; adverse cash flow trends; an adverse action or assessment by a government agency; unanticipated competition; sustained decline in our stock price; and a significant restructuring charge within a reporting unit. We define reporting units at the business segment level or one level below the business segment level. For purposes of testing goodwill for impairment, goodwill has been allocated to our reporting units to the extent it relates to each reporting unit.

It is our practice, at a minimum, to perform a quantitative goodwill impairment test in the fourth quarter every three years. In the fourth quarter of 2019, we performed our triennial quantitative goodwill impairment test for our reporting units. We use a discounted cash flow approach to develop the estimated fair value of a reporting unit when a quantitative review is performed. Management judgment is required in developing the assumptions for the discounted cash flow model. We also corroborate our discounted cash flow analysis by evaluating a market-based approach that considers earnings before interest, taxes, depreciation and amortization (EBITDA) multiples from a representative sample of comparable public companies. As a further indicator that each reporting unit has been valued appropriately using a discounted cash flow model, the aggregate fair value of all reporting units is reconciled to the total market value of Olin. An impairment would be recorded if the carrying amount of a reporting unit exceeded the estimated fair value. Based on the aforementioned analysis, the estimated fair value of

our reporting units exceeded the carrying value of the reporting units. No impairment charges were recorded for 2019, 2018 or 2017.

The discount rate, profitability assumptions and terminal growth rate of our reporting units and the cyclical nature of the chlor alkali industry were the material assumptions utilized in the discounted cash flow model used to estimate the fair value of each reporting unit. The discount rate reflects a weighted-average cost of capital, which is calculated based on observable market data. Some of this data (such as the risk free or treasury rate and the pretax cost of debt) are based on the market data at a point in time. Other data (such as the equity risk premium) are based upon market data over time for a peer group of companies in the chemical manufacturing or distribution industries with a market capitalization premium added, as applicable.

The discounted cash flow analysis requires estimates, assumptions and judgments about future events. Our analysis uses our internally generated long-range plan. Our discounted cash flow analysis uses the assumptions in our long-range plan about terminal growth rates, forecasted capital expenditures and changes in future working capital requirements to determine the implied fair value of each reporting unit. The long-range plan reflects management judgment, supplemented by independent chemical industry analyses which provide multi-year chlor alkali industry operating and pricing forecasts.

We believe the assumptions used in our goodwill impairment analysis are appropriate and result in reasonable estimates of the implied fair value of each reporting unit. However, given the economic environment and the uncertainties regarding the impact on our business, there can be no assurance that our estimates and assumptions, made for purposes of our goodwill impairment testing, will prove to be an accurate prediction of the future. In order to evaluate the sensitivity of the fair value calculation on the goodwill impairment test, we applied a hypothetical 10% decrease to the fair value of each reporting unit. We also applied a hypothetical decrease of 100-basis points in our terminal growth rate or an increase of 100-basis points in our weighted-average cost of capital to test the fair value calculation. In all cases, the estimated fair value of our reporting units derived in these sensitivity calculations exceeded the carrying value in excess of 10%. If our assumptions regarding future performance are not achieved, we may be required to record goodwill impairment charges in future periods. It is not possible at this time to determine if any such future impairment charge would result or, if it does, whether such charge would be material.

Environmental

Accruals (charges to income) for environmental matters are recorded when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated, based upon current law and existing technologies. These amounts, which are not discounted and are exclusive of claims against third parties, are adjusted periodically as assessments and remediation efforts progress or additional technical or legal information becomes available. Environmental costs are capitalized if the costs increase the value of the property and/or mitigate or prevent contamination from future operations. Environmental costs and recoveries are included in costs of goods sold.

Environmental exposures are difficult to assess for numerous reasons, including the identification of new sites, developments at sites resulting from investigatory studies, advances in technology, changes in environmental laws and regulations and their application, changes in regulatory authorities, the scarcity of reliable data pertaining to identified sites, the difficulty in assessing the involvement and financial capability of other PRPs and our ability to obtain contributions from other parties and the lengthy time periods over which site remediation occurs. It is possible that some of these matters (the outcomes of which are subject to various uncertainties) may be resolved unfavorably to us, which could materially adversely affect our financial position, cash flows or results of operations.

NEW ACCOUNTING PRONOUNCEMENTS

In December 2019, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2019-12, "Simplifying the Accounting for Income Taxes" which amends ASC 740 "Income Taxes" (ASC 740). This update is intended to simplify accounting for income taxes by removing certain exceptions to the general principles in ASC 740 and amending existing guidance to improve consistent application of ASC 740. This update is effective for fiscal years beginning after December 15, 2020 and interim periods within those fiscal years. The guidance in this update has various elements, some of which are applied on a prospective basis and others on a retrospective basis with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, "Simplifying the Test for Goodwill Impairment" which amends ASC 350. This update will simplify the measurement of goodwill impairment by eliminating Step 2 from the goodwill impairment test. This update will require an entity to perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount

exceeds the reporting unit's fair value. The update does not modify the option to perform the qualitative assessment for a reporting unit to determine if the quantitative impairment test is necessary. This update is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. The guidance in this update is applied on a prospective basis, with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, "Measurement of Credit Losses on Financial Instruments," (ASU 2016-13) which amends ASC 326 "Financial Instruments—Credit Losses" (ASC 326). Subsequent to the issuance of ASU 2016-13, ASC 326 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. The new guidance introduces the current expected credit loss (CECL) model, which will require an entity to record an allowance for credit losses for certain financial instruments and financial assets, including trade receivables, based on expected losses rather than incurred losses. Under this update, on initial recognition and at each reporting period, an entity will be required to recognize an allowance that reflects the entity's current estimate of credit losses expected to be incurred over the life of the financial instrument. This update is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. The guidance in this update has various elements, some of which are applied on a prospective basis and others on a retrospective basis, with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements and related disclosures.

In February 2016, the FASB issued ASU 2016-02 "Leases," (ASU 2016-02) which supersedes ASC 840 "Leases" and creates a new topic, ASC 842 "Leases" (ASC 842). Subsequent to the issuance of ASU 2016-02, ASC 842 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. These updates require lessees to recognize a lease liability and a lease asset for all leases, including operating leases, with a term greater than 12 months on its balance sheet. Upon initial application, the provisions of these updates are required to be applied using the modified retrospective method which requires retrospective adoption to each prior reporting period presented with the cumulative effect of adoption recorded to the earliest reporting period presented. An optional transition method can be utilized which requires application of these updates beginning on the date of adoption with the cumulative effect of initially applying these updates recognized at the date of initial adoption. These updates also expand the required quantitative and qualitative disclosures surrounding leases. These updates are effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years, with earlier application permitted. We adopted these updates on January 1, 2019 using the optional transition method. Accordingly, prior periods were not retrospectively adjusted. Adoption of these updates resulted in the recording of operating lease assets and lease liabilities on our consolidated balance sheet of \$291.9 million as of January 1, 2019. Our assets and liabilities for finance leases remained unchanged. We also recognized the cumulative effect of applying these updates as an adjustment to retained earnings of \$11.2 million, net of tax, which was primarily related to the recognition of previously deferred sale/leaseback gains. Our consolidated statements of operations and cash flows, along with our compliance with all covenants and restrictions under all our outstanding credit agreements, were not impacted by this adoption. These updates also impacted our accounting policies, internal controls and disclosures related to leases. Expanded disclosures regarding leases are included in Note 23 "Leases" in the notes to the consolidated financial statements contained in Item 8.

DERIVATIVE FINANCIAL INSTRUMENTS

We are exposed to market risk in the normal course of our business operations due to our purchases of certain commodities, our ongoing investing and financing activities and our operations that use foreign currencies. The risk of loss can be assessed from the perspective of adverse changes in fair values, cash flows and future earnings. We have established policies and procedures governing our management of market risks and the use of financial instruments to manage exposure to such risks. ASC 815 requires an entity to recognize all derivatives as either assets or liabilities in the consolidated balance sheets and measure those instruments at fair value. In accordance with ASC 815, we designate derivative contracts as cash flow hedges of forecasted purchases of commodities and forecasted interest payments related to variable-rate borrowings and designate certain interest rate swaps as fair value hedges of fixed-rate borrowings. We do not enter into any derivative instruments for trading or speculative purposes.

Energy costs, including electricity and natural gas, and certain raw materials used in our production processes are subject to price volatility. Depending on market conditions, we may enter into futures contracts, forward contracts, commodity swaps and put and call option contracts in order to reduce the impact of commodity price fluctuations. The majority of our commodity derivatives expire within one year.

For derivative instruments that are designated and qualify as a cash flow hedge, the change in fair value of the derivative is recognized as a component of other comprehensive income (loss) until the hedged item is recognized in earnings.

We use cash flow hedges for certain raw material and energy costs such as copper, zinc, lead, ethane, electricity and natural gas to provide a measure of stability in managing our exposure to price fluctuations associated with forecasted purchases of raw materials and energy used in our manufacturing process. Settlements on commodity derivative contracts resulted in (losses) gains of \$(31.1) million, \$5.4 million, and \$1.5 million in 2019, 2018, and 2017, respectively which were included in cost of goods sold. At December 31, 2019, we had open derivative notional contract positions through 2027 totaling \$174.6 million (2018—\$116.5 million). If all open futures contracts had been settled on December 31, 2019, we would have recognized a pretax loss of \$17.6 million.

If commodity prices were to remain at December 31, 2019 levels, approximately \$12.7 million of deferred losses, net of tax, would be reclassified into earnings during the next twelve months. The actual effect on earnings will be dependent on actual commodity prices when the forecasted transactions occur.

We use interest rate swaps as a means of minimizing cash flow fluctuations that may arise from volatility in interest rates of our variable-rate borrowings. In April 2016, we entered into three tranches of forward starting interest rate swaps whereby we agreed to pay fixed rates to the counterparties who, in turn, pay us floating rates on \$1,100.0 million, \$900.0 million and \$400.0 million of our underlying floating-rate debt obligations. Each tranche's term length was for twelve months beginning on December 31, 2016, 2017 and 2018, respectively. We have designated the swaps as cash flow hedges of the risk of changes in interest payments associated with our variable-rate borrowings. In July 2019, we terminated the remaining interest rate swap agreement which resulted in a gain of \$1.8 million that was recognized in interest expense for the year ended December 31, 2019. For the years ended December 31, 2019, 2018 and 2017, \$4.3 million, \$8.9 million and \$3.1 million, respectively, of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

We also use interest rate swaps as a means of managing interest expense and floating interest rate exposure to optimal levels. For derivative instruments that are designated and qualify as a fair value hedge, the gain or loss on the derivative as well as the offsetting loss or gain on the hedged item attributable to the hedged risk are recognized in current earnings. We include the gain or loss on the hedged items (fixed-rate borrowings) in the same line item, interest expense, as the offsetting loss or gain on the related interest rate swaps.

In April 2016, we entered into interest rate swaps on \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. In October 2016, we entered into interest rate swaps on an additional \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. We designated the April 2016 and October 2016 interest rate swap agreements as fair value hedges of the risk of changes in the value of fixed-rate debt due to changes in interest rates for a portion of our fixed-rate borrowings. In August 2019, we terminated the April 2016 and October 2016 interest rate swaps which resulted in a loss of \$2.3 million that will be deferred as an offset to the carrying value of the related debt and will be recognized to interest expense through October 2025. As of December 31, 2019, \$2.2 million of this loss was included in long-term debt in the consolidated balance sheet. For the years ended December 31, 2019 and 2018, \$2.6 million and \$2.1 million, respectively, of expense and for the year ended December 31, 2017, \$2.9 million of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

We actively manage currency exposures that are associated with net monetary asset positions, currency purchases and sales commitments denominated in foreign currencies and foreign currency denominated assets and liabilities created in the normal course of business. We enter into forward sales and purchase contracts to manage currency risk to offset our net exposures, by currency, related to the foreign currency denominated monetary assets and liabilities of our operations. At December 31, 2019, we had outstanding forward contracts to buy foreign currency with a notional value of \$140.6 million and to sell foreign currency with a notional value of \$99.2 million. All of the currency derivatives expire within one year and are for U.S. dollar (USD) equivalents. The counterparties to the forward contracts are large financial institutions; however, the risk of loss to us in the event of nonperformance by a counterparty could be significant to our financial position or results of operations. At December 31, 2018, we had outstanding forward contracts to buy foreign currency with a notional value of \$123.7 million and to sell foreign currency with a notional value of \$82.6 million.

Our foreign currency forward contracts and certain commodity derivatives did not meet the criteria to qualify for hedge accounting. The effect on operating results of items not qualifying for hedge accounting was a (loss) gain of \$(4.0) million, \$(5.4) million and \$1.8 million in 2019, 2018 and 2017, respectively.

The fair value of our derivative asset and liability balances were:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Other current assets	\$ 1.9	\$ 5.7
Other assets	0.7	0.7
Total derivative asset	<u>\$ 2.6</u>	<u>\$ 6.4</u>
Accrued liabilities	\$ 19.0	\$ 3.5
Other liabilities	1.8	34.1
Total derivative liability	<u>\$ 20.8</u>	<u>\$ 37.6</u>

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to market risk in the normal course of our business operations due to our purchases of certain commodities, our ongoing investing and financing activities and our operations that use foreign currencies. The risk of loss can be assessed from the perspective of adverse changes in fair values, cash flows and future earnings. We have established policies and procedures governing our management of market risks and the use of financial instruments to manage exposure to such risks.

Energy costs, including electricity and natural gas, and certain raw materials used in our production processes are subject to price volatility. Depending on market conditions, we may enter into futures contracts, forward contracts, commodity swaps and put and call option contracts in order to reduce the impact of commodity price fluctuations. As of December 31, 2019, we maintained open positions on commodity contracts with a notional value totaling \$174.6 million (\$116.5 million at December 31, 2018). Assuming a hypothetical 10% increase in commodity prices, which are currently hedged, as of December 31, 2019, we would experience an \$17.5 million (\$11.7 million at December 31, 2018) increase in our cost of inventory purchased, which would be substantially offset by a corresponding increase in the value of related hedging instruments.

We transact business in various foreign currencies other than the USD which exposes us to movements in exchange rates which may impact revenue and expenses, assets and liabilities and cash flows. Our significant foreign currency exposure is denominated with European currencies, primarily the Euro, although exposures also exist in other currencies of Asia Pacific, Latin America, Middle East and Africa. For all derivative positions, we evaluated the effects of a 10% shift in exchange rates between those currencies and the USD, holding all other assumptions constant. Unfavorable currency movements of 10% would negatively affect the fair values of the derivatives held to hedge currency exposures by \$21.3 million. These unfavorable changes would generally have been offset by favorable changes in the values of the underlying exposures.

We are exposed to changes in interest rates primarily as a result of our investing and financing activities. Our current debt structure is used to fund business operations, and commitments from banks under our Delayed Draw Term Loan Facility, 2019 Senior Revolving Credit Facility, Receivables Financing Agreement and AR Facilities are sources of liquidity. As of December 31, 2019, we had long-term borrowings, including current installments of long-term debt and finance lease obligations, of \$3,340.8 million (\$3,230.3 million at December 31, 2018) of which \$155.9 million (\$823.9 million at December 31, 2018) was issued at variable rates. Included within long-term borrowings on the consolidated balance sheets were deferred debt issuance costs and deferred losses on fair value interest rate swaps.

Assuming no changes in the \$155.9 million of variable-rate debt levels from December 31, 2019, we estimate that a hypothetical change of 100-basis points in the LIBOR interest rates from 2019 would impact annual interest expense by \$1.6 million.

Our interest rate swaps reduced interest expense by \$1.7 million, \$6.8 million and \$6.1 million in 2019, 2018 and 2017, respectively.

If the actual changes in commodities, foreign currency or interest pricing is substantially different than expected, the net impact of commodity risk, foreign currency risk or interest rate risk on our cash flow may be materially different than that disclosed above.

We do not enter into any derivative financial instruments for speculative purposes.

CAUTIONARY STATEMENT ABOUT FORWARD-LOOKING STATEMENTS

This report includes forward-looking statements. These statements relate to analyses and other information that are based on management’s beliefs, certain assumptions made by management, forecasts of future results and current expectations, estimates and projections about the markets and economy in which we and our various segments operate. The statements contained in this report that are not statements of historical fact may include forward-looking statements that involve a number of risks and uncertainties.

We have used the words “anticipate,” “intend,” “may,” “expect,” “believe,” “should,” “plan,” “estimate,” “project,” “forecast,” “optimistic” and variations of such words and similar expressions in this report to identify such forward-looking statements. These statements are not guarantees of future performance and involve certain risks, uncertainties and assumptions, which are difficult to predict and many of which are beyond our control. Therefore, actual outcomes and results may differ materially from those matters expressed or implied in such forward-looking statements. We undertake no obligation to update publicly any forward-looking statements, whether as a result of future events, new information or otherwise.

The risks, uncertainties and assumptions involved in our forward-looking statements include those discussed under Item 1A—“Risk Factors.” You should consider all of our forward-looking statements in light of these factors. In addition, other risks and uncertainties not presently known to us or that we consider immaterial could affect the accuracy of our forward-looking statements.

Item 8. CONSOLIDATED FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

MANAGEMENT REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

The management of Olin Corporation is responsible for establishing and maintaining adequate internal control over financial reporting. Olin's internal control system was designed to provide reasonable assurance to the company's management and board of directors regarding the preparation and fair presentation of published financial statements.

All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation, and may not prevent or detect all misstatements.

The management of Olin Corporation has assessed the effectiveness of the company's internal control over financial reporting as of December 31, 2019. In making this assessment, we used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control - Integrated Framework (2013)* to guide our analysis and assessment. Based on our assessment as of December 31, 2019, the company's internal control over financial reporting was effective based on those criteria.

Our independent registered public accountants, KPMG LLP, have audited and issued a report on our internal control over financial reporting, which appears in this Form 10-K.

/s/ John E. Fischer
Chairman, President and Chief Executive Officer

/s/ Todd A. Slater
Vice President and Chief Financial Officer

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and Board of Directors
Olin Corporation:

Opinions on the Consolidated Financial Statements and Internal Control Over Financial Reporting

We have audited the accompanying consolidated balance sheets of Olin Corporation and subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

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, 2019 and 2018, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for leases as of January 1, 2019 due to the adoption of Accounting Standards Update 2016-02 - *Leases* and amendments thereto.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying *Management Report on Internal Control Over Financial Reporting*. Our responsibility is to express an opinion on the Company's consolidated financial statements and an opinion 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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Evaluation of the recoverability of the carrying value of goodwill

As discussed in Notes 2 and 12 to the consolidated financial statements, the carrying amount of goodwill as of December 31, 2019 was \$2,119.7 million. Of this amount, the goodwill balances of the Chlor Alkali Products and Vinyls and Epoxy reporting units were \$1,832.7 million and \$287.0 million, respectively. The Company performs a goodwill impairment assessment on an annual basis during the fourth quarter of each fiscal year or whenever events and changes in circumstances indicate that the carrying value of a reporting unit might exceed the fair value of each reporting unit.

We identified the evaluation of the recoverability of the carrying value of goodwill for each reporting unit as a critical audit matter. Subjective and challenging auditor judgment was required to evaluate certain assumptions used in the Company's estimate of the fair value of the reporting units. Specifically, the cash flow projections and the discount rate assumptions underlying the Company's determination of the fair value of the reporting units were challenging to audit as changes to those assumptions had a significant effect on the assessment of the fair value for the reporting units.

The primary procedures that we performed to address this critical audit matter included the following. We tested certain internal controls over the Company's goodwill impairment assessment process, including controls related to the development of the cash flow and discount rate assumptions. We evaluated the Company's cash flow projection assumptions for each reporting unit, including revenue growth rates and forecasted margins, by comparing them to the Company's past history, industry reports, and peer companies' analyst reports and historical growth rates. We performed sensitivity analyses over the cash flow projections and discount rate assumptions to assess their impact on the Company's determination that the fair value of each reporting unit exceeded its carrying value. In addition, we involved a valuation professional with specialized skills and knowledge who assisted in:

- Evaluating the Company's selection of discount rates, by comparing them against a discount rate range that was independently developed using publicly available market data for comparable entities, and
- Developing an estimate of each reporting unit's fair value using the reporting unit's cash flow forecast and independently developed discount rates, and comparing the results of our estimate of fair value to the Company's fair value estimate.

Determination of environmental obligations

As discussed in Notes 2 and 22 to the consolidated financial statements, the Company has recorded liabilities for future environmental expenditures of \$139.0 million as of December 31, 2019. The Company accrues a liability for environmental matters when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated based upon current law and existing technologies.

We identified the determination of the environmental liabilities as a critical audit matter. This required challenging auditor judgment due to the nature of the estimate and assumptions, including judgments about future events and uncertainties and the time period over which remediation will occur.

The primary procedures that we performed to address this critical audit matter included the following. We tested certain internal controls over the Company's process to estimate environmental obligations, including controls related to the

monitoring of the liability as compared to remedial activities required by regulatory authority. We involved an environmental professional with specialized skills and knowledge who assisted in assessing the Company's environmental specialist's qualifications and in evaluating the Company's planned remediation activities for certain sites. We compared the Company's planned remediation activities to those communicated to regulatory authorities, those commonly observed in conducting remediation, and to the liability recorded. We also considered the Company's changes in the liability and assumptions from those used in the prior year.

/s/ KPMG LLP

We have served as the Company's auditor since 1954.

St. Louis, Missouri

February 24, 2020

CONSOLIDATED BALANCE SHEETS
December 31
(In millions, except per share data)

Assets	2019	2018
Current assets:		
Cash and cash equivalents	\$ 220.9	\$ 178.8
Receivables, net	760.4	776.3
Income taxes receivable	13.9	5.9
Inventories, net	695.7	711.4
Other current assets	23.1	35.0
Total current assets	1,714.0	1,707.4
Property, plant and equipment, net	3,323.8	3,482.1
Operating lease assets, net	377.8	—
Deferred income taxes	35.3	26.3
Other assets	1,169.1	1,150.4
Intangible assets, net	448.1	511.6
Goodwill	2,119.7	2,119.6
Total assets	\$ 9,187.8	\$ 8,997.4
Liabilities and Shareholders' Equity		
Current liabilities:		
Current installments of long-term debt	\$ 2.1	\$ 125.9
Accounts payable	651.9	636.5
Income taxes payable	19.8	22.6
Current operating lease liabilities	79.3	—
Accrued liabilities	329.1	333.3
Total current liabilities	1,082.2	1,118.3
Long-term debt	3,338.7	3,104.4
Operating lease liabilities	303.4	—
Accrued pension liability	797.7	674.3
Deferred income taxes	454.5	518.9
Other liabilities	793.8	749.3
Total liabilities	6,770.3	6,165.2
Commitments and contingencies		
Shareholders' equity:		
Common stock, \$1.00 par value per share:		
Authorized, 240.0 shares; issued and outstanding, 157.7 and 165.3 shares	157.7	165.3
Additional paid-in capital	2,122.1	2,247.4
Accumulated other comprehensive loss	(803.4)	(651.0)
Retained earnings	941.1	1,070.5
Total shareholders' equity	2,417.5	2,832.2
Total liabilities and shareholders' equity	\$ 9,187.8	\$ 8,997.4

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

CONSOLIDATED STATEMENTS OF OPERATIONS

Years ended December 31

(In millions, except per share data)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Sales	\$ 6,110.0	\$ 6,946.1	\$ 6,268.4
Operating expenses:			
Cost of goods sold	5,439.2	5,822.1	5,554.9
Selling and administration	416.9	430.6	369.8
Restructuring charges	76.5	21.9	37.6
Acquisition-related costs	—	1.0	12.8
Other operating income	0.4	6.4	3.3
Operating income	177.8	676.9	296.6
Earnings (losses) of non-consolidated affiliates	—	(19.7)	1.8
Interest expense	243.2	243.2	217.4
Interest income	1.0	1.6	1.8
Non-operating pension income	16.3	21.7	34.4
Other income	11.2	—	—
Income (loss) before taxes	(36.9)	437.3	117.2
Income tax (benefit) provision	(25.6)	109.4	(432.3)
Net (loss) income	<u>\$ (11.3)</u>	<u>\$ 327.9</u>	<u>\$ 549.5</u>
Net (loss) income per common share:			
Basic	<u>\$ (0.07)</u>	<u>\$ 1.97</u>	<u>\$ 3.31</u>
Diluted	<u>\$ (0.07)</u>	<u>\$ 1.95</u>	<u>\$ 3.26</u>
Average common shares outstanding:			
Basic	<u>162.3</u>	<u>166.8</u>	<u>166.2</u>
Diluted	<u>162.3</u>	<u>168.4</u>	<u>168.5</u>

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

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)*Years ended December 31**(In millions)*

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Net (loss) income	\$ (11.3)	\$ 327.9	\$ 549.5
Other comprehensive (loss) income, net of tax:			
Foreign currency translation adjustments, net	(9.1)	(22.2)	31.7
Unrealized losses on derivative contracts, net	(15.4)	(11.7)	(1.7)
Pension and postretirement liability adjustments, net	(150.2)	(74.9)	(21.6)
Amortization of prior service costs and actuarial losses, net	22.3	28.3	17.0
Total other comprehensive (loss) income, net of tax	<u>(152.4)</u>	<u>(80.5)</u>	<u>25.4</u>
Comprehensive (loss) income	<u>\$ (163.7)</u>	<u>\$ 247.4</u>	<u>\$ 574.9</u>

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

CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY
(In millions, except per share data)

	<i>Common Stock</i>		<i>Additional Paid-In Capital</i>	<i>Accumulated Other Comprehensive Loss</i>	<i>Retained Earnings</i>	<i>Total Shareholders' Equity</i>
	<i>Shares Issued</i>	<i>Par Value</i>				
Balance at January 1, 2017	165.4	\$ 165.4	\$ 2,243.8	\$ (510.0)	\$ 373.8	\$ 2,273.0
Net income	—	—	—	—	549.5	549.5
Other comprehensive income	—	—	—	25.4	—	25.4
Dividends paid:						
Common stock (\$0.80 per share)	—	—	—	—	(133.0)	(133.0)
Common stock issued for:						
Stock options exercised	1.7	1.7	30.7	—	—	32.4
Other transactions	—	—	(0.9)	—	—	(0.9)
Stock-based compensation	—	—	7.3	—	—	7.3
Balance at December 31, 2017	<u>167.1</u>	<u>\$ 167.1</u>	<u>\$ 2,280.9</u>	<u>\$ (484.6)</u>	<u>\$ 790.3</u>	<u>\$ 2,753.7</u>
Income tax reclassification adjustment	—	—	—	(85.9)	85.9	—
Net income	—	—	—	—	327.9	327.9
Other comprehensive loss	—	—	—	(80.5)	—	(80.5)
Dividends paid:						
Common stock (\$0.80 per share)	—	—	—	—	(133.6)	(133.6)
Common stock repurchased and retired	(2.1)	(2.1)	(47.9)	—	—	(50.0)
Common stock issued for:						
Stock options exercised	0.2	0.2	3.2	—	—	3.4
Other transactions	0.1	0.1	2.0	—	—	2.1
Stock-based compensation	—	—	9.2	—	—	9.2
Balance at December 31, 2018	<u>165.3</u>	<u>\$ 165.3</u>	<u>\$ 2,247.4</u>	<u>\$ (651.0)</u>	<u>\$ 1,070.5</u>	<u>\$ 2,832.2</u>
Lease accounting adoption adjustment	—	—	—	—	11.2	11.2
Net loss	—	—	—	—	(11.3)	(11.3)
Other comprehensive loss	—	—	—	(152.4)	—	(152.4)
Dividends paid:						
Common stock (\$0.80 per share)	—	—	—	—	(129.3)	(129.3)
Common stock repurchased and retired	(8.0)	(8.0)	(137.9)	—	—	(145.9)
Common stock issued for:						
Stock options exercised	0.1	0.1	1.6	—	—	1.7
Other transactions	0.3	0.3	2.8	—	—	3.1
Stock-based compensation	—	—	8.2	—	—	8.2
Balance at December 31, 2019	<u>157.7</u>	<u>\$ 157.7</u>	<u>\$ 2,122.1</u>	<u>\$ (803.4)</u>	<u>\$ 941.1</u>	<u>\$ 2,417.5</u>

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

CONSOLIDATED STATEMENTS OF CASH FLOWS
Years ended December 31
(In millions)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Operating Activities			
Net (loss) income	\$ (11.3)	\$ 327.9	\$ 549.5
Adjustments to reconcile net (loss) income to net cash and cash equivalents provided by (used for) operating activities:			
Gain on disposition of non-consolidated affiliate	(11.2)	—	—
Losses (earnings) of non-consolidated affiliates	—	19.7	(1.8)
Losses (gains) on disposition of property, plant and equipment	—	2.0	(3.1)
Stock-based compensation	10.7	12.0	9.1
Depreciation and amortization	597.4	601.4	558.9
Deferred income taxes	(45.5)	35.6	(452.7)
Write-off of equipment and facility included in restructuring charges	58.9	2.6	1.4
Qualified pension plan contributions	(14.9)	(2.6)	(1.7)
Qualified pension plan income	(9.3)	(15.0)	(26.9)
Change in assets and liabilities:			
Receivables	12.3	(46.3)	(49.9)
Income taxes receivable/payable	(10.7)	24.5	9.6
Inventories	13.0	(35.5)	(37.8)
Other current assets	7.4	0.2	(12.1)
Accounts payable and accrued liabilities	(11.0)	(14.5)	100.0
Other assets	(1.3)	(2.6)	5.8
Other noncurrent liabilities	30.5	4.3	(5.9)
Other operating activities	2.3	(5.9)	6.4
Net operating activities	<u>617.3</u>	<u>907.8</u>	<u>648.8</u>
Investing Activities			
Capital expenditures	(385.6)	(385.2)	(294.3)
Payments under long-term supply contracts	—	—	(209.4)
Proceeds from disposition of property, plant and equipment	—	2.9	5.2
Proceeds from disposition of affiliated companies	20.0	—	—
Net investing activities	<u>(365.6)</u>	<u>(382.3)</u>	<u>(498.5)</u>
Financing Activities			
Long-term debt:			
Borrowings	825.0	570.0	2,035.5
Repayments	(744.2)	(946.1)	(2,037.9)
Common stock repurchased and retired	(145.9)	(50.0)	—
Stock options exercised	1.7	3.4	29.8
Dividends paid	(129.3)	(133.6)	(133.0)
Debt issuance costs	(16.6)	(8.5)	(11.2)
Net financing activities	<u>(209.3)</u>	<u>(564.8)</u>	<u>(116.8)</u>
Effect of exchange rate changes on cash and cash equivalents	(0.3)	(0.3)	0.4
Net increase (decrease) in cash and cash equivalents	42.1	(39.6)	33.9
Cash and cash equivalents, beginning of year	178.8	218.4	184.5
Cash and cash equivalents, end of year	<u>\$ 220.9</u>	<u>\$ 178.8</u>	<u>\$ 218.4</u>
Cash paid for interest and income taxes:			
Interest, net	<u>\$ 198.3</u>	<u>\$ 208.8</u>	<u>\$ 200.9</u>
Income taxes, net of refunds	<u>\$ 36.3</u>	<u>\$ 52.9</u>	<u>\$ 18.0</u>

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1. DESCRIPTION OF BUSINESS

Olin Corporation (Olin) is a Virginia corporation, incorporated in 1892, having its principal executive offices in Clayton, MO. We are a manufacturer concentrated in three business segments: Chlor Alkali Products and Vinyls, Epoxy and Winchester. The Chlor Alkali Products and Vinyls segment manufactures and sells chlorine and caustic soda, ethylene dichloride and vinyl chloride monomer, methyl chloride, methylene chloride, chloroform, carbon tetrachloride, perchloroethylene, trichloroethylene and vinylidene chloride, hydrochloric acid, hydrogen, bleach products and potassium hydroxide. The Epoxy segment produces and sells a full range of epoxy materials, including allyl chloride, epichlorohydrin, liquid epoxy resins, solid epoxy resins and downstream products such as differentiated epoxy resins and additives. The Winchester segment produces and sells sporting ammunition, reloading components, small caliber military ammunition and components, and industrial cartridges.

NOTE 2. ACCOUNTING POLICIES

The preparation of the consolidated financial statements requires estimates and assumptions that affect amounts reported and disclosed in the financial statements and related notes. Actual results could differ from those estimates.

Basis of Presentation

The consolidated financial statements include the accounts of Olin and all majority-owned subsidiaries. Investment in our affiliates are accounted for on the equity method. Accordingly, we include only our share of earnings or losses of these affiliates in consolidated net income (loss). Certain reclassifications were made to prior year amounts to conform to the 2019 presentation.

Revenue Recognition

In May 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2014-09, "Revenue from Contracts with Customers" (ASU 2014-09), which amends Accounting Standards Codification (ASC) 605 "Revenue Recognition" and creates a new topic, ASC 606 "Revenue from Contracts with Customers" (ASC 606). Subsequent to the issuance of ASU 2014-09, ASC 606 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. We adopted these updates on January 1, 2018 using the modified retrospective transition method. The cumulative effect of applying the updates did not have a material impact on our consolidated financial statements. The most significant impact the updates had was on our accounting policies and disclosures on revenue recognition.

We derive our revenues primarily from the manufacturing and delivery of goods to customers. Revenues are recognized on sales of goods at the time when control of those goods is transferred to our customers at an amount that reflects the consideration to which we expect to be entitled in exchange for those goods. We primarily sell our goods directly to customers, and to a lesser extent, through distributors. Payment terms are typically 30 to 90 days from date of invoice. Our contracts do not typically have a significant financing component. Right to payment is determined at the point in time in which control has transferred to the customer.

A performance obligation is a promise in a contract to transfer a distinct good to the customer. At contract inception, we assess the goods promised in our contracts with customers and identify a performance obligation for each promise to transfer to the customer a good (or bundle of goods) that is distinct. A contract's transaction price is based on the price stated in the contract and allocated to each distinct performance obligation and revenue is recognized when the performance obligation is satisfied. Substantially all of our contracts have a single distinct performance obligation or multiple performance obligations which are distinct and represent individual promises within the contract. Substantially all of our performance obligations are satisfied at a single point in time, when control is transferred, which is generally upon shipment or delivery as stated in the contract terms.

All taxes assessed by governmental authorities that are both imposed on and concurrent with our revenue-producing transactions and collected from our customers are excluded from the measurement of the transaction price. Shipping and handling fees billed to customers are included in revenue and are considered activities to fulfill the promise to transfer the good. Allowances for estimated returns, discounts and rebates are considered variable consideration, which may be constrained, and are estimated and recognized when sales are recorded. The estimates are based on various market data, historical trends and information from customers. Actual returns, discounts and rebates have not been materially different from estimates. For all contracts that have a duration of one year or less at contract inception, we do not adjust the promised amount of consideration for the effects of a significant financing component.

Substantially all of our revenue is derived from contracts with an original expected length of time of one year or less and for which we recognize revenue for the amount in which we have the right to invoice at the point in time in which control has transferred to the customer. However, a portion of our revenue is derived from long-term contracts which have contract periods that vary between one to multi-year. Certain of these contracts represent contracts with minimum purchase obligations, which can be substantially different than the actual revenue recognized. Such contracts consist of varying types of products across our chemical businesses. Certain contracts include variable volumes and/or variable pricing with pricing provisions tied to commodity, consumer price or other indices. The transaction price allocated to the remaining performance obligations related to our contracts was excluded from the disclosure of our remaining performance obligations based on the following practical expedients that we elected to apply: (i) contracts with index-based pricing or variable volume attributes in which such variable consideration is allocated entirely to a wholly unsatisfied performance obligation; and (ii) contracts with an original expected duration of one year or less.

Refer to Note 21 “Segment Information” for information regarding the disaggregation of revenue by primary geographical markets and major product lines.

Cost of Goods Sold and Selling and Administration Expenses

Cost of goods sold includes the costs of inventory sold, related purchasing, distribution and warehousing costs, costs incurred for shipping and handling, depreciation and amortization expense related to these activities and environmental remediation costs and recoveries. Selling and administration expenses include personnel costs associated with sales, marketing and administration, research and development, legal and legal-related costs, consulting and professional services fees, advertising expenses, depreciation expense related to these activities, foreign currency translation and other similar costs.

Acquisition-related Costs

Acquisition-related costs include advisory, legal, accounting and other professional fees incurred in connection with the purchase and integration of our acquisitions. Acquisition-related costs also may include costs which arise as a result of acquisitions, including contractual change in control provisions, contract termination costs, compensation payments related to the acquisition or pension and other postretirement benefit plan settlements.

Other Operating Income (Expense)

Other operating income (expense) consists of miscellaneous operating income items, which are related to our business activities, and gains (losses) on disposition of property, plant and equipment.

Included in other operating income were the following:

	<i>Years Ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<i>(\$ in millions)</i>		
Gains (losses) on disposition of property, plant and equipment, net	\$ —	\$ (2.0)	\$ 3.1
Gains on insurance recoveries	—	8.0	—
Other	0.4	0.4	0.2
Other operating income	<u>\$ 0.4</u>	<u>\$ 6.4</u>	<u>\$ 3.3</u>

Other operating income for 2018 included an \$8.0 million insurance recovery for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility partially offset by a \$1.7 million loss on the sale of land. Other operating income for 2017 included a \$3.3 million gain on the disposition of property, plant and equipment from the sale of a former manufacturing facility.

Other Income (Expense)

Other income (expense) consists of non-operating income and expense items which are not related to our primary business activities.

Foreign Currency Translation

Our worldwide operations utilize the U.S. dollar (USD) or local currency as the functional currency, where applicable. For foreign entities where the USD is the functional currency, gains and losses resulting from balance sheet translations are included in selling and administration. For foreign entities where the local currency is the functional currency, assets and liabilities denominated in local currencies are translated into USD at end-of-period exchange rates and the resultant translation adjustments are included in accumulated other comprehensive loss. Assets and liabilities denominated in other than the local currency are remeasured into the local currency prior to translation into USD and the resultant exchange gains or losses are included in income in the period in which they occur. Income and expenses are translated into USD using an approximation of the average rate prevailing during the period. We change the functional currency of our separate and distinct foreign entities only when significant changes in economic facts and circumstances indicate clearly that the functional currency has changed.

Cash and Cash Equivalents

All highly liquid investments, with a maturity of three months or less at the date of purchase, are considered to be cash equivalents.

Short-Term Investments

We classify our marketable securities as available-for-sale, which are reported at fair market value with unrealized gains and losses included in accumulated other comprehensive loss, net of applicable taxes. The fair value of marketable securities is determined by quoted market prices. Realized gains and losses on sales of investments, as determined on the specific identification method, and declines in value of securities judged to be other-than-temporary are included in other income (expense) in the consolidated statements of operations. Interest and dividends on all securities are included in interest income and other income (expense), respectively. As of December 31, 2019 and 2018, we had no short-term investments recorded on our consolidated balance sheets.

Allowance for Doubtful Accounts Receivable

We evaluate the collectibility of accounts receivable based on a combination of factors. We estimate an allowance for doubtful accounts as a percentage of net sales based on historical bad debt experience. This estimate is periodically adjusted when we become aware of a specific customer's inability to meet its financial obligations (e.g., bankruptcy filing) or as a result of changes in the overall aging of accounts receivable. While we have a large number of customers that operate in diverse businesses and are geographically dispersed, a general economic downturn in any of the industry segments in which we operate could result in higher than expected defaults, and, therefore, the need to revise estimates for the provision for doubtful accounts could occur.

Inventories

Inventories are valued at the lower of cost and net realizable value. For U.S. inventories, inventory costs are determined principally by the last-in, first-out (LIFO) method of inventory accounting while for international inventories, inventory costs are determined principally by the first-in, first-out (FIFO) method of inventory accounting. Costs for other inventories have been determined principally by the average-cost method (primarily operating supplies, spare parts and maintenance parts). Elements of costs in inventories include raw materials, direct labor and manufacturing overhead.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost. Depreciation is computed on a straight-line basis over the estimated useful lives of the related assets. Interest costs incurred to finance expenditures for major long-term construction projects are capitalized as part of the historical cost and included in property, plant and equipment and are depreciated over the useful lives of the related assets. Leasehold improvements are amortized over the term of the lease or the estimated useful life of the improvement, whichever is shorter. Start-up costs are expensed as incurred. Expenditures for maintenance and repairs are charged to expense when incurred while the costs of significant improvements, which extend the useful life of the underlying asset, are capitalized.

Property, plant and equipment are reviewed for impairment when conditions indicate that the carrying values of the assets may not be recoverable. Such impairment conditions include an extended period of idleness or a plan of disposal. If such impairment indicators are present or other factors exist that indicate that the carrying amount of an asset may not be recoverable, we determine whether impairment has occurred through the use of an undiscounted cash flow analysis at the lowest level for which identifiable cash flows exist. For our Chlor Alkali Products and Vinyls, Epoxy and Winchester segments, the lowest level for which identifiable cash flows exist is the operating facility level or an appropriate grouping of operating facilities level. The amount of impairment loss, if any, is measured by the difference between the net book value of the assets and the estimated fair value of the related assets.

Leases

In February 2016, the FASB issued ASU 2016-02 “Leases,” (ASU 2016-02) which supersedes ASC 840 “Leases” and creates a new topic, ASC 842 “Leases” (ASC 842). Subsequent to the issuance of ASU 2016-02, ASC 842 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. Upon initial application, the provisions of these updates are required to be applied using the modified retrospective method which requires retrospective adoption to each prior reporting period presented with the cumulative effect of adoption recorded to the earliest reporting period presented. An optional transition method can be utilized which requires application of these updates beginning on the date of adoption with the cumulative effect of initially applying these updates recognized at the date of initial adoption. We adopted these updates on January 1, 2019 using the optional transition method. Consequently, our comparative periods have not been retrospectively adjusted for the new lease requirements. In addition, we elected the following practical expedients:

- We elected the package of practical expedients permitted under the transition guidance within the new standard, which among other things, allowed us to carry forward the historical lease classification.
- We elected the practical expedient related to land easements, allowing us to carry forward our accounting treatment for land easements on existing agreements.
- We elected the short-term practical expedient for all classes of lease assets, which allows us to not record leases with an initial term of 12 months or less on the balance sheet, and instead recognize the expense straight-line over the lease term.
- We elected the practical expedient to not separate lease components from non-lease components for all asset classes.

Adoption of these updates resulted in the recording of operating lease assets and lease liabilities on our consolidated balance sheet of \$291.9 million as of January 1, 2019. Our assets and liabilities for finance leases remained unchanged. We also recognized the cumulative effect of applying these updates as an adjustment to retained earnings of \$11.2 million, net of tax, which was primarily related to the recognition of previously deferred sale/leaseback gains. Our consolidated statements of operations and cash flows, along with our compliance with all covenants and restrictions under all our outstanding credit agreements, were not impacted by this adoption.

We determine if an arrangement is a lease at inception of the contract. Operating lease assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease assets and liabilities are recognized at commencement date based on the present value of fixed lease payments over the lease term. Our lease commitments are primarily for railcars, but also include logistics, manufacturing, storage, real estate and information technology assets. Leases with an initial term of 12 months or less are not recorded on the balance sheet; instead, we recognize lease expense for these leases on a straight-line basis over the lease term. We do not account for lease components (e.g., fixed payments to use the underlying lease asset) separately from the non-lease components (e.g., fixed payments for common-area maintenance costs and other items that transfer a good or service). Some of our leases include variable lease payments, which primarily result from changes in consumer price and other market-based indices, which are generally updated annually, and maintenance and usage charges. These variable payments are excluded from the calculation of our lease assets and liabilities.

Most leases include one or more options to renew, with renewal terms that can extend the lease term from one to many years. The exercise of lease renewal options is typically at our sole discretion. Certain leases also include options to purchase the leased asset. We do not include options to renew or purchase leased assets in the measurement of lease liabilities unless those options are highly certain of exercise. The depreciable life of assets and leasehold improvements are limited by the expected lease term, unless there is a transfer of title or purchase option reasonably certain of exercise. We have operating leases with terms that require us to guarantee a portion of the residual value of the leased assets upon termination of the lease as well as other guarantees. These residual value guarantees consist primarily of leases for railcars. Residual value guarantee payments that become probable and estimable are accrued as part of the lease liability and recognized over the remaining life of the applicable lease. Our current expectation is that the likelihood of material residual guarantee payments is remote. We utilize the interest rate implicit in the lease to determine the lease liability when the interest rate can be determined. As most of our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at the lease commencement date in determining the present value of lease payments. We estimate the incremental borrowing rate based on the geographic region for which we would borrow, on a secured basis of the lease asset, at an amount equal to the lease payments over a similar time period as the lease term. We have no additional restrictions or covenants imposed by our lease contracts.

Asset Retirement Obligations

We record the fair value of an asset retirement obligation associated with the retirement of a tangible long-lived asset as a liability in the period incurred. The liability is measured at discounted fair value and is adjusted to its present value in subsequent periods as accretion expense is recorded. The corresponding asset retirement costs are capitalized as part of the carrying amount of the related long-lived asset and depreciated over the asset's useful life. Asset retirement obligations are reviewed annually in the fourth quarter and/or when circumstances or other events indicate that changes underlying retirement assumptions may have occurred.

The activities of our asset retirement obligations were as follows:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning balance	\$ 60.2	\$ 54.3
Accretion	3.4	3.2
Spending	(4.5)	(8.0)
Foreign currency translation adjustments	0.1	(0.2)
Adjustments	4.5	10.9
Ending balance	<u>\$ 63.7</u>	<u>\$ 60.2</u>

At December 31, 2019 and 2018, our consolidated balance sheets included an asset retirement obligation of \$53.4 million and \$49.6 million, respectively, which were classified as other noncurrent liabilities.

In 2019, we had net adjustments that increased the asset retirement obligation by \$4.5 million which was primarily comprised of increases in estimated costs for certain assets.

In 2018, we had net adjustments that increased the asset retirement obligation by \$10.9 million which was primarily related to additional asset retirement obligations for leased assets.

Comprehensive Income (Loss)

Accumulated other comprehensive loss consists of foreign currency translation adjustments, pension and postretirement liability adjustments, pension and postretirement amortization of prior service costs and actuarial losses and net unrealized (losses) gains on derivative contracts.

Goodwill

Goodwill is not amortized, but is reviewed for impairment annually in the fourth quarter and/or when circumstances or other events indicate that impairment may have occurred. ASC 350 “Intangibles—Goodwill and Other” (ASC 350) permits entities to make a qualitative assessment of whether it is more likely than not that a reporting unit’s fair value is less than its carrying amount before applying the two-step goodwill impairment test. Circumstances that are considered as part of the qualitative assessment and could trigger the two-step impairment test include, but are not limited to: a significant adverse change in the business climate; a significant adverse legal judgment; adverse cash flow trends; an adverse action or assessment by a government agency; unanticipated competition; sustained decline in our stock price; and a significant restructuring charge within a reporting unit. We define reporting units at the business segment level or one level below the business segment level. For purposes of testing goodwill for impairment, goodwill has been allocated to our reporting units to the extent it relates to each reporting unit.

It is our practice, at a minimum, to perform a quantitative goodwill impairment test in the fourth quarter every three years. In the fourth quarter of 2019, we performed our triennial quantitative goodwill impairment test for our reporting units. We use a discounted cash flow approach to develop the estimated fair value of a reporting unit when a quantitative test is performed. Management judgment is required in developing the assumptions for the discounted cash flow model. We also corroborate our discounted cash flow analysis by evaluating a market-based approach that considers earnings before interest, taxes, depreciation and amortization (EBITDA) multiples from a representative sample of comparable public companies. As a further indicator that each reporting unit has been valued appropriately using a discounted cash flow model, the aggregate fair value of all reporting units is reconciled to the total market value of Olin. An impairment would be recorded if the carrying amount of a reporting unit exceeded the estimated fair value. Based on the aforementioned analysis, the estimated fair value of our reporting units exceeded the carrying value of the reporting units. No impairment charges were recorded for 2019, 2018 or 2017.

The discount rate, profitability assumptions and terminal growth rate of our reporting units and the cyclical nature of the chlor alkali industry were the material assumptions utilized in the discounted cash flow model used to estimate the fair value of each reporting unit. The discount rate reflects a weighted-average cost of capital, which is calculated based on observable market data. Some of this data (such as the risk free or treasury rate and the pretax cost of debt) are based on the market data at a point in time. Other data (such as the equity risk premium) are based upon market data over time for a peer group of companies in the chemical manufacturing or distribution industries with a market capitalization premium added, as applicable.

The discounted cash flow analysis requires estimates, assumptions and judgments about future events. Our analysis uses our internally generated long-range plan. Our discounted cash flow analysis uses the assumptions in our long-range plan about terminal growth rates, forecasted capital expenditures and changes in future working capital requirements to determine the implied fair value of each reporting unit. The long-range plan reflects management judgment, supplemented by independent chemical industry analyses which provide multi-year industry operating and pricing forecasts.

We believe the assumptions used in our goodwill impairment analysis are appropriate and result in reasonable estimates of the implied fair value of each reporting unit. However, given the economic environment and the uncertainties regarding the impact on our business, there can be no assurance that our estimates and assumptions, made for purposes of our goodwill impairment testing, will prove to be an accurate prediction of the future. In order to evaluate the sensitivity of the fair value calculation on the goodwill impairment test, we applied a hypothetical 10% decrease to the fair value of each reporting unit. We also applied a hypothetical decrease of 100-basis points in our terminal growth rate or an increase of 100-basis points in our weighted-average cost of capital to test the fair value calculation. In all cases, the estimated fair value of our reporting units derived in these sensitivity calculations exceeded the carrying value in excess of 10%. If our assumptions regarding future performance are not achieved, we may be required to record goodwill impairment charges in future periods. It is not possible at this time to determine if any such future impairment charge would result or, if it does, whether such charge would be material.

Intangible Assets

In conjunction with our acquisitions, we have obtained access to the customer contracts and relationships, trade names, acquired technology and other intellectual property of the acquired companies. These relationships are expected to provide economic benefit for future periods. Amortization expense is recognized on a straight-line basis over the estimated lives of the related assets. The amortization period of customer contracts and relationships, trade names, acquired technology and other intellectual property represents our best estimate of the expected usage or consumption of the economic benefits of the acquired assets, which is based on the company’s historical experience.

Intangible assets with finite lives are reviewed for impairment when conditions indicate that the carrying values of the assets may not be recoverable. Circumstances that are considered as part of the qualitative assessment and could trigger a quantitative impairment test include, but are not limited to: a significant adverse change in the business climate; a significant adverse legal judgment including asset specific factors; adverse cash flow trends; an adverse action or assessment by a government agency; unanticipated competition; sustained decline in our stock price; and a significant restructuring charge within a reporting unit. Based upon our qualitative assessment, it is more likely than not that the fair value of our intangible assets are greater than the carrying amount as of December 31, 2019. No impairment of our intangible assets were recorded in 2019, 2018 or 2017.

Environmental Liabilities and Expenditures

Accruals (charges to income) for environmental matters are recorded when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated, based upon current law and existing technologies. These amounts, which are not discounted and are exclusive of claims against third parties, are adjusted periodically as assessment and remediation efforts progress or additional technical or legal information becomes available. Environmental costs are capitalized if the costs increase the value of the property and/or mitigate or prevent contamination from future operations.

Income Taxes

Deferred taxes are provided for differences between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. A valuation allowance is provided to offset deferred tax assets if, based on the available evidence, it is more likely than not that some or all of the value of the deferred tax assets will not be realized.

Derivative Financial Instruments

We are exposed to market risk in the normal course of our business operations due to our purchases of certain commodities, our ongoing investing and financing activities and our operations that use foreign currencies. The risk of loss can be assessed from the perspective of adverse changes in fair values, cash flows and future earnings. We have established policies and procedures governing our management of market risks and the use of financial instruments to manage exposure to such risks. We use hedge accounting treatment for a significant amount of our business transactions whose risks are covered using derivative instruments. The hedge accounting treatment provides for the deferral of gains or losses on derivative instruments until such time as the related transactions occur.

Concentration of Credit Risk

Accounts receivable is the principal financial instrument which subjects us to a concentration of credit risk. Credit is extended based upon the evaluation of a customer's financial condition and, generally, collateral is not required. Concentrations of credit risk with respect to receivables are somewhat limited due to our large number of customers, the diversity of these customers' businesses and the geographic dispersion of such customers. Our accounts receivable are predominantly derived from sales denominated in USD or the Euro. We maintain an allowance for doubtful accounts based upon the expected collectibility of all trade receivables.

Fair Value

Fair value is defined as the price at which an asset could be exchanged in a current transaction between knowledgeable, willing parties or the amount that would be paid to transfer a liability to a new obligor, not the amount that would be paid to settle the liability with the creditor. Where available, fair value is based on observable market prices or parameters or derived from such prices or parameters. Where observable prices or inputs are not available, valuation models are applied. These valuation techniques involve some level of management estimation and judgment, the degree of which is dependent on the price transparency for the instruments or market and the instruments' complexity.

Assets and liabilities recorded at fair value in the consolidated balance sheets are categorized based upon the level of judgment associated with the inputs used to measure their fair value. Hierarchical levels, defined by ASC 820 “Fair Value Measurement” (ASC 820), and directly related to the amount of subjectivity associated with the inputs to fair valuation of these assets and liabilities, are as follows:

Level 1 — Inputs were unadjusted, quoted prices in active markets for identical assets or liabilities at the measurement date.

Level 2 — Inputs (other than quoted prices included in Level 1) were either directly or indirectly observable for the asset or liability through correlation with market data at the measurement date and for the duration of the instrument’s anticipated life.

Level 3 — Inputs reflected management’s best estimate of what market participants would use in pricing the asset or liability at the measurement date. Consideration was given to the risk inherent in the valuation technique and the risk inherent in the inputs to the model.

Retirement-Related Benefits

We account for our defined benefit pension plans and non-pension postretirement benefit plans using actuarial models required by ASC 715 “Compensation—Retirement Benefits” (ASC 715). These models use an attribution approach that generally spreads the financial impact of changes to the plan and actuarial assumptions over the average remaining service lives of the employees in the plan. Changes in liability due to changes in actuarial assumptions such as discount rate, rate of compensation increases and mortality, as well as annual deviations between what was assumed and what was experienced by the plan are treated as actuarial gains or losses. The principle underlying the required attribution approach is that employees render service over their average remaining service lives on a relatively smooth basis and, therefore, the accounting for benefits earned under the pension or non-pension postretirement benefits plans should follow the same relatively smooth pattern. Substantially all domestic defined benefit pension plan participants are no longer accruing benefits; therefore, actuarial gains and losses are amortized based upon the remaining life expectancy of the inactive plan participants. For both the years ended December 31, 2019 and 2018, the average remaining life expectancy of the inactive participants in the domestic defined benefit pension plan were 18 years, respectively.

One of the key assumptions for the net periodic pension calculation is the expected long-term rate of return on plan assets, used to determine the “market-related value of assets.” The “market-related value of assets” recognizes differences between the plan’s actual return and expected return over a five year period. The required use of an expected long-term rate of return on the market-related value of plan assets may result in recognized pension income that is greater or less than the actual returns of those plan assets in any given year. Over time, however, the expected long-term returns are designed to approximate the actual long-term returns and, therefore, result in a pattern of income and expense recognition that more closely matches the pattern of the services provided by the employees. As differences between actual and expected returns are recognized over five years, they subsequently generate gains and losses that are subject to amortization over the average remaining life expectancy of the inactive plan participants, as described in the preceding paragraph.

We use long-term historical actual return information, the mix of investments that comprise plan assets, and future estimates of long-term investment returns and inflation by reference to external sources to develop the expected long-term rate of return on plan assets as of December 31.

The discount rate assumptions used for pension and non-pension postretirement benefit plan accounting reflect the rates available on high-quality fixed-income debt instruments on December 31 of each year. The rate of compensation increase is based upon our long-term plans for such increases. For retiree medical plan accounting, we review external data and our own historical trends for healthcare costs to determine the healthcare cost trend rates.

For our defined benefit pension and other postretirement benefit plans, we measure service and interest costs by applying the specific spot rates along the yield curve to the plans’ estimated cash flows. We believe this approach provides a more precise measurement of service and interest costs by aligning the timing of the plans’ liability cash flows to the corresponding spot rates on the yield curve.

Stock-Based Compensation

We measure the cost of employee services received in exchange for an award of equity instruments, such as stock options, performance shares and restricted stock, based on the grant-date fair value of the award. This cost is recognized over the period during which an employee is required to provide service in exchange for the award, the requisite service period (usually the vesting period). An initial measurement is made of the cost of employee services received in exchange for an award of liability instruments based on its current fair value and the value of that award is subsequently remeasured at each reporting date through the settlement date. Changes in fair value of liability awards during the requisite service period are recognized as compensation cost over that period.

The fair value of each option granted, which typically vests ratably over three years, but not less than one year, was estimated on the date of grant, using the Black-Scholes option-pricing model with the following assumptions:

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Dividend yield	3.05%	2.43%	2.69%
Risk-free interest rate	2.51%	2.72%	2.06%
Expected volatility	34%	32%	34%
Expected life (years)	6.0	6.0	6.0
Weighted-average grant fair value (per option)	\$ 6.76	\$ 8.89	\$ 7.78
Weighted-average exercise price	\$ 26.26	\$ 32.94	\$ 29.82
Shares granted	1,578,200	927,000	1,621,000

Dividend yield was based on our current dividend yield as of the option grant date. Risk-free interest rate was based on zero coupon U.S. Treasury securities rates for the expected life of the options. Expected volatility was based on our historical stock price movements, as we believe that historical experience is the best available indicator of the expected volatility. Expected life of the option grant was based on historical exercise and cancellation patterns, as we believe that historical experience is the best estimate for future exercise patterns.

Share Repurchases

On April 26, 2018, our board of directors authorized a share repurchase program for the purchase of shares of common stock at an aggregate price of up to \$500.0 million. This program will terminate upon the purchase of \$500.0 million of our common stock. Under our April 26, 2018 share repurchase program, we may pursue various share repurchase strategies, which include entering into accelerated share repurchase (ASR) agreements with third-party financial institutions to repurchase shares of Olin’s common stock. Under an ASR agreement, Olin pays a specified amount to the financial institution and receives an initial delivery of shares. This initial delivery of shares represents the minimum number of shares that Olin may receive under the agreement. Upon settlement of the ASR agreement, the financial institution delivers additional shares, with the final number of shares delivered determined with reference to the volume weighted-average price of Olin’s common stock over the term of the agreement, less an agreed-upon discount. The transactions are accounted for as liability or equity transactions and also as share retirements, similar to our other share repurchase activity, when the shares are received, at which time there is an immediate reduction in the weighted-average common shares calculation for basic and diluted earnings per share.

NOTE 3. RECENT ACCOUNTING PRONOUNCEMENTS

In December 2019, the FASB issued ASU 2019-12, “Simplifying the Accounting for Income Taxes” which amends ASC 740 “Income Taxes” (ASC 740). This update is intended to simplify accounting for income taxes by removing certain exceptions to the general principles in ASC 740 and amending existing guidance to improve consistent application of ASC 740. This update is effective for fiscal years beginning after December 15, 2020 and interim periods within those fiscal years. The guidance in this update has various elements, some of which are applied on a prospective basis and others on a retrospective basis with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, “Simplifying the Test for Goodwill Impairment” which amends ASC 350. This update will simplify the measurement of goodwill impairment by eliminating Step 2 from the goodwill impairment test. This update will require an entity to perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit’s fair value. The update does not modify the option to perform the qualitative assessment for a reporting unit to determine if the quantitative impairment test is necessary. This update is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. The guidance in this update is applied on a prospective basis, with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, “Measurement of Credit Losses on Financial Instruments,” (ASU 2016-03) which amends ASC 326 “Financial Instruments—Credit Losses.” Subsequent to the issuance of ASU 2016-13, ASC 326 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. The new guidance introduces the current expected credit loss (CECL) model, which will require an entity to record an allowance for credit losses for certain financial instruments and financial assets, including trade receivables, based on expected losses rather than incurred losses. Under this update, on initial recognition and at each reporting period, an entity will be required to recognize an allowance that reflects the entity’s current estimate of credit losses expected to be incurred over the life of the financial instrument. This update is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. The guidance in this update has various elements, some of which are applied on a prospective basis and others on a retrospective basis, with earlier application permitted. We adopted this update on January 1, 2020 which did not have a material impact on our consolidated financial statements and related disclosures.

In February 2016, the FASB issued ASU 2016-02 “Leases,” (ASU 2016-02) which supersedes ASC 840 “Leases” and creates a new topic, ASC 842 “Leases” (ASC 842). Subsequent to the issuance of ASU 2016-02, ASC 842 was amended by various updates that amend and clarify the impact and implementation of the aforementioned update. These updates require lessees to recognize a lease liability and a lease asset for all leases, including operating leases, with a term greater than 12 months on its balance sheet. Upon initial application, the provisions of these updates are required to be applied using the modified retrospective method which requires retrospective adoption to each prior reporting period presented with the cumulative effect of adoption recorded to the earliest reporting period presented. An optional transition method can be utilized which requires application of these updates beginning on the date of adoption with the cumulative effect of initially applying these updates recognized at the date of initial adoption. These updates also expand the required quantitative and qualitative disclosures surrounding leases. These updates are effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years, with earlier application permitted. We adopted these updates on January 1, 2019 using the optional transition method. Accordingly, prior periods were not retrospectively adjusted. Adoption of these updates resulted in the recording of operating lease assets and lease liabilities on our consolidated balance sheet of \$291.9 million as of January 1, 2019. Our assets and liabilities for finance leases remained unchanged. We also recognized the cumulative effect of applying these updates as an adjustment to retained earnings of \$11.2 million, net of tax, which was primarily related to the recognition of previously deferred sale/leaseback gains. Our consolidated statements of operations and cash flows, along with our compliance with all covenants and restrictions under all our outstanding credit agreements, were not impacted by this adoption. These updates also impacted our accounting policies, internal controls and disclosures related to leases. Expanded disclosures regarding leases are included in Note 23 “Leases”.

NOTE 4. ACQUISITION

On October 5, 2015 (the Closing Date), we completed the acquisition (the Acquisition) from The Dow Chemical Company (Dow) of its U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses (collectively, the Acquired Business), whose operating results are included in the accompanying financial statements since the Closing Date.

For the years ended December 31, 2018 and 2017, we incurred costs related to the integration of the Acquired Business of \$1.0 million and \$12.8 million, respectively, which consisted of advisory, legal, accounting and other professional fees.

NOTE 5. RESTRUCTURING CHARGES

On December 11, 2019, we announced that we had made the decision to permanently close a chlor alkali plant with a capacity of 230,000 tons and our vinylidene chloride (VDC) production facility, both in Freeport, TX. These closures are expected to be completed before the end of 2020. For the year ended December 31, 2019, we recorded pretax restructuring charges of \$58.9 million for non-cash impairment of equipment and facilities related to these actions. We expect to incur additional restructuring charges through 2024 of approximately \$50 million related to these actions.

On December 10, 2018, we announced that we had made the decision to permanently close the ammunition assembly operations at our Winchester facility in Geelong, Australia. Subsequent to the facility's closure, products for customers in the region are sourced from Winchester manufacturing facilities located in the United States. For the years ended December 31, 2019 and 2018, we recorded pretax restructuring charges of \$0.4 million and \$4.1 million, respectively for the write-off of equipment and facility costs, employee severance and related benefit costs, lease and other contract termination costs and facility exit costs related to this action. For the year ended December 31, 2019, we also recorded additional pretax restructuring charges of \$1.4 million for employee severance and related benefit costs related to our Winchester operations.

On March 21, 2016, we announced that we had made the decision to close a combined total of 433,000 tons of chlor alkali capacity across three separate locations. Associated with this action, we have permanently closed our Henderson, NV chlor alkali plant with 153,000 tons of capacity and have reconfigured the site to manufacture bleach and distribute caustic soda and hydrochloric acid. Also, the capacity of our Niagara Falls, NY chlor alkali plant has been reduced from 300,000 tons to 240,000 tons and the chlor alkali capacity at our Freeport, TX facility was reduced by 220,000 tons. This 220,000 ton reduction was entirely from diaphragm cell capacity. For the years ended December 31, 2019, 2018 and 2017, we recorded pretax restructuring charges of \$15.8 million, \$15.7 million and \$32.6 million, respectively, for the write-off of equipment and facility costs, lease and other contract termination costs, employee severance and related benefit costs, employee relocation costs and facility exit costs related to these actions. We expect to incur additional restructuring charges through 2020 of approximately \$5 million related to these capacity reductions.

For the years ended December 31, 2018 and 2017, we recorded pretax restructuring charges of \$2.1 million and \$3.3 million, respectively, for lease and other contract termination costs and facility exit costs related to our permanent reduction in capacity at our Becancour, Canada chlor alkali facility in 2014.

For the year ended December 31, 2017, we recorded pretax restructuring charges of \$1.7 million for employee severance and related benefit costs related to the relocation of our Winchester centerfire pistol and rifle ammunition manufacturing operations from East Alton, IL to Oxford, MS that was announced in 2010 and completed in 2016.

The following table summarizes the activities by major component of these restructuring actions and the remaining balances of accrued restructuring costs as of December 31, 2019:

	<i>Employee severance and related benefit costs</i>	<i>Lease and other contract termination costs</i>	<i>Employee relocation costs</i>	<i>Facility exit costs</i>	<i>Write-off of equipment and facility</i>	<i>Total</i>
	(\$ in millions)					
Balance at January 1, 2017	\$ 3.4	\$ 7.5	\$ —	\$ 1.8	\$ —	\$ 12.7
2017 restructuring charges	2.0	22.1	0.3	11.7	1.5	37.6
Amounts utilized	(3.6)	(26.3)	(0.3)	(13.5)	(1.5)	(45.2)
Balance at December 31, 2017	1.8	3.3	—	—	—	5.1
2018 restructuring charges	1.7	5.6	—	12.0	2.6	21.9
Amounts utilized	(2.0)	(2.9)	—	(11.3)	(2.6)	(18.8)
Balance at December 31, 2018	1.5	6.0	—	0.7	—	8.2
2019 restructuring charges	2.1	0.9	—	14.6	58.9	76.5
Amounts utilized	(3.6)	(3.8)	—	(15.3)	(58.9)	(81.6)
Balance at December 31, 2019	\$ —	\$ 3.1	\$ —	\$ —	\$ —	\$ 3.1

The following table summarizes the cumulative restructuring charges of these restructuring actions by major component through December 31, 2019:

	<i>Chlor Alkali Products and Vinyls</i>			<i>Winchester</i>		<i>Total</i>
	<i>Becancour</i>	<i>Capacity Reductions</i>	<i>Freeport</i>	<i>Oxford</i>	<i>Other</i>	
	<i>(\$ in millions)</i>					
Write-off of equipment and facility	\$ 3.5	\$ 78.1	\$ 58.9	\$ —	\$ 2.6	\$ 143.1
Employee severance and related benefit costs	2.7	6.6	—	14.7	2.7	26.7
Facility exit costs	5.9	48.2	—	2.3	0.2	56.6
Pension and other postretirement benefits curtailment	—	—	—	4.1	—	4.1
Employee relocation costs	—	1.7	—	6.0	—	7.7
Lease and other contract termination costs	6.1	40.9	—	—	0.4	47.4
Total cumulative restructuring charges	\$ 18.2	\$ 175.5	\$ 58.9	\$ 27.1	\$ 5.9	\$ 285.6

As of December 31, 2019, we have incurred cash expenditures of \$134.9 million and non-cash charges of \$147.6 million related to these restructuring actions. The remaining balance of \$3.1 million is expected to be paid out through 2021.

NOTE 6. EARNINGS PER SHARE

Basic and diluted net (loss) income per share are computed by dividing net (loss) income by the weighted-average number of common shares outstanding. Diluted net (loss) income per share reflects the dilutive effect of stock-based compensation.

	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(In millions, except per share data)</i>		
<i>Computation of (Loss) Income per Share</i>			
Net (loss) income	\$ (11.3)	\$ 327.9	\$ 549.5
Basic shares	162.3	166.8	166.2
Basic net (loss) income per share	\$ (0.07)	\$ 1.97	\$ 3.31
Diluted shares:			
Basic shares	162.3	166.8	166.2
Stock-based compensation	—	1.6	2.3
Diluted shares	162.3	168.4	168.5
Diluted net (loss) income per share	\$ (0.07)	\$ 1.95	\$ 3.26

The computation of dilutive shares from stock-based compensation does not include 7.8 million, 2.4 million and 1.6 million shares in 2019, 2018 and 2017, respectively, as their effect would have been anti-dilutive.

NOTE 7. ACCOUNTS RECEIVABLES

On July 16, 2019, our existing \$250.0 million Receivables Financing Agreement was extended to July 15, 2022 and downsized to \$10.0 million with the option to expand to \$300.0 million (Receivables Financing Agreement). The administrative agent for our Receivables Financing Agreement is PNC Bank, National Association. Under the Receivables Financing Agreement, our eligible trade receivables are used for collateralized borrowings and continue to be serviced by us. In addition, the Receivables Financing Agreement incorporates the leverage and coverage covenants that are contained in the \$2,000.0 million senior credit facility. For the year ended December 31, 2019, the outstanding balance of the \$250.0 million Receivables Financing Agreement of \$150.0 million was repaid with proceeds from the issuance of \$750.0 million senior notes due 2029. As of December 31, 2019 and 2018, we had zero and \$125.0 million, respectively, drawn under the agreement. As of December 31, 2019, we had \$10.0 million of additional borrowing capacity under the Receivables Financing Agreement.

Olin also has trade accounts receivable factoring arrangements (AR Facilities) and pursuant to the terms of the AR Facilities, certain of our subsidiaries may sell their accounts receivable up to a maximum of \$315.0 million. We will continue

to service the outstanding accounts sold. These receivables qualify for sales treatment under ASC 860 “Transfers and Servicing” and, accordingly, the proceeds are included in net cash provided by operating activities in the consolidated statements of cash flows. The following table summarizes the AR Facilities activity:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning Balance	\$ 132.4	\$ 182.3
Gross receivables sold	984.8	1,372.3
Payments received from customers on sold accounts	(1,054.1)	(1,422.2)
Ending Balance	<u>\$ 63.1</u>	<u>\$ 132.4</u>

The factoring discount paid under the AR Facilities is recorded as interest expense on the consolidated statements of operations. The factoring discount for the years ended December 31, 2019, 2018 and 2017 was \$2.9 million, \$4.3 million and \$3.7 million, respectively. The agreements are without recourse and therefore no recourse liability has been recorded as of December 31, 2019.

At December 31, 2019 and 2018, our consolidated balance sheets included other receivables of \$87.4 million and \$58.0 million, respectively, which were classified as receivables, net.

NOTE 8. ALLOWANCE FOR DOUBTFUL ACCOUNTS RECEIVABLES

Allowance for doubtful accounts receivable consisted of the following:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning balance	\$ 12.9	\$ 12.3
Provisions charged	1.1	1.7
Write-offs, net of recoveries	(2.1)	(0.7)
Foreign currency translation adjustments	—	(0.4)
Ending balance	<u>\$ 11.9</u>	<u>\$ 12.9</u>

NOTE 9. INVENTORIES

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Supplies	\$ 80.5	\$ 66.4
Raw materials	74.9	66.7
Work in process	140.3	139.6
Finished goods	449.5	488.5
	<u>745.2</u>	<u>761.2</u>
LIFO reserve	(49.5)	(49.8)
Inventories, net	<u>\$ 695.7</u>	<u>\$ 711.4</u>

Inventories valued using the LIFO method comprised 56% and 55% of the total inventories at December 31, 2019 and 2018, respectively. The replacement cost of our inventories would have been approximately \$49.5 million and \$49.8 million higher than that reported at December 31, 2019 and 2018, respectively.

NOTE 10. OTHER ASSETS

Included in other assets were the following:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Supply contracts	\$ 1,112.6	\$ 1,099.5
Investments in non-consolidated affiliates	—	8.8
Other	56.5	42.1
Other assets	<u>\$ 1,169.1</u>	<u>\$ 1,150.4</u>

On January 1, 2019, we sold our 9.1% limited partnership interest in Bay Gas Storage Company, Ltd. (Bay Gas) for \$20.0 million. The sale closed on February 7, 2019 which resulted in a gain of \$11.2 million for the year ended December 31, 2019 which was recorded to other income in the consolidated statements of operations.

For the year ended December 31, 2018, we recorded a \$21.5 million non-cash impairment charge related to an adjustment to the value of our 9.1% limited partnership interest in Bay Gas. Bay Gas owns, leases and operates underground gas storage and related pipeline facilities, which are used to provide storage in the McIntosh, AL area and delivery of natural gas. The general partner, Sempra Energy (Sempra), announced in the second quarter of 2018 its plan to sell several assets including its 90.9% interest in Bay Gas. In connection with this decision, Sempra recorded an impairment charge related to Bay Gas adjusting the related assets' carrying values to an estimated fair value. We recorded a reduction in our investment in the non-consolidated affiliate for the proportionate share of the non-cash impairment charge. Olin has no other non-consolidated affiliates.

The losses of non-consolidated affiliates were \$19.7 million for the year ended December 31, 2018, which reflect the \$21.5 million non-cash impairment charge. The earnings of non-consolidated affiliates were \$1.8 million for the year ended December 31, 2017.

In connection with the Acquisition, Olin and Dow entered into arrangements for the long-term supply of ethylene by Dow to Olin, pursuant to which, among other things, Olin made upfront payments of \$433.5 million on the Closing Date in order to receive ethylene at producer economics and for certain reservation fees and for the option to obtain additional ethylene at producer economics. The fair value of the long-term supply contracts recorded as of the Closing Date was a long-term asset of \$416.1 million which will be amortized over the life of the contracts as ethylene is received. During 2017, we made an additional payment of \$209.4 million in connection with our option to reserve additional ethylene supply at producer economics from Dow which increased the value of the long-term asset.

On February 27, 2017, we exercised the remaining option to reserve additional ethylene at producer economics from Dow. In connection with the exercise of this option, we also secured a long-term customer arrangement. As a result, an additional payment will be made to Dow that is not to exceed \$493 million on or about the fourth quarter of 2020. During 2017, as a result of Dow's new Texas 9 ethylene cracker becoming operational, Olin recognized a long-term asset and other liability of \$389.2 million, which represented the present value of the additional estimated payment. During 2019, Olin increased the long-term asset and other liability by \$50.7 million. The discounted amount of \$52.7 million will be recorded as interest expense through the fourth quarter of 2020. For the years ended December 31, 2019, 2018, and 2017 interest expense of \$17.0 million, \$16.0 million and \$3.9 million, respectively, was recorded for accretion on the 2020 payment discount.

The weighted-average useful life of long-term supply contracts at December 31, 2019 was 20 years. For the years ended December 31, 2019, 2018 and 2017, amortization expense of \$37.6 million, \$37.6 million and \$28.2 million, respectively, was recognized within cost of goods sold related to these supply contracts and is reflected in depreciation and amortization on the consolidated statements of cash flows. We estimate that amortization expense will be approximately \$38 million in 2020 and \$60 million in 2021, 2022, 2023 and 2024 related to these long-term supply contracts. The long-term supply contracts are monitored for impairment each reporting period.

NOTE 11. PROPERTY, PLANT AND EQUIPMENT

	<i>Useful Lives</i>	<i>December 31,</i>	
		<i>2019</i>	<i>2018</i>
<i>(\$ in millions)</i>			
Land and improvements to land	10-20 Years	\$ 277.5	\$ 276.9
Buildings and building equipment	10-30 Years	392.4	387.6
Machinery and equipment	3-20 Years	5,566.0	5,252.0
Leasehold improvements		9.9	5.2
Construction in progress		346.1	341.4
Property, plant and equipment		6,591.9	6,263.1
Accumulated depreciation		(3,268.1)	(2,781.0)
Property, plant and equipment, net		<u>\$ 3,323.8</u>	<u>\$ 3,482.1</u>

The weighted-average useful life of machinery and equipment at December 31, 2019 was 11 years. Depreciation expense was \$493.3 million, \$497.8 million and \$465.1 million for 2019, 2018 and 2017, respectively. Interest capitalized was \$10.8 million, \$6.0 million and \$3.0 million for 2019, 2018 and 2017, respectively.

The consolidated statements of cash flows for the years ended December 31, 2019, 2018 and 2017, included decreases of \$5.7 million, \$25.5 million and \$0.5 million, respectively, to capital expenditures, with the corresponding change to accounts payable and accrued liabilities, related to purchases of property, plant and equipment included in accounts payable and accrued liabilities at December 31, 2019, 2018 and 2017.

NOTE 12. GOODWILL AND INTANGIBLE ASSETS

Changes in the carrying value of goodwill were as follows:

	<i>Chlor Alkali Products and Vinyls</i>		<i>Epoxy</i>		<i>Total</i>	
	<i>(\$ in millions)</i>					
Balance at January 1, 2018	\$	1,832.9	\$	287.1	\$	2,120.0
Foreign currency translation adjustment		(0.3)		(0.1)		(0.4)
Balance at December 31, 2018		1,832.6		287.0		2,119.6
Foreign currency translation adjustment		0.1		—		0.1
Balance at December 31, 2019	<u>\$</u>	<u>1,832.7</u>	<u>\$</u>	<u>287.0</u>	<u>\$</u>	<u>2,119.7</u>

Intangible assets consisted of the following:

	<i>Useful Lives</i>	<i>December 31,</i>					
		<i>2019</i>			<i>2018</i>		
		<i>Gross Amount</i>	<i>Accumulated Amortization</i>	<i>Net</i>	<i>Gross Amount</i>	<i>Accumulated Amortization</i>	<i>Net</i>
<i>(\$ in millions)</i>							
Customers, customer contracts and relationships	10-15 Years	\$ 673.5	\$ (260.9)	\$ 412.6	\$ 675.2	\$ (211.9)	\$ 463.3
Trade name	5 Years	7.0	(6.0)	1.0	7.0	(4.6)	2.4
Acquired technology	7 Years	85.1	(51.8)	33.3	85.4	(39.6)	45.8
Other	10 Years	1.8	(0.6)	1.2	0.7	(0.6)	0.1
Total intangible assets		<u>\$ 767.4</u>	<u>\$ (319.3)</u>	<u>\$ 448.1</u>	<u>\$ 768.3</u>	<u>\$ (256.7)</u>	<u>\$ 511.6</u>

Amortization expense relating to intangible assets was \$62.8 million in 2019, 2018 and 2017. We estimate that amortization expense will be approximately \$62 million in 2020, approximately \$61 million in 2021, approximately \$54 million in 2022 and approximately \$35 million in both 2023 and 2024.

NOTE 13. DEBT

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
Notes payable:	<i>(\$ in millions)</i>	
Variable-rate Delayed Draw Term Loan Facility, due 2024 (4.02% at December 31, 2018)	\$ —	\$ 543.0
Variable-rate Recovery Zone bonds, due 2024-2035 (2.85% and 3.67% at December 31, 2019 and 2018, respectively)	103.0	103.0
Variable-rate Go Zone bonds, due 2024 (2.85% and 3.67% at December 31, 2019 and 2018, respectively)	50.0	50.0
Variable-rate Industrial development and environmental improvement obligations, due 2025 (1.70% and 2.52% at December 31, 2019 and 2018, respectively)	2.9	2.9
10.00%, due 2025	500.0	500.0
9.75%, due 2023	720.0	720.0
5.625%, due 2029	750.0	—
5.50%, due 2022	200.0	200.0
5.125%, due 2027	500.0	500.0
5.00%, due 2030	550.0	550.0
Receivables Financing Agreement (See Note 7)	—	125.0
Finance lease obligations	5.3	4.2
Total notes payable	3,381.2	3,298.1
Deferred debt issuance costs	(38.2)	(34.1)
Interest rate swaps	(2.2)	(33.7)
Total debt	3,340.8	3,230.3
Amounts due within one year	2.1	125.9
Total long-term debt	\$ 3,338.7	\$ 3,104.4

On July 16, 2019, Olin issued \$750.0 million aggregate principal amount of 5.625% senior notes due August 1, 2029 (2029 Notes), which were registered under the Securities Act of 1933, as amended. Interest on the 2029 Notes began accruing from July 16, 2019 and is payable semi-annually beginning on February 1, 2020. Proceeds from the 2029 Notes were used to redeem the remaining balance of the \$1,375.0 million term loan facility of \$493.0 million and \$150.0 million of the Receivables Financing Agreement.

On July 16, 2019, Olin entered into a new five-year, \$2,000.0 million senior credit facility (2019 Senior Credit Facility), which replaces the existing \$1,975.0 million senior credit facility. The 2019 Senior Credit Facility includes a senior unsecured delayed-draw term loan facility in an aggregate principal amount of up to \$1,200.0 million (Delayed Draw Term Loan Facility). The Delayed Draw Term Loan Facility will be available on a delayed basis in up to three draws to be made on or prior to November 29, 2020. The Delayed Draw Term Loan Facility includes principal amortization amounts payable beginning the quarter ending after the facility is borrowed upon at a rate of 5.0% per annum for the first two years, increasing to 7.5% per annum for the following year and to 10.0% per annum for the last two years. We expect the proceeds from the Delayed Draw Term Loan Facility will be used to redeem the 9.75% senior notes due 2023 and the 10.00% senior notes due 2025 on or about October 15, 2020. The 2019 Senior Credit Facility also includes a senior unsecured revolving credit facility with aggregate commitments in an amount equal to \$800.0 million (2019 Senior Revolving Credit Facility), which was increased from \$600.0 million. The 2019 Senior Revolving Credit Facility includes a \$100.0 million letter of credit subfacility. For the year ended December 31, 2019, we had \$796.5 million available under our 2019 Senior Revolving Credit Facility because we had issued \$3.5 million of letters of credit. The maturity date for the 2019 Senior Credit Facility is July 16, 2024 at which point all outstanding Delayed Draw Term Loan Facility and 2019 Senior Revolving Credit Facility balances will become due and payable. In December 2019, Olin amended the 2019 Senior Credit Facility which amended the restrictive covenants of the agreement, including expanding the coverage and leverage ratios to be less restrictive over the next two and a half years.

Under the 2019 Senior Credit Facility, we may select various floating rate borrowing options. The actual interest rate paid on borrowings under the 2019 Senior Credit Facility is based on a pricing grid which is dependent upon the leverage ratio as calculated under the terms of the applicable facility for the prior fiscal quarter. The 2019 Senior Credit Facility includes

various customary restrictive covenants, including restrictions related to the ratio of debt to earnings before interest expense, taxes, depreciation and amortization (leverage ratio) and the ratio of earnings before interest expense, taxes, depreciation and amortization to interest expense (coverage ratio). Compliance with these covenants is determined quarterly based on operating cash flows. We were in compliance with all covenants and restrictions under all our outstanding credit agreements as of December 31, 2019, and no event of default had occurred that would permit the lenders under our outstanding credit agreements to accelerate the debt if not cured. In the future, our ability to generate sufficient operating cash flows, among other factors, will determine the amounts available to be borrowed under these facilities. As of December 31, 2019, there were no covenants or other restrictions that would have limited our ability to borrow under these facilities.

For the year ended December 31, 2019, we recognized interest expense of \$2.8 million for the write-off of unamortized deferred debt issuance costs related to the replacement of the existing \$1,975.0 million senior credit facility, including the redemption of the remaining balance of the \$1,375.0 million term loan facility, and the redemption of the remaining balance of and reduction in the borrowing capacity under the Receivables Financing Agreement.

On January 19, 2018, Olin issued \$550.0 million aggregate principal amount of 5.00% senior notes due February 1, 2030 (2030 Notes), which were registered under the Securities Act of 1933, as amended. Interest on the 2030 Notes began accruing from January 19, 2018 and is paid semi-annually beginning on August 1, 2018. Proceeds from the 2030 Notes were used to redeem \$550.0 million of debt under the \$1,375.0 million term loan facility. We recognized interest expense of \$2.6 million for the write-off of unamortized deferred debt issuance costs related to this action in 2018.

On March 9, 2017, we entered into a five-year \$1,975.0 million senior credit facility, which amended and restated the then existing \$1,850.0 million senior credit facility. We recognized interest expense of \$1.2 million for the write-off of unamortized deferred debt issuance costs related to this action during 2017. Pursuant to the agreement, the aggregate principal amount under the term loan facility was increased to \$1,375.0 million, and the aggregate commitments under the senior revolving credit facility were increased to \$600.0 million. In March 2017, we drew the entire \$1,375.0 million term loan facility and used the proceeds to redeem the remaining balance of the existing \$1,350.0 million senior credit facility of \$1,282.5 million and a portion of the \$800.0 million Sumitomo Credit Facility (Sumitomo Credit Facility). For the year ended December 31, 2017, we repaid \$51.6 million under the required quarterly installments of the \$1,375.0 million term loan facility.

On March 9, 2017, Olin issued \$500.0 million aggregate principal amount of 5.125% senior notes due September 15, 2027 (2027 Notes), which were registered under the Securities Act of 1933, as amended. Interest on the 2027 Notes began accruing from March 9, 2017 and is paid semi-annually beginning on September 15, 2017. Proceeds from the 2027 Notes were used to redeem the remaining balance of the Sumitomo Credit Facility.

During 2017, the remaining Sumitomo Credit Facility balance of \$590.0 million was repaid using proceeds from the \$1,975.0 million senior credit facility and the 2027 Notes. We recognized interest expense of \$1.5 million related to the write-off of unamortized deferred debt issuance costs related to this action in 2017.

In 2019, we paid debt issuance costs of \$16.6 million for the issuance of the 2029 Notes and 2019 Senior Credit Facility. In 2018, we paid debt issuance costs of \$8.5 million relating to the 2030 Notes. In 2017, we paid debt issuance costs of \$11.2 million relating to the \$1,975.0 million senior credit facility and the 2027 Notes.

Pursuant to a note purchase agreement dated December 22, 1997, SunBelt sold \$97.5 million of Guaranteed Senior Secured Notes due 2017, Series O, and \$97.5 million of Guaranteed Senior Secured Notes due 2017, Series G. We refer to these notes as the SunBelt Notes. The SunBelt Notes accrued interest at a rate of 7.23% per annum, payable semi-annually in arrears on each June 22 and December 22. In December 2017, \$12.2 million was repaid on these SunBelt Notes. At December 31, 2017, all amounts due under the SunBelt Notes had been repaid.

At December 31, 2019, we had total letters of credit of \$68.7 million outstanding, of which \$3.5 million were issued under our 2019 Senior Revolving Credit Facility. The letters of credit are used to support certain long-term debt, certain workers compensation insurance policies, certain plant closure and post-closure obligations and certain international pension funding requirements.

Annual maturities of long-term debt, including finance lease obligations, are \$2.1 million in 2020, \$1.0 million in 2021, \$200.7 million in 2022, \$720.6 million in 2023, \$70.7 million in 2024 and a total of \$2,386.1 million thereafter.

In April 2016, we entered into three tranches of forward starting interest rate swaps whereby we agreed to pay fixed rates to the counterparties who, in turn, pay us floating rates on \$1,100.0 million, \$900.0 million and \$400.0 million of our underlying floating-rate debt obligations. Each tranche's term length was for twelve months beginning on December 31, 2016,

2017 and 2018, respectively. We designated the swaps as cash flow hedges of the risk of changes in interest payments associated with our variable-rate borrowings. In July 2019, we terminated the remaining interest rate swap agreement which resulted in a gain of \$1.8 million that was recognized in interest expense for the year ended December 31, 2019. For the years ended December 31, 2019, 2018 and 2017, \$4.3 million, \$8.9 million and \$3.1 million, respectively, of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

In April 2016, we entered into interest rate swaps on \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. In October 2016, we entered into interest rate swaps on an additional \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. We designated the April 2016 and October 2016 interest rate swap agreements as fair value hedges of the risk of changes in the value of fixed-rate debt due to changes in interest rates for a portion of our fixed-rate borrowings. In August 2019, we terminated the April 2016 and October 2016 interest rate swaps which resulted in a loss of \$2.3 million that will be deferred as an offset to the carrying value of the related debt and will be recognized to interest expense through October 2025. As of December 31, 2019, \$2.2 million of this loss was included in long-term debt in the consolidated balance sheet. For the years ended December 31, 2019 and 2018, \$2.6 million and \$2.1 million, respectively, of expense and for the year ended December 31, 2017, \$2.9 million of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

Our interest rate swaps reduced interest expense by \$1.7 million, \$6.8 million and \$6.1 million in 2019, 2018 and 2017, respectively. The difference between interest paid and interest received is included as an adjustment to interest expense.

NOTE 14. PENSION PLANS

We sponsor domestic and foreign defined benefit pension plans for eligible employees and retirees. Most of our domestic employees participate in defined contribution plans. However, a portion of our bargaining hourly employees continue to participate in our domestic qualified defined benefit pension plans under a flat-benefit formula. Our funding policy for the qualified defined benefit pension plans is consistent with the requirements of federal laws and regulations. Our foreign subsidiaries maintain pension and other benefit plans, which are consistent with local statutory practices.

Our domestic qualified defined benefit pension plan provides that if, within three years following a change of control of Olin, any corporate action is taken or filing made in contemplation of, among other things, a plan termination or merger or other transfer of assets or liabilities of the plan, and such termination, merger or transfer thereafter takes place, plan benefits would automatically be increased for affected participants (and retired participants) to absorb any plan surplus (subject to applicable collective bargaining requirements).

During 2019, we made a discretionary cash contribution to our domestic qualified defined benefit pension plan of \$12.5 million. Based on our plan assumptions and estimates, we will not be required to make any cash contributions to the domestic qualified defined benefit pension plan at least through 2020.

We have international qualified defined benefit pension plans to which we made cash contributions of \$2.4 million, \$2.6 million and \$1.7 million in 2019, 2018 and 2017, respectively, and we anticipate less than \$5 million of cash contributions to international qualified defined benefit pension plans in 2020.

Pension Obligations and Funded Status

Changes in the benefit obligation and plan assets were as follows:

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
<u>Change in Benefit Obligation</u>	<i>(\$ in millions)</i>					
Benefit obligation at beginning of year	\$ 2,365.5	\$ 302.3	\$ 2,667.8	\$ 2,579.9	\$ 303.4	\$ 2,883.3
Service cost	1.0	10.3	11.3	1.4	9.7	11.1
Interest cost	88.7	6.0	94.7	80.6	5.7	86.3
Actuarial loss (gain)	299.5	64.6	364.1	(163.2)	1.5	(161.7)
Benefits paid	(134.5)	(4.8)	(139.3)	(133.2)	(3.7)	(136.9)
Plan participant's contributions	—	1.7	1.7	—	1.2	1.2
Plan amendments	—	(0.7)	(0.7)	—	(0.4)	(0.4)
Foreign currency translation adjustments	—	(1.8)	(1.8)	—	(15.1)	(15.1)
Benefit obligation at end of year	<u>\$ 2,620.2</u>	<u>\$ 377.6</u>	<u>\$ 2,997.8</u>	<u>\$ 2,365.5</u>	<u>\$ 302.3</u>	<u>\$ 2,667.8</u>

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
<u>Change in Plan Assets</u>	<i>(\$ in millions)</i>					
Fair value of plans' assets at beginning of year	\$ 1,925.8	\$ 67.2	\$ 1,993.0	\$ 2,172.5	\$ 74.4	\$ 2,246.9
Actual return on plans' assets	318.8	7.6	326.4	(113.9)	(2.1)	(116.0)
Employer contributions	12.5	2.4	14.9	0.4	1.8	2.2
Benefits paid	(134.5)	(3.4)	(137.9)	(133.2)	(2.2)	(135.4)
Foreign currency translation adjustments	—	2.9	2.9	—	(4.7)	(4.7)
Fair value of plans' assets at end of year	<u>\$ 2,122.6</u>	<u>\$ 76.7</u>	<u>\$ 2,199.3</u>	<u>\$ 1,925.8</u>	<u>\$ 67.2</u>	<u>\$ 1,993.0</u>

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
<u>Funded Status</u>	<i>(\$ in millions)</i>					
Qualified plans	\$ (494.3)	\$ (298.4)	\$ (792.7)	\$ (436.1)	\$ (232.8)	\$ (668.9)
Non-qualified plans	(3.3)	(2.5)	(5.8)	(3.6)	(2.3)	(5.9)
Total funded status	<u>\$ (497.6)</u>	<u>\$ (300.9)</u>	<u>\$ (798.5)</u>	<u>\$ (439.7)</u>	<u>\$ (235.1)</u>	<u>\$ (674.8)</u>

Under ASC 715, we recorded a \$145.5 million after-tax charge (\$177.7 million pretax) to shareholders' equity as of December 31, 2019 for our pension plans. This charge primarily reflected a 100-basis point decrease in the domestic pension plans' discount rate, partially offset by favorable performance on plan assets during 2019. In 2018, we recorded a \$76.5 million after-tax charge (\$100.6 million pretax) to shareholders' equity as of December 31, 2018 for our pension plans. This charge primarily reflected unfavorable performance on plan assets during 2018, partially offset by a 60-basis point increase in the domestic pension plans' discount rate.

The \$364.1 million actuarial loss for 2019 was primarily due to a 100-basis point decrease in the domestic pension plans' discount rate. The \$161.7 million actuarial gain for 2018 was primarily due to a 60-basis point increase in the domestic pension plans' discount rate.

Amounts recognized in the consolidated balance sheets consisted of:

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
	<i>(\$ in millions)</i>					
Accrued benefit in current liabilities	\$ (0.6)	\$ (0.2)	\$ (0.8)	\$ (0.4)	\$ (0.1)	\$ (0.5)
Accrued benefit in noncurrent liabilities	(497.0)	(300.7)	(797.7)	(439.3)	(235.0)	(674.3)
Accumulated other comprehensive loss	891.6	111.6	1,003.2	796.5	56.0	852.5
Net balance sheet impact	<u>\$ 394.0</u>	<u>\$ (189.3)</u>	<u>\$ 204.7</u>	<u>\$ 356.8</u>	<u>\$ (179.1)</u>	<u>\$ 177.7</u>

At December 31, 2019 and 2018, the benefit obligation of non-qualified pension plans was \$5.8 million and \$5.9 million, respectively, and was included in the above pension benefit obligation. There were no plan assets for these non-qualified pension plans. Benefit payments for the non-qualified pension plans are expected to be as follows: 2020—\$0.8 million; 2021—\$0.5 million; 2022—\$0.4 million; 2023—\$0.4 million; and 2024—\$0.2 million. Benefit payments for the qualified plans are projected to be as follows: 2020—\$146.9 million; 2021—\$146.4 million; 2022—\$146.3 million; 2023—\$145.0 million; and 2024—\$143.8 million.

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Projected benefit obligation	\$ 2,997.8	\$ 2,667.8
Accumulated benefit obligation	2,972.4	2,641.3
Fair value of plan assets	2,199.3	1,993.0

	<i>Years Ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(\$ in millions)</i>		
<i>Components of Net Periodic Benefit (Income) Costs</i>			
Service cost	\$ 11.3	\$ 11.1	\$ 9.4
Interest cost	94.7	86.3	86.6
Expected return on plans' assets	(141.8)	(146.5)	(149.4)
Amortization of prior service cost	—	0.1	2.2
Recognized actuarial loss	27.0	34.5	24.8
Net periodic benefit (income) costs	<u>\$ (8.8)</u>	<u>\$ (14.5)</u>	<u>\$ (26.4)</u>

Included in Other Comprehensive Loss (Pretax)

Liability adjustment	\$ 177.7	\$ 100.6	\$ 26.9
Amortization of prior service costs and actuarial losses	(27.0)	(34.6)	(27.0)

The service cost component of net periodic benefit (income) cost related to the employees of the operating segments are allocated to the operating segments based on their respective estimated census data.

Pension Plan Assumptions

Certain actuarial assumptions, such as discount rate and long-term rate of return on plan assets, have a significant effect on the amounts reported for net periodic benefit cost and accrued benefit obligation amounts. We use a measurement date of December 31 for our pension plans.

<i>Weighted-Average Assumptions</i>	<i>U.S. Pension Benefits</i>			<i>Foreign Pension Benefits</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>	<i>2019</i>	<i>2018</i>	<i>2017</i>
Discount rate—periodic benefit cost	4.2% ⁽¹⁾	3.6%	4.1%	2.2%	2.2%	2.3%
Expected return on assets	7.75%	7.75%	7.75%	5.2%	5.2%	5.6%
Rate of compensation increase	3.0%	3.0%	3.0%	2.9%	2.9%	3.0%
Discount rate—benefit obligation	3.2%	4.2%	3.6%	1.4%	2.2%	2.2%

(1) The discount rate—periodic benefit cost for our domestic qualified pension plan is comprised of the discount rate used to determine interest costs of 3.9% and the discount rate used to determine service costs of 4.3%.

The discount rate is based on a hypothetical yield curve represented by a series of annualized individual zero-coupon bond spot rates for maturities ranging from one-half to thirty years. The bonds used in the yield curve must have a rating of AA or better per Standard & Poor’s, be non-callable, and have at least \$250 million par outstanding. The yield curve is then applied to the projected benefit payments from the plan. Based on these bonds and the projected benefit payment streams, the single rate that produces the same yield as the matching bond portfolio is used as the discount rate.

The long-term expected rate of return on plan assets represents an estimate of the long-term rate of returns on the investment portfolio consisting of equities, fixed income and alternative investments. We use long-term historical actual return information, the allocation mix of investments that comprise plan assets and forecast estimates of long-term investment returns, including inflation rates, by reference to external sources. The historic rates of return on plan assets have been 7.3% for the last 5 years, 8.8% for the last 10 years and 9.3% for the last 15 years. The following rates of return by asset class were considered in setting the long-term rate of return assumption:

U.S. equities	9%	to	13%
Non-U.S. equities	6%	to	11%
Fixed income/cash	5%	to	9%
Alternative investments	5%	to	15%

Plan Assets

Our pension plan asset allocations at December 31, 2019 and 2018 by asset class were as follows:

<i>Asset Class</i>	<i>Percentage of Plan Assets</i>	
	<i>2019</i>	<i>2018</i>
U.S. equities	11%	12%
Non-U.S. equities	17%	15%
Fixed income/cash	38%	32%
Alternative investments	34%	24%
Absolute return strategies	0%	17%
Total	100%	100%

The Alternative Investments asset class includes hedge funds, real estate and private equity investments. The Alternative Investments class is intended to help diversify risk and increase returns by utilizing a broader group of assets.

Absolute Return Strategies further diversify the plan’s assets through the use of asset allocations that seek to provide a targeted rate of return over inflation. The investment managers allocate funds within asset classes that they consider to be undervalued in an effort to preserve gains in overvalued asset classes and to find opportunities in undervalued asset classes.

A master trust was established by our pension plan to accumulate funds required to meet benefit payments of our plan and is administered solely in the interest of our plan’s participants and their beneficiaries. The master trust’s investment

horizon is long term. Its assets are managed by professional investment managers or invested in professionally managed investment vehicles.

Our pension plan maintains a portfolio of assets designed to achieve an appropriate risk adjusted return. The portfolio of assets is also structured to manage risk by diversifying assets across asset classes whose return patterns are not highly correlated, investing in passively and actively managed strategies and in value and growth styles, and by periodic rebalancing of asset classes, strategies and investment styles to objectively set targets.

As of December 31, 2019, the following target allocation and ranges have been set for each asset class:

<u>Asset Class</u>	<u>Target Allocation</u>	<u>Target Range</u>
U.S. equities ⁽¹⁾	27%	27-37
Non-U.S. equities ⁽¹⁾	18%	2-38
Fixed income/cash ⁽¹⁾	47%	25-90
Alternative investments	8%	0-35

(1) The target allocation for these asset classes include alternative investments, primarily hedge funds, based on the underlying investments in each hedge fund.

Determining which hierarchical level an asset or liability falls within requires significant judgment. The following table summarizes our domestic and foreign defined benefit pension plan assets measured at fair value as of December 31, 2019:

<u>Asset Class</u>	<u>Investments Measured at Net Asset Value</u>	<u>Quoted Prices In Active Markets for Identical Assets (Level 1)</u>	<u>Significant Other Observable Inputs (Level 2)</u>	<u>Significant Unobservable Inputs (Level 3)</u>	<u>Total</u>
Equity securities			(\$ in millions)		
U.S. equities	\$ 117.2	\$ 132.8	\$ —	\$ —	\$ 250.0
Non-U.S. equities	341.2	32.7	0.3	—	374.2
Fixed income/cash					
Cash	—	101.5	—	—	101.5
Government treasuries	—	—	285.0	—	285.0
Corporate debt instruments	99.1	—	158.3	—	257.4
Asset-backed securities	166.9	—	19.2	—	186.1
Alternative investments					
Hedge fund of funds	698.3	—	—	—	698.3
Real estate funds	16.9	—	—	—	16.9
Private equity funds	29.9	—	—	—	29.9
Total assets	\$ 1,469.5	\$ 267.0	\$ 462.8	\$ —	\$ 2,199.3

The following table summarizes our domestic and foreign defined benefit pension plan assets measured at fair value as of December 31, 2018:

<i>Asset Class</i>	<i>Investments Measured at Net Asset Value</i>	<i>Quoted Prices In Active Markets for Identical Assets (Level 1)</i>	<i>Significant Other Observable Inputs (Level 2)</i>	<i>Significant Unobservable Inputs (Level 3)</i>	<i>Total</i>
<i>(\$ in millions)</i>					
Equity securities					
U.S. equities	\$ 111.5	\$ 136.6	\$ —	\$ —	\$ 248.1
Non-U.S. equities	255.8	44.5	0.9	—	301.2
Fixed income/cash					
Cash	—	55.7	—	—	55.7
Government treasuries	0.7	—	175.0	—	175.7
Corporate debt instruments	83.7	—	139.2	—	222.9
Asset-backed securities	153.6	—	17.6	—	171.2
Alternative investments					
Hedge fund of funds	440.8	—	—	—	440.8
Real estate funds	22.3	—	—	—	22.3
Private equity funds	7.6	—	—	—	7.6
Absolute return strategies	347.5	—	—	—	347.5
Total assets	\$ 1,423.5	\$ 236.8	\$ 332.7	\$ —	\$ 1,993.0

U.S. equities—This class included actively and passively managed equity investments in common stock and commingled funds comprised primarily of large-capitalization stocks with value, core and growth strategies.

Non-U.S. equities—This class included actively managed equity investments in commingled funds comprised primarily of international large-capitalization stocks from both developed and emerging markets.

Fixed income and cash—This class included commingled funds comprised of debt instruments issued by the U.S. and Canadian Treasuries, U.S. Agencies, corporate debt instruments, asset- and mortgage-backed securities and cash.

Hedge fund of funds—This class included a hedge fund which invests in the following types of hedge funds:

Event driven hedge funds—This class included hedge funds that invest in securities to capture excess returns that are driven by market or specific company events including activist investment philosophies and the arbitrage of equity and private and public debt securities.

Market neutral hedge funds—This class included investments in U.S. and international equities and fixed income securities while maintaining a market neutral position in those markets.

Other hedge funds—This class primarily included long-short equity strategies and a global macro fund which invested in fixed income, equity, currency, commodity and related derivative markets.

Real estate funds—This class included several funds that invest primarily in U.S. commercial real estate.

Private equity funds—This class included several private equity funds that invest primarily in infrastructure and U.S. power generation and transmission assets.

Absolute return strategies—This class included multiple strategies which use asset allocations that seek to provide a targeted rate of return over inflation. The investment managers allocate funds within asset classes that they consider to be undervalued in an effort to preserve gains in overvalued asset classes and to find opportunities in undervalued asset classes.

U.S. equities and non-U.S. equities are primarily valued at the net asset value provided by the independent administrator or custodian of the commingled fund. The net asset value is based on the value of the underlying equities, which are traded on an active market. U.S. equities are also valued at the closing price reported in an active market on which the individual

securities are traded. A portion of our fixed income investments are valued at the net asset value provided by the independent administrator or custodian of the fund. The net asset value is based on the underlying assets, which are valued using inputs such as the closing price reported, if traded on an active market, values derived from comparable securities of issuers with similar credit ratings, or under a discounted cash flow approach that utilizes observable inputs, such as current yields of similar instruments, but includes adjustments for risks that may not be observable such as certain credit and liquidity risks. Alternative investments are valued at the net asset value as determined by the independent administrator or custodian of the fund. The net asset value is based on the underlying investments, which are valued using inputs such as quoted market prices of identical instruments, discounted future cash flows, independent appraisals and market-based comparable data. Absolute return strategies are commingled funds which reflect the fair value of our ownership interest in these funds. The investments in these commingled funds include some or all of the above asset classes and are primarily valued at net asset values based on the underlying investments, which are valued consistent with the methodologies described above for each asset class.

NOTE 15. POSTRETIREMENT BENEFITS

We provide certain postretirement healthcare (medical) and life insurance benefits for eligible active and retired domestic employees. The healthcare plans are contributory with participants' contributions adjusted annually based on medical rates of inflation and plan experience. We use a measurement date of December 31 for our postretirement plans.

Other Postretirement Benefits Obligations and Funded Status

Changes in the benefit obligation were as follows:

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
<i>Change in Benefit Obligation</i>	<i>(\$ in millions)</i>					
Benefit obligation at beginning of year	\$ 37.5	\$ 9.5	\$ 47.0	\$ 40.6	\$ 10.2	\$ 50.8
Service cost	0.8	0.3	1.1	0.9	0.4	1.3
Interest cost	1.4	0.3	1.7	1.2	0.3	1.5
Actuarial loss (gain)	5.5	0.7	6.2	(2.0)	(0.1)	(2.1)
Benefits paid	(3.4)	(0.4)	(3.8)	(3.2)	(0.4)	(3.6)
Foreign currency translation adjustments	—	0.5	0.5	—	(0.9)	(0.9)
Benefit obligation at end of year	<u>\$ 41.8</u>	<u>\$ 10.9</u>	<u>\$ 52.7</u>	<u>\$ 37.5</u>	<u>\$ 9.5</u>	<u>\$ 47.0</u>

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
Funded status	<i>(\$ in millions)</i>					
	<u>\$ (41.8)</u>	<u>\$ (10.9)</u>	<u>\$ (52.7)</u>	<u>\$ (37.5)</u>	<u>\$ (9.5)</u>	<u>\$ (47.0)</u>

Under ASC 715, we recorded a \$4.7 million after-tax charge (\$6.2 million pretax) to shareholders' equity as of December 31, 2019 for our other postretirement plans. In 2018, we recorded an after-tax benefit of \$1.6 million (\$2.1 million pretax) to shareholders' equity as of December 31, 2018 for our other postretirement plans.

Amounts recognized in the consolidated balance sheets consisted of:

	<i>December 31, 2019</i>			<i>December 31, 2018</i>		
	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>	<i>U.S.</i>	<i>Foreign</i>	<i>Total</i>
	<i>(\$ in millions)</i>					
Accrued benefit in current liabilities	\$ (3.3)	\$ (0.4)	\$ (3.7)	\$ (3.6)	\$ (0.3)	\$ (3.9)
Accrued benefit in noncurrent liabilities	(38.5)	(10.5)	(49.0)	(33.9)	(9.2)	(43.1)
Accumulated other comprehensive loss	23.5	1.7	25.2	20.1	1.0	21.1
Net balance sheet impact	<u>\$ (18.3)</u>	<u>\$ (9.2)</u>	<u>\$ (27.5)</u>	<u>\$ (17.4)</u>	<u>\$ (8.5)</u>	<u>\$ (25.9)</u>

	<i>Years Ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
<i>(\$ in millions)</i>			
<u>Components of Net Periodic Benefit Cost</u>			
Service cost	\$ 1.1	\$ 1.3	\$ 1.1
Interest cost	1.7	1.5	1.5
Amortization of prior service cost	—	—	(2.2)
Recognized actuarial loss	2.1	2.4	2.1
Net periodic benefit cost	<u>\$ 4.9</u>	<u>\$ 5.2</u>	<u>\$ 2.5</u>
<u>Included in Other Comprehensive Loss (Pretax)</u>			
Liability adjustment	\$ 6.2	\$ (2.1)	\$ 0.4
Amortization of prior service costs and actuarial losses	(2.1)	(2.4)	0.1

The service cost component of net periodic postretirement benefit cost related to the employees of the operating segments are allocated to the operating segments based on their respective estimated census data.

Other Postretirement Benefits Plan Assumptions

Certain actuarial assumptions, such as discount rate, have a significant effect on the amounts reported for net periodic benefit cost and accrued benefit obligation amounts.

	<i>December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
<u>Weighted-Average Assumptions</u>			
Discount rate—periodic benefit cost	4.1%	3.5%	3.8%
Discount rate—benefit obligation	3.1%	4.1%	3.5%

The discount rate is based on a hypothetical yield curve represented by a series of annualized individual zero-coupon bond spot rates for maturities ranging from one-half to thirty years. The bonds used in the yield curve must have a rating of AA or better per Standard & Poor's, be non-callable, and have at least \$250 million par outstanding. The yield curve is then applied to the projected benefit payments from the plan. Based on these bonds and the projected benefit payment streams, the single rate that produces the same yield as the matching bond portfolio is used as the discount rate.

We review external data and our own internal trends for healthcare costs to determine the healthcare cost for the post retirement benefit obligation. The assumed healthcare cost trend rates for pre-65 retirees were as follows:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
Healthcare cost trend rate assumed for next year	7.5%	7.5%
Rate that the cost trend rate gradually declines to	4.5%	4.5%
Year that the rate reaches the ultimate rate	2031	2024

For post-65 retirees, we provide a fixed dollar benefit, which is not subject to escalation.

We expect to make payments of approximately \$4 million for each of the next five years under the provisions of our other postretirement benefit plans.

NOTE 16. INCOME TAXES

	<i>Years ended December 31,</i>		
	2019	2018	2017
<i>(\$ in millions)</i>			
<u>Components of Income (Loss) Before Taxes</u>			
Domestic	\$ (1.3)	\$ 288.0	\$ 53.3
Foreign	(35.6)	149.3	63.9
Income (loss) before taxes	<u>\$ (36.9)</u>	<u>\$ 437.3</u>	<u>\$ 117.2</u>
<u>Components of Income Tax (Benefit) Provision</u>			
Current expense (benefit):			
Federal	\$ 9.3	\$ 21.7	\$ (4.0)
State	3.2	5.1	3.0
Foreign	7.6	48.0	24.1
	<u>20.1</u>	<u>74.8</u>	<u>23.1</u>
Deferred (benefit) expense:			
Federal	(32.4)	27.0	(549.6)
State	(9.3)	(0.8)	14.6
Foreign	(4.0)	8.4	79.6
	<u>(45.7)</u>	<u>34.6</u>	<u>(455.4)</u>
Income tax (benefit) provision	<u>\$ (25.6)</u>	<u>\$ 109.4</u>	<u>\$ (432.3)</u>

The following table accounts for the difference between the actual tax provision and the amounts obtained by applying the statutory U.S. federal income tax rate to the income (loss) before taxes.

	<i>Years ended December 31,</i>		
	2019	2018	2017
<u>Effective Tax Rate Reconciliation (Percent)</u>			
Statutory federal tax rate	21.0%	21.0%	35.0 %
State income taxes, net	(5.4)	2.0	(1.2)
Foreign rate differential	19.4	1.8	(7.7)
U.S. tax on foreign earnings	—	1.1	(70.8)
Salt depletion	29.0	(2.4)	(16.1)
Change in valuation allowance	(64.9)	3.8	76.0
Remeasurement of U.S. state deferred taxes	16.1	(0.6)	10.2
Change in tax contingencies	35.4	(0.7)	(7.7)
U.S. Tax Cuts and Jobs Act	—	(0.8)	(373.5)
Share-based payments	0.7	—	(5.7)
Dividends paid to Contributing Employee Ownership Plan	1.1	(0.1)	(0.6)
Return to provision	15.0	(0.1)	(0.6)
U.S. federal tax credits	6.4	(0.4)	(4.2)
Other, net	(4.4)	0.4	(2.0)
Effective tax rate	<u>69.4%</u>	<u>25.0%</u>	<u>(368.9)%</u>

The effective tax rate for 2019 included benefits associated with the finalization of the Internal Revenue Service (IRS) review of years 2013 to 2015 U.S. income tax claims, stock-based compensation, prior year tax positions, foreign tax law changes, a remeasurement of deferred taxes due to a decrease in our state effective tax rates and a change in tax contingencies. The effective tax rate also included expenses associated with a net increase in the valuation allowance primarily related to foreign deferred tax assets and liabilities. These factors resulted in a net \$19.4 million tax benefit. After giving consideration to these items, the effective tax rate for 2019 of 16.8% was lower than the 21% U.S. federal statutory rate primarily due to state taxes and a net increase in the valuation allowance related to losses in foreign jurisdictions, partially offset by foreign income taxes and favorable permanent salt depletion deductions.

The effective tax rate for 2018 included benefits associated with the U.S. Tax Cuts and Jobs Act (2017 Tax Act), stock-based compensation, changes in tax contingencies, a foreign dividend payment, changes associated with prior year tax positions and the remeasurement of deferred taxes due to a decrease in our state effective tax rates. The effective tax rate also included expenses associated with a net increase in the valuation allowance related to deferred tax assets in foreign jurisdictions and the remeasurement of deferred taxes due to changes in our foreign tax rates. These factors resulted in a net \$2.9 million tax benefit, of which \$3.8 million related to the increase of the 2017 Tax Act benefit. After giving consideration to these items, the effective tax rate for 2018 of 25.7% was higher than the 21% U.S. federal statutory rate primarily due to state and foreign income taxes, foreign income inclusions and a net increase in the valuation allowance related to current year losses in foreign jurisdictions, partially offset by favorable permanent salt depletion deductions.

The effective tax rate for 2017 included benefits associated with the 2017 Tax Act, an agreement with the IRS on prior period tax examinations, stock based compensation, U.S. federal tax credits, changes to prior year tax positions and a reduction to the deferred tax liability on unremitted foreign earnings. The effective tax rate also included an expense associated with a net increase in the valuation allowance, primarily related to foreign net operating losses and remeasurement of deferred taxes due to an increase in our state effective tax rates. These factors resulted in a net \$452.3 million tax benefit, of which \$437.9 million was a provisional benefit from the 2017 Tax Act. After giving consideration to these items, the effective tax rate for 2017 of 17.1% was lower than the 35% U.S. federal statutory rate, primarily due to favorable permanent salt depletion deductions.

<i>Components of Deferred Tax Assets and Liabilities</i>	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
Deferred tax assets:	<i>(\$ in millions)</i>	
Pension and postretirement benefits	\$ 190.6	\$ 156.8
Environmental reserves	34.5	31.9
Asset retirement obligations	13.2	15.5
Accrued liabilities	38.6	37.0
Right of use lease liabilities	90.0	—
Tax credits	25.1	19.5
Net operating losses	70.0	50.2
Capital loss carryforward	0.9	2.0
Interest deduction limitation	41.8	9.3
Other miscellaneous items	20.2	14.6
Total deferred tax assets	<u>524.9</u>	<u>336.8</u>
Valuation allowance	(182.1)	(147.4)
Net deferred tax assets	<u>342.8</u>	<u>189.4</u>
Deferred tax liabilities:		
Property, plant and equipment	525.0	541.8
Right of use lease assets	88.8	—
Intangible amortization	54.6	61.6
Inventory and prepaids	20.6	8.3
Partnerships	67.3	65.2
Taxes on unremitted earnings	5.7	5.1
Total deferred tax liabilities	<u>762.0</u>	<u>682.0</u>
Net deferred tax liability	<u>\$ (419.2)</u>	<u>\$ (492.6)</u>

Realization of the net deferred tax assets, irrespective of indefinite-lived deferred tax liabilities, is dependent on future reversals of existing taxable temporary differences and adequate future taxable income, exclusive of reversing temporary differences and carryforwards. Although realization is not assured, we believe that it is more likely than not that the net deferred tax assets will be realized.

At December 31, 2019, we had deferred state tax benefits of \$12.5 million relating to state NOLs, which are available to offset future state taxable income through 2038.

At December 31, 2019, we had deferred state tax benefits of \$20.3 million relating to state tax credits, which are available to offset future state tax liabilities through 2034.

At December 31, 2019, we had a capital loss carryforward of \$3.6 million (representing \$0.9 million of deferred tax assets) which is available to offset future consolidated capital gains that will expire in years 2020 through 2023, if not utilized.

At December 31, 2019, we had foreign tax credits of \$5.4 million, which are available to offset certain federal tax liabilities through 2029.

At December 31, 2019, we had NOLs of approximately \$317.0 million (representing \$57.5 million of deferred tax assets) in various foreign jurisdictions. Of these, \$58.1 million (representing \$14.1 million of deferred tax assets) expire in various years from 2020 to 2039. The remaining \$258.9 million (representing \$43.4 million of deferred tax assets) do not expire.

As of December 31, 2019, we had recorded a valuation allowance of \$182.1 million, compared to \$147.4 million as of December 31, 2018. The increase of \$34.7 million is primarily due to the recent history of cumulative losses within foreign jurisdictions and projections of future taxable income insufficient to overcome the loss history. We continue to have net deferred tax assets in several jurisdictions which we expect to realize, assuming sufficient taxable income can be generated to utilize these deferred tax benefits, which is based on certain estimates and assumptions. If these estimates and related assumptions change in the future, we may be required to reduce the value of the deferred tax assets resulting in additional tax expense.

The activity of our deferred income tax valuation allowance was as follows:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning balance	\$ 147.4	\$ 121.4
Increases to valuation allowances	38.1	31.9
Decreases to valuation allowances	(0.7)	(0.9)
Foreign currency translation adjustments	(2.7)	(5.0)
Ending balance	<u>\$ 182.1</u>	<u>\$ 147.4</u>

As of December 31, 2019, we had \$22.8 million of gross unrecognized tax benefits, which would have a net \$22.4 million impact on the effective tax rate, if recognized. As of December 31, 2018, we had \$33.8 million of gross unrecognized tax benefits, which would have a net \$33.0 million impact on the effective tax rate, if recognized. The change for 2019 primarily relates to additional gross unrecognized benefits for current and prior year tax positions, as well as decreases for prior year tax positions. The change for 2018 primarily relates to additional gross unrecognized benefits for current and prior year tax positions, as well as decreases for prior year tax positions. The amounts of unrecognized tax benefits were as follows:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning balance	\$ 33.8	\$ 36.3
Increase for current year tax positions	2.0	2.1
Increase for prior year tax positions	1.5	0.3
Decrease for prior year tax positions	(14.3)	(4.9)
Decrease due to tax settlements	(0.2)	—
Ending balance	<u>\$ 22.8</u>	<u>\$ 33.8</u>

In July 2019, the review of certain U.S. income tax claims by the IRS for the years 2013 to 2015 was finalized which resulted in a \$14.3 million income tax benefit primarily related to favorable adjustments in uncertain tax positions for prior tax years.

We recognize interest and penalty expense related to unrecognized tax positions as a component of the income tax provision. As of December 31, 2019 and 2018, interest and penalties accrued were \$0.1 million and \$1.6 million, respectively. For 2019, 2018 and 2017, we recorded (benefit) expense related to interest and penalties of \$(1.5) million, \$0.4 million and \$(1.8) million, respectively.

As of December 31, 2019, we believe it is reasonably possible that our total amount of unrecognized tax benefits will decrease by approximately \$3.8 million over the next twelve months. The anticipated reduction primarily relates to settlements with tax authorities and the expiration of federal, state and foreign statutes of limitation.

We operate globally and file income tax returns in numerous jurisdictions. Our tax returns are subject to examination by various federal, state and local tax authorities. Our 2016 U.S. federal income tax return is currently under examination by the IRS. In connection with the October 5, 2015 acquisition of Dow's U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities relating to taxes to the extent arising prior to October 5, 2015. We believe we have adequately provided for all tax positions; however, amounts asserted by taxing authorities could be greater than our accrued position. For our primary tax jurisdictions, the tax years that remain subject to examination are as follows:

	<i>Tax Years</i>
U.S. federal income tax	2016 - 2018
U.S. state income tax	2006 - 2018
Canadian federal income tax	2012 - 2018
Brazil	2014 - 2018
Germany	2015 - 2018
China	2014 - 2018
The Netherlands	2014 - 2018

NOTE 17. ACCRUED LIABILITIES

Included in accrued liabilities were the following:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Accrued compensation and payroll taxes	\$ 56.3	\$ 86.8
Tax-related accruals	37.4	36.3
Accrued interest	68.2	48.9
Legal and professional costs	52.4	54.4
Accrued employee benefits	24.0	25.3
Environmental (current portion only)	17.0	17.0
Asset retirement obligation (current portion only)	10.3	10.6
Restructuring reserves (current portion only)	2.1	7.3
Derivative contracts	19.0	3.5
Other	42.4	43.2
Accrued liabilities	<u>\$ 329.1</u>	<u>\$ 333.3</u>

NOTE 18. CONTRIBUTING EMPLOYEE OWNERSHIP PLAN

The Contributing Employee Ownership Plan (CEOP) is a defined contribution plan available to essentially all domestic employees. We provide a contribution to an individual retirement contribution account maintained with the CEOP equal to an amount of between 5.0% and 7.5% of the employee's eligible compensation. The defined contribution plan expense was \$29.9 million, \$28.6 million and \$29.0 million for 2019, 2018 and 2017, respectively.

Company matching contributions are invested in the same investment allocation as the employee's contribution. Our matching contributions for eligible employees amounted to \$15.8 million, \$14.9 million and \$11.5 million in 2019, 2018 and 2017, respectively. Effective January 1, 2020, we suspended the match on all salaried and non-bargaining hourly employees'

contributions, and moved to a discretionary contribution model with contributions contingent upon company-wide financial performance.

Employees generally become vested in the value of the contributions we make to the CEOP according to a schedule based on service. After 2 years of service, participants are 25% vested. They vest in increments of 25% for each additional year and after 5 years of service, they are 100% vested in the value of the contributions that we have made to their accounts.

Employees may transfer any or all of the value of the investments, including Olin common stock, to any one or combination of investments available in the CEOP. Employees may transfer balances daily and may elect to transfer any percentage of the balance in the fund from which the transfer is made. However, when transferring out of a fund, employees are prohibited from trading out of the fund to which the transfer was made for seven calendar days. This limitation does not apply to trades into the money market fund or the Olin Common Stock Fund.

NOTE 19. STOCK-BASED COMPENSATION

Stock-based compensation expense was allocated to the operating segments for the portion related to employees whose compensation would be included in cost of goods sold with the remainder recognized in corporate/other. There were no significant capitalized stock-based compensation costs. Stock-based compensation granted includes stock options, performance stock awards, restricted stock awards and deferred directors' compensation. Stock-based compensation expense was as follows:

	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(\$ in millions)</i>		
Stock-based compensation	\$ 9.4	\$ 19.3	\$ 19.1
Mark-to-market adjustments	(1.8)	(10.7)	4.5
Total expense	\$ 7.6	\$ 8.6	\$ 23.6

Stock Plans

Under the stock option and long-term incentive plans, options may be granted to purchase shares of our common stock at an exercise price not less than fair market value at the date of grant, and are exercisable for a period not exceeding ten years from that date. Stock options, restricted stock and performance shares typically vest over three years. We issue shares to settle stock options, restricted stock and share-based performance awards. In 2019, 2018 and 2017, long-term incentive awards included stock options, performance share awards and restricted stock. The stock option exercise price was set at the fair market value of common stock on the date of the grant, and the options have a ten-year term.

Stock option transactions were as follows:

	<i>Shares</i>	<i>Option Price</i>	<i>Weighted-Average Option Price</i>	<i>Exercisable</i>	
				<i>Options</i>	<i>Weighted-Average Exercise Price</i>
Outstanding at January 1, 2019	5,864,216	\$13.14-32.94	\$ 24.40	3,571,732	\$ 22.27
Granted	1,578,200	26.26-26.26	26.26		
Exercised	(135,731)	13.14-15.68	14.10		
Canceled	(96,134)	13.14-32.94	28.19		
Outstanding at December 31, 2019	7,210,551	\$13.14-32.94	\$ 24.95	4,648,574	\$ 23.07

At December 31, 2019, the average exercise period for all outstanding and exercisable options was 77 months and 63 months, respectively. At December 31, 2019, the aggregate intrinsic value (the difference between the exercise price and market value) for outstanding options was \$5.0 million and exercisable options was \$5.0 million. The total intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017 was \$1.3 million, \$2.9 million and \$26.5 million, respectively.

The total unrecognized compensation cost related to unvested stock options at December 31, 2019 was \$9.9 million and was expected to be recognized over a weighted-average period of 1.3 years.

The following table provides certain information with respect to stock options exercisable at December 31, 2019:

<i>Range of Exercise Prices</i>	<i>Options Exercisable</i>	<i>Weighted-Average Exercise Price</i>	<i>Options Outstanding</i>	<i>Weighted-Average Exercise Price</i>
Under \$20.00	1,440,150	\$ 13.87	1,440,150	\$ 13.87
\$20.00 - \$26.00	1,288,236	23.77	1,288,236	23.77
Over \$26.00	1,920,188	29.49	4,482,165	28.85
	<u>4,648,574</u>		<u>7,210,551</u>	

At December 31, 2019, common shares reserved for issuance and available for grant or purchase under the following plans consisted of:

<i>Stock Option Plans</i>	<i>Number of Shares</i>	
	<i>Reserved for Issuance</i>	<i>Available for Grant or Purchase⁽¹⁾</i>
2000 long term incentive plan	42,130	—
2003 long term incentive plan	187,184	—
2006 long term incentive plan	164,138	—
2009 long term incentive plan	1,701,404	—
2014 long term incentive plan	1,821,795	—
2016 long term incentive plan	2,285,000	—
2018 long term incentive plan	9,583,249	7,646,099
Total under stock option plans	<u>15,784,900</u>	<u>7,646,099</u>

<i>Stock Purchase Plans</i>	<i>Number of Shares</i>	
	<i>Reserved for Issuance</i>	<i>Available for Grant or Purchase</i>
1997 stock plan for non-employee directors	483,860	302,796

(1) All available to be issued as stock options, but includes a sub-limit for all types of stock awards of 1,589,950 shares.

Under the stock purchase plans, our non-employee directors may defer certain elements of their compensation into shares of our common stock based on fair market value of the shares at the time of deferral. Non-employee directors annually receive stock grants as a portion of their director compensation. Of the shares reserved under the stock purchase plans at December 31, 2019, 181,064 shares were committed.

Performance share awards are denominated in shares of our stock and are paid half in cash and half in stock. Payouts for performance share awards are based on two criteria: (1) 50% of the award is based on Olin’s total shareholder returns over the applicable three-year performance cycle in relation to the total shareholder return over the same period among a portfolio of public companies which are selected in concert with outside compensation consultants and (2) 50% of the award is based on Olin’s net income over the applicable three-year performance cycle in relation to the net income goal for such period as set by the compensation committee of Olin’s board of directors. The expense associated with performance shares is recorded based on our estimate of our performance relative to the respective target. If an employee leaves the company before the end of the performance cycle, the performance shares may be prorated based on the number of months of the performance cycle worked and are settled in cash instead of half in cash and half in stock when the three-year performance cycle is completed.

Performance share transactions were as follows:

	<i>To Settle in Cash</i>		<i>To Settle in Shares</i>	
	<i>Shares</i>	<i>Weighted-Average Fair Value per Share</i>	<i>Shares</i>	<i>Weighted-Average Fair Value per Share</i>
Outstanding at January 1, 2019	670,303	\$ 19.89	490,700	\$ 21.58
Granted	149,950	26.26	149,950	26.26
Paid/Issued	(193,408)	19.89	(128,275)	13.14
Converted from shares to cash	2,296	29.94	(2,296)	29.94
Canceled	(311,431)	19.13	(206,004)	19.15
Outstanding at December 31, 2019	<u>317,710</u>	<u>\$ 17.18</u>	<u>304,075</u>	<u>\$ 28.91</u>
Total vested at December 31, 2019	<u>192,143</u>	<u>\$ 17.18</u>	<u>177,558</u>	<u>\$ 29.77</u>

The summary of the status of our unvested performance shares to be settled in cash were as follows:

	<i>Shares</i>	<i>Weighted-Average Fair Value per Share</i>
Unvested at January 1, 2019	105,617	\$ 19.89
Granted	149,950	26.26
Vested	(127,776)	17.18
Canceled	(2,224)	24.35
Unvested at December 31, 2019	<u>125,567</u>	<u>\$ 17.18</u>

At December 31, 2019, the liability recorded for performance shares to be settled in cash totaled \$3.3 million. The total unrecognized compensation cost related to unvested performance shares at December 31, 2019 was \$5.6 million and was expected to be recognized over a weighted-average period of 1.2 years.

NOTE 20. SHAREHOLDERS’ EQUITY

On April 26, 2018, our board of directors authorized a share repurchase program for the purchase of shares of common stock at an aggregate price of up to \$500.0 million. This program will terminate upon the purchase of \$500.0 million of our common stock.

On August 5, 2019, we entered into an accelerated share repurchase (ASR) agreement with Goldman Sachs & Co. LLC, a third-party financial institution, to repurchase \$100.0 million of Olin’s common stock. This authorization was granted under the April 26, 2018 share repurchase program and reduced the remaining authorized repurchase amount under that program by \$100.0 million. In connection with this agreement, we repurchased a total of 5.7 million shares under this ASR agreement.

For the years ended December 31, 2019 and 2018, 8.0 million and 2.1 million shares, respectively, were repurchased and retired at a cost of \$145.9 million and \$50.0 million, respectively. As of December 31, 2019, a cumulative total of 10.1 million shares were repurchased and retired at a cost of \$195.9 million and \$304.1 million of common stock remained authorized to be repurchased.

During 2019, 2018 and 2017, we issued 0.1 million, 0.2 million and 1.7 million shares, respectively, with a total value of \$1.7 million, \$3.4 million and \$32.4 million, respectively, representing stock options exercised.

We have registered an undetermined amount of securities with the SEC, so that, from time-to-time, we may issue debt securities, preferred stock and/or common stock and associated warrants in the public market under that registration statement.

In February 2018, the FASB issued ASU 2018-02, “Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income” (ASU 2018-02) which amends ASC 220 “Income Statement—Reporting Comprehensive Income.” This update allows a reclassification from accumulated other comprehensive loss to retained earnings for the stranded tax effects resulting from the 2017 Tax Act during each fiscal year or quarter in which the effect of the lower tax rate is recorded. We adopted this update in March 2018 and reclassified \$85.9 million related to the deferred gain resulting from the 2017 Tax Act from accumulated other comprehensive loss to retained earnings.

The following table represents the activity included in accumulated other comprehensive loss:

	<i>Foreign Currency Translation Adjustment (net of taxes)</i>	<i>Unrealized (Losses) Gains on Derivative Contracts (net of taxes)</i>	<i>Pension and Other Postretirement Benefits (net of taxes)</i>	<i>Accumulated Other Comprehensive Loss</i>
	(\$ in millions)			
Balance at January 1, 2017	\$ (24.1)	\$ 12.8	\$ (498.7)	\$ (510.0)
Unrealized gains (losses)	55.6	1.9	(27.3)	30.2
Reclassification adjustments of (gains) losses into income	—	(4.6)	26.9	22.3
Tax (provision) benefit	(23.9)	1.0	(4.2)	(27.1)
Net change	31.7	(1.7)	(4.6)	25.4
Balance at December 31, 2017	7.6	11.1	(503.3)	(484.6)
Unrealized losses	(22.2)	(1.1)	(98.5)	(121.8)
Reclassification adjustments of (gains) losses into income	—	(14.3)	37.0	22.7
Tax benefit (provision)	—	3.7	14.9	18.6
Net change	(22.2)	(11.7)	(46.6)	(80.5)
Income tax reclassification adjustment	15.3	2.4	(103.6)	(85.9)
Balance at December 31, 2018	0.7	1.8	(653.5)	(651.0)
Unrealized losses	(9.1)	(23.0)	(183.9)	(216.0)
Reclassification adjustments of (gains) losses into income	—	2.8	29.1	31.9
Tax benefit (provision)	—	4.8	26.9	31.7
Net change	(9.1)	(15.4)	(127.9)	(152.4)
Balance at December 31, 2019	\$ (8.4)	\$ (13.6)	\$ (781.4)	\$ (803.4)

Net income (loss), interest expense and cost of goods sold included reclassification adjustments for realized gains and losses on derivative contracts from accumulated other comprehensive loss.

Net income (loss) and non-operating pension income included the amortization of prior service costs and actuarial losses from accumulated other comprehensive loss.

NOTE 21. SEGMENT INFORMATION

We define segment results as income (loss) before interest expense, interest income, other operating income (expense), non-operating pension income, other income (expense) and income taxes, and includes the operating results of non-consolidated affiliates. Consistent with the guidance in ASC 280 “Segment Reporting,” we have determined it is appropriate to include the operating results of non-consolidated affiliates in the relevant segment financial results. We have three operating segments: Chlor Alkali Products and Vinyls, Epoxy and Winchester. The three operating segments reflect the organization used by our management for purposes of allocating resources and assessing performance. Chlorine used in our Epoxy segment is transferred at cost from the Chlor Alkali Products and Vinyls segment. Sales and profits are recognized in the Chlor Alkali Products and Vinyls segment for all caustic soda generated and sold by Olin.

	<i>Years ended December 31,</i>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
Sales:	<i>(\$ in millions)</i>		
Chlor Alkali Products and Vinyls	\$ 3,420.1	\$ 3,986.7	\$ 3,500.8
Epoxy	2,024.4	2,303.1	2,086.4
Winchester	665.5	656.3	681.2
Total sales	<u>\$ 6,110.0</u>	<u>\$ 6,946.1</u>	<u>\$ 6,268.4</u>
Income (loss) before taxes:			
Chlor Alkali Products and Vinyls	\$ 336.7	\$ 637.1	\$ 405.8
Epoxy	53.9	52.8	(11.8)
Winchester	40.1	38.4	72.4
Corporate/Other:			
Environmental (expense) income	(20.5)	103.7	(8.5)
Other corporate and unallocated costs	(156.3)	(158.3)	(112.4)
Restructuring charges	(76.5)	(21.9)	(37.6)
Acquisition-related costs	—	(1.0)	(12.8)
Other operating income	0.4	6.4	3.3
Interest expense	(243.2)	(243.2)	(217.4)
Interest income	1.0	1.6	1.8
Non-operating pension income	16.3	21.7	34.4
Other income	11.2	—	—
Income (loss) before taxes	<u>\$ (36.9)</u>	<u>\$ 437.3</u>	<u>\$ 117.2</u>
Earnings (losses) of non-consolidated affiliates:			
Chlor Alkali Products and Vinyls	\$ —	\$ (19.7)	\$ 1.8
Depreciation and amortization expense:			
Chlor Alkali Products and Vinyls	\$ 470.4	\$ 473.1	\$ 432.2
Epoxy	100.1	102.4	94.3
Winchester	20.1	20.0	19.5
Corporate/Other	6.8	5.9	12.9
Total depreciation and amortization expense	<u>\$ 597.4</u>	<u>\$ 601.4</u>	<u>\$ 558.9</u>
Capital spending:			
Chlor Alkali Products and Vinyls	\$ 240.3	\$ 259.9	\$ 209.5
Epoxy	30.0	36.3	37.9
Winchester	12.1	14.7	22.5
Corporate/Other	103.2	74.3	24.4
Total capital spending	<u>\$ 385.6</u>	<u>\$ 385.2</u>	<u>\$ 294.3</u>

Segment assets include only those assets which are directly identifiable to an operating segment. Assets of the corporate/other segment include primarily such items as cash and cash equivalents, deferred taxes and other assets.

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
Assets:	<i>(\$ in millions)</i>	
Chlor Alkali Products and Vinyls	\$ 6,898.7	\$ 6,837.2
Epoxy	1,469.1	1,521.9
Winchester	385.0	399.9
Corporate/Other	435.0	238.4
Total assets	\$ 9,187.8	\$ 8,997.4

Investments—affiliated companies (at equity):

Chlor Alkali Products and Vinyls	\$ —	\$ 8.8
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Long-lived assets are attributed to geographic areas based on asset location and sales are attributed to geographic areas based on customer location.

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
Long-lived assets:	<i>(\$ in millions)</i>	
United States	\$ 3,017.4	\$ 3,147.6
Foreign	306.4	334.5
Total long-lived assets	\$ 3,323.8	\$ 3,482.1

	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
Sales by geography:	<i>(\$ in millions)</i>		
Chlor Alkali Products and Vinyls			
United States	\$ 2,332.1	\$ 2,610.7	\$ 2,294.4
Europe	134.5	181.8	130.1
Other foreign	953.5	1,194.2	1,076.3
Total Chlor Alkali Products and Vinyls	3,420.1	3,986.7	3,500.8
Epoxy			
United States	664.0	742.7	646.5
Europe	844.2	991.1	940.8
Other foreign	516.2	569.3	499.1
Total Epoxy	2,024.4	2,303.1	2,086.4
Winchester			
United States	603.4	591.0	615.2
Europe	11.7	11.0	11.6
Other foreign	50.4	54.3	54.4
Total Winchester	665.5	656.3	681.2
Total			
United States	3,599.5	3,944.4	3,556.1
Europe	990.4	1,183.9	1,082.5
Other foreign	1,520.1	1,817.8	1,629.8
Total sales	\$ 6,110.0	\$ 6,946.1	\$ 6,268.4

	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(\$ in millions)</i>		
Sales by product line:			
Chlor Alkali Products and Vinyls			
Caustic soda	\$ 1,737.4	\$ 2,198.6	\$ 1,904.3
Chlorine, chlorine derivatives and other co-products	1,682.7	1,788.1	1,596.5
Total Chlor Alkali Products and Vinyls	<u>3,420.1</u>	<u>3,986.7</u>	<u>3,500.8</u>
Epoxy			
Aromatics and allylics	945.3	1,145.7	1,051.1
Epoxy resins	1,079.1	1,157.4	1,035.3
Total Epoxy	<u>2,024.4</u>	<u>2,303.1</u>	<u>2,086.4</u>
Winchester			
Commercial	441.3	427.6	471.0
Military and law enforcement	224.2	228.7	210.2
Total Winchester	<u>665.5</u>	<u>656.3</u>	<u>681.2</u>
Total sales	<u>\$ 6,110.0</u>	<u>\$ 6,946.1</u>	<u>\$ 6,268.4</u>

NOTE 22. ENVIRONMENTAL

As is common in our industry, we are subject to environmental laws and regulations related to the use, storage, handling, generation, transportation, emission, discharge, disposal and remediation of, and exposure to, hazardous and non-hazardous substances and wastes in all of the countries in which we do business.

The establishment and implementation of national, state or provincial and local standards to regulate air, water and land quality affect substantially all of our manufacturing locations around the world. Laws providing for regulation of the manufacture, transportation, use and disposal of hazardous and toxic substances, and remediation of contaminated sites, have imposed additional regulatory requirements on industry, particularly the chemicals industry. In addition, implementation of environmental laws has required and will continue to require new capital expenditures and will increase plant operating costs. We employ waste minimization and pollution prevention programs at our manufacturing sites.

In connection with the October 5, 2015 acquisition of Dow's U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities relating to releases of hazardous materials and violations of environmental law to the extent arising prior to October 5, 2015.

We are party to various government and private environmental actions associated with past manufacturing facilities and former waste disposal sites. Associated costs of investigatory and remedial activities are provided for in accordance with generally accepted accounting principles governing probability and the ability to reasonably estimate future costs. Our ability to estimate future costs depends on whether our investigatory and remedial activities are in preliminary or advanced stages. With respect to unasserted claims, we accrue liabilities for costs that, in our experience, we expect to incur to protect our interests against those unasserted claims. Our accrued liabilities for unasserted claims amounted to \$8.6 million at December 31, 2019. With respect to asserted claims, we accrue liabilities based on remedial investigation, feasibility study, remedial action and operation, maintenance and monitoring (OM&M) expenses that, in our experience, we expect to incur in connection with the asserted claims. Required site OM&M expenses are estimated and accrued in their entirety for required periods not exceeding 30 years, which reasonably approximates the typical duration of long-term site OM&M.

Our liabilities for future environmental expenditures were as follows:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Beginning balance	\$ 125.6	\$ 131.6
Charges to income	25.3	7.3
Remedial and investigatory spending	(12.2)	(13.0)
Foreign currency translation adjustments	0.3	(0.3)
Ending balance	<u>\$ 139.0</u>	<u>\$ 125.6</u>

At December 31, 2019 and 2018, our consolidated balance sheets included environmental liabilities of \$122.0 million and \$108.6 million, respectively, which were classified as other noncurrent liabilities. Our environmental liability amounts do not take into account any discounting of future expenditures or any consideration of insurance recoveries or advances in technology. These liabilities are reassessed periodically to determine if environmental circumstances have changed and/or remediation efforts and our estimate of related costs have changed. As a result of these reassessments, future charges to income may be made for additional liabilities. Of the \$139.0 million included on our consolidated balance sheet at December 31, 2019 for future environmental expenditures, we currently expect to utilize \$87.3 million of the reserve for future environmental expenditures over the next 5 years, \$20.5 million for expenditures 6 to 10 years in the future, and \$31.2 million for expenditures beyond 10 years in the future.

Our total estimated environmental liability at December 31, 2019 was attributable to 59 sites, 14 of which were United States Environmental Protection Agency National Priority List sites. Nine sites accounted for 81% of our environmental liability and, of the remaining 50 sites, no one site accounted for more than 3% of our environmental liability. At seven of the nine sites, part of the site is in the long-term OM&M stage. At six of the nine sites, a remedial action plan is being developed for part of the site. At five of the nine sites, a remedial design is being developed at part of the site and at four of the nine sites, part of the site is subject to a remedial investigation. All nine sites are either associated with past manufacturing operations or former waste disposal sites. None of the nine largest sites represents more than 20% of the liabilities reserved on our consolidated balance sheet at December 31, 2019 for future environmental expenditures.

Environmental provisions charged (credited) to income, which are included in cost of goods sold, were as follows:

	<i>Years ended December 31,</i>		
	<i>2019</i>	<i>2018</i>	<i>2017</i>
	<i>(\$ in millions)</i>		
Provisions charged to income	\$ 25.3	\$ 7.3	\$ 10.3
Insurance recoveries for costs incurred and expensed	(4.8)	(111.0)	(1.8)
Environmental expense (income)	<u>\$ 20.5</u>	<u>\$ (103.7)</u>	<u>\$ 8.5</u>

Provisions charged to income for the year ended December 31, 2019 include a \$20.0 million increase in costs at a former manufacturing site resulting from revised remediation estimates as a result of agency action during the second quarter of 2019.

During 2018, we settled certain disputes with respect to insurance coverage for costs at various environmental remediation sites for \$121.0 million. Environmental expense (income) for the year ended December 31, 2018 include insurance recoveries for environmental costs incurred and expensed in prior periods of \$111.0 million. The recoveries are reduced by estimated liabilities of \$10.0 million associated with claims by subsequent owners of certain of the settled environmental sites. Environmental expense (income) for the year ended December 31, 2019 included \$4.8 million of recoveries associated with resolving the outstanding third party claims against the proceeds from the 2018 environmental insurance settlement.

These charges relate primarily to remedial and investigatory activities associated with past manufacturing operations and former waste disposal sites and may be material to operating results in future years.

Annual environmental-related cash outlays for site investigation and remediation are expected to range between approximately \$15 million to \$25 million over the next several years, which are expected to be charged against reserves recorded on our consolidated balance sheet. While we do not anticipate a material increase in the projected annual level of our

environmental-related cash outlays for site investigation and remediation, there is always the possibility that such an increase may occur in the future in view of the uncertainties associated with environmental exposures. Environmental exposures are difficult to assess for numerous reasons, including the identification of new sites, developments at sites resulting from investigatory studies, advances in technology, changes in environmental laws and regulations and their application, changes in regulatory authorities, the scarcity of reliable data pertaining to identified sites, the difficulty in assessing the involvement and financial capability of other Potentially Responsible Parties (PRPs), our ability to obtain contributions from other parties and the lengthy time periods over which site remediation occurs. It is possible that some of these matters (the outcomes of which are subject to various uncertainties) may be resolved unfavorably to us, which could materially adversely affect our financial position or results of operations. At December 31, 2019, we estimate that it is reasonably possible that we may have additional contingent environmental liabilities of \$80 million in addition to the amounts for which we have already recorded as a reserve.

NOTE 23. LEASES

Our lease commitments are primarily for railcars, but also include logistics, manufacturing, storage, real estate and information technology assets. Our leases have remaining lease terms of up to 95 years, some of which may include options to extend the leases for up to five years, and some of which may include options to terminate the leases within one year.

The amounts for leases included in our consolidated balance sheet include:

		<i>December 31, 2019</i>
		<i>(\$ in millions)</i>
Lease assets:	Balance sheet location:	
Operating	Operating lease assets, net	\$ 377.8
Finance	Property, plant and equipment, less accumulated depreciation ⁽¹⁾	5.4
Total lease assets		\$ 383.2
Lease liabilities:		
Current		
Operating	Current operating lease liabilities	\$ 79.3
Finance	Current installments of long-term debt	2.1
Long-term		
Operating	Operating lease liabilities	303.4
Finance	Long-term debt	3.2
Total lease liabilities		\$ 388.0

(1) As of December 31, 2019, assets recorded under finance leases were \$9.9 million and accumulated depreciation associated with finance leases was \$4.5 million.

The components of lease expense are recorded to cost of goods sold and selling and administration expenses in the consolidated statement of operations, excluding interest on finance lease liabilities which is recorded to interest expense. The components of lease expense were as follows:

		<i>Year Ended December 31, 2019</i>
		<i>(\$ in millions)</i>
Lease expense:		
Operating		\$ 93.6
Other operating lease expense ⁽¹⁾		27.5
Finance:		
Depreciation of leased assets		1.3
Interest on lease liabilities		0.2
Total lease expense		\$ 122.6

(1) Includes costs associated with short-term leases and variable lease expenses.

The maturities of lease liabilities were as follows:

	<i>December 31, 2019</i>		
	<i>Operating leases</i>	<i>Finance leases</i>	<i>Total</i>
	<i>(\$ in millions)</i>		
2020	\$ 88.8	\$ 2.2	\$ 91.0
2021	71.0	1.1	72.1
2022	55.0	0.8	55.8
2023	44.2	0.6	44.8
2024	33.5	0.8	34.3
Thereafter	153.6	0.2	153.8
Total lease payments	446.1	5.7	451.8
Less: Imputed interest ⁽¹⁾	(63.4)	(0.4)	(63.8)
Present value of lease liabilities	<u>\$ 382.7</u>	<u>\$ 5.3</u>	<u>\$ 388.0</u>

(1) Calculated using the discount rate for each lease.

As previously disclosed in our 2018 Annual Report on Form 10-K and under ASC 840, the previous lease accounting standard, future minimum lease payments for non-cancelable operating leases were expected to be as follows:

	<i>December 31, 2018</i>
	<i>(\$ in millions)</i>
2019	\$ 82.2
2020	61.4
2021	44.2
2022	31.8
2023	23.2
Thereafter	102.6
Total lease payments	<u>\$ 345.4</u>

Other information related to leases was as follows:

	<i>Year Ended December 31, 2019</i>
	<i>(\$ in millions)</i>
Supplemental cash flows information:	
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows from operating leases	\$ 93.4
Operating cash flows from finance leases	0.2
Financing cash flows from finance leases	1.4
Non-cash increase in lease assets and lease liabilities:	
Operating leases	\$ 176.1
Finance leases	2.5
Weighted-average remaining lease term:	
Operating leases	<i>December 31, 2019</i> 9.4 years
Finance leases	3.2 years
Weighted-average discount rate:	
Operating leases	3.10%
Finance leases	3.30%

As of December 31, 2019, we have additional operating leases for office space that have not yet commenced of approximately \$27 million which are expected to commence during 2020 with lease terms between 10 years and 15 years. We

also have additional operating leases for railcars that have not yet commenced of approximately \$9 million which are expected to commence during 2020 with lease terms between 5 years and 10 years.

NOTE 24. COMMITMENTS AND CONTINGENCIES

The following table summarizes our contractual commitments under purchase contracts as of December 31, 2019:

	<i>Purchase Commitments</i> (\$ in millions)
2020	\$ 628.0
2021	676.7
2022	635.8
2023	630.1
2024	630.1
Thereafter	2,766.2
Total commitments	<u>\$ 5,966.9</u>

The above purchase commitments include raw material, capital expenditure and utility purchasing commitments utilized in our normal course of business for our projected needs. In connection with the Acquisition, certain additional agreements have been entered into with Dow, including, long-term purchase agreements for raw materials. These agreements are maintained through long-term cost based contracts that provide us with a reliable supply of key raw materials. Key raw materials received from Dow include ethylene, electricity, propylene and benzene. On February 27, 2017, we exercised the remaining option to reserve additional ethylene at producer economics from Dow. In connection with the exercise of this option, we also secured a long-term customer arrangement. As a result, an additional payment will be made to Dow that is not to exceed \$493 million on or about the fourth quarter of 2020.

We are party to a dispute relating to a contract at our Plaquemine, LA facility. The other party to the contract filed a demand for arbitration alleging, among other things, that Olin breached the contract, and claims damages in excess of the amount Olin believes it is obligated to pay under the contract. Olin asserted a counterclaim alleging it has been charged a fee in excess of what the contract permits. The arbitration hearing was held during the fourth quarter 2019. Although the timing is uncertain, we currently anticipate receiving a ruling during the first half of 2020. Any additional losses related to this contract dispute are not currently estimable because of unresolved questions of fact and law but, if resolved unfavorably to Olin, they could have a material adverse effect on our financial position, cash flows or results of operations.

Olin and Oxy Vinyls, L.P. (Oxy) have a long-term chlorine supply agreement, which is the subject of a pricing dispute. The dispute is pending in the United States District Court for the Southern District of Texas. Although the timing is uncertain, we currently anticipate that the case will proceed to trial during 2020. Any additional losses related to this contract dispute are not currently estimable because of unresolved questions of fact and law but, if resolved unfavorably to Olin, they could have a material adverse effect on our financial position, cash flows or results of operations.

Olin, K.A. Steel Chemicals (a wholly owned subsidiary of Olin) and other caustic soda producers were named as defendants in six purported class action civil lawsuits filed March 22, 25 and 26, 2019 and April 12, 2019 in the U.S. District Court for the Western District of New York on behalf of the respective named plaintiffs and a putative class comprised of all persons and entities who purchased caustic soda in the U.S. directly from one or more of the defendants, their parents, predecessors, subsidiaries or affiliates at any time between October 1, 2015 and the present. Olin, K.A. Steel Chemicals and other caustic soda producers were also named as defendants in two purported class action civil lawsuits filed July 25 and 29, 2019 in the U.S. District Court for the Western District of New York on behalf of the respective named plaintiffs and a putative class comprised of all persons and entities who purchased caustic soda in the U.S. indirectly from distributors at any time between October 1, 2015 and the present. The other defendants named in the lawsuits are Occidental Petroleum Corporation, Occidental Chemical Corporation d/b/a OxyChem, Westlake Chemical Corporation, Shin-Etsu Chemical Co., Ltd., Shintech Incorporated, Formosa Plastics Corporation, and Formosa Plastics Corporation, U.S.A. The lawsuits allege the defendants conspired to fix, raise, maintain and stabilize the price of caustic soda, restrict domestic (U.S.) supply of caustic soda and allocate caustic soda customers. Plaintiffs seek an unspecified amount of damages and injunctive relief. We believe we have meritorious legal positions and will continue to represent our interests vigorously in this matter. Any losses related to this matter are not currently estimable because of unresolved questions of fact and law, but if resolved unfavorably to Olin, could have a material adverse effect on our financial position, cash flows or results of operations.

We, and our subsidiaries, are defendants in various other legal actions (including proceedings based on alleged exposures to asbestos) incidental to our past and current business activities. At December 31, 2019 and 2018, our consolidated balance sheets included liabilities for these other legal actions of \$12.4 million and \$15.6 million, respectively. These liabilities do not include costs associated with legal representation. Based on our analysis, and considering the inherent uncertainties associated with litigation, we do not believe that it is reasonably possible that these other legal actions will materially adversely affect our financial position, cash flows or results of operations. In connection with the October 5, 2015 acquisition of Dow's U.S. Chlor Alkali and Vinyl, Global Chlorinated Organics and Global Epoxy businesses, the prior owner of the businesses retained liabilities related to litigation to the extent arising prior to October 5, 2015.

During the ordinary course of our business, contingencies arise resulting from an existing condition, situation or set of circumstances involving an uncertainty as to the realization of a possible gain contingency. In certain instances such as environmental projects, we are responsible for managing the clean-up and remediation of an environmental site. There exists the possibility of recovering a portion of these costs from other parties. We account for gain contingencies in accordance with the provisions of ASC 450 "Contingencies" and therefore do not record gain contingencies and recognize income until it is earned and realizable.

For the year ended December 31, 2018, we recognized an insurance recovery of \$8.0 million in other operating income for a second quarter 2017 business interruption at our Freeport, TX vinyl chloride monomer facility.

NOTE 25. DERIVATIVE FINANCIAL INSTRUMENTS

We are exposed to market risk in the normal course of our business operations due to our purchases of certain commodities, our ongoing investing and financing activities and our operations that use foreign currencies. The risk of loss can be assessed from the perspective of adverse changes in fair values, cash flows and future earnings. We have established policies and procedures governing our management of market risks and the use of financial instruments to manage exposure to such risks. ASC 815 requires an entity to recognize all derivatives as either assets or liabilities in the consolidated balance sheets and measure those instruments at fair value. In accordance with ASC 815, we designate derivative contracts as cash flow hedges of forecasted purchases of commodities and forecasted interest payments related to variable-rate borrowings and designate certain interest rate swaps as fair value hedges of fixed-rate borrowings. We do not enter into any derivative instruments for trading or speculative purposes.

Energy costs, including electricity and natural gas, and certain raw materials used in our production processes are subject to price volatility. Depending on market conditions, we may enter into futures contracts, forward contracts, commodity swaps and put and call option contracts in order to reduce the impact of commodity price fluctuations. The majority of our commodity derivatives expire within one year.

We actively manage currency exposures that are associated with net monetary asset positions, currency purchases and sales commitments denominated in foreign currencies and foreign currency denominated assets and liabilities created in the normal course of business. We enter into forward sales and purchase contracts to manage currency risk to offset our net exposures, by currency, related to the foreign currency denominated monetary assets and liabilities of our operations. At December 31, 2019, we had outstanding forward contracts to buy foreign currency with a notional value of \$140.6 million and to sell foreign currency with a notional value of \$99.2 million. All of the currency derivatives expire within one year and are for USD equivalents. The counterparties to the forward contracts are large financial institutions; however, the risk of loss to us in the event of nonperformance by a counterparty could be significant to our financial position or results of operations. At December 31, 2018, we had outstanding forward contracts to buy foreign currency with a notional value of \$123.7 million and to sell foreign currency with a notional value of \$82.6 million.

Cash Flow Hedges

For derivative instruments that are designated and qualify as a cash flow hedge, the change in fair value of the derivative is recognized as a component of other comprehensive income (loss) until the hedged item is recognized in earnings.

We had the following notional amounts of outstanding commodity contracts that were entered into to hedge forecasted purchases:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Natural gas	\$ 62.9	\$ 58.4
Ethane	51.5	5.4
Other commodities	60.2	52.7
Total notional	<u>\$ 174.6</u>	<u>\$ 116.5</u>

As of December 31, 2019, the counterparties to these commodity contracts were Wells Fargo Bank, N.A., Citibank, N.A., JPMorgan Chase Bank, National Association and Bank of America Corporation, all of which are major financial institutions.

We use cash flow hedges for certain raw material and energy costs such as copper, zinc, lead, ethane, electricity and natural gas to provide a measure of stability in managing our exposure to price fluctuations associated with forecasted purchases of raw materials and energy used in our manufacturing process. At December 31, 2019, we had open derivative contract positions through 2027. If all open futures contracts had been settled on December 31, 2019, we would have recognized a pretax loss of \$17.6 million.

If commodity prices were to remain at December 31, 2019 levels, approximately \$12.7 million of deferred losses, net of tax, would be reclassified into earnings during the next twelve months. The actual effect on earnings will be dependent on actual commodity prices when the forecasted transactions occur.

We use interest rate swaps as a means of minimizing cash flow fluctuations that may arise from volatility in interest rates of our variable-rate borrowings. In April 2016, we entered into three tranches of forward starting interest rate swaps whereby we agreed to pay fixed rates to the counterparties who, in turn, pay us floating rates on \$1,100.0 million, \$900.0 million and \$400.0 million of our underlying floating-rate debt obligations. Each tranche's term length was for twelve months beginning on December 31, 2016, 2017 and 2018, respectively. We have designated the swaps as cash flow hedges of the risk of changes in interest payments associated with our variable-rate borrowings. In July 2019, we terminated the remaining interest rate swap agreement which resulted in a gain of \$1.8 million that was recognized in interest expense for the year ended December 31, 2019. For the years ended December 31, 2019, 2018 and 2017, \$4.3 million, \$8.9 million and \$3.1 million, respectively, of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

Fair Value Hedges

We use interest rate swaps as a means of managing interest expense and floating interest rate exposure to optimal levels. For derivative instruments that are designated and qualify as a fair value hedge, the gain or loss on the derivative as well as the offsetting loss or gain on the hedged item attributable to the hedged risk are recognized in current earnings. We include the gain or loss on the hedged items (fixed-rate borrowings) in the same line item, interest expense, as the offsetting loss or gain on the related interest rate swaps. As of December 31, 2019 and 2018, the total notional amounts of our interest rate swaps designated as fair value hedges were zero and \$500.0 million, respectively.

In April 2016, we entered into interest rate swaps on \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. In October 2016, we entered into interest rate swaps on an additional \$250.0 million of our underlying fixed-rate debt obligations, whereby we agreed to pay variable rates to the counterparties who, in turn, pay us fixed rates. We designated the April 2016 and October 2016 interest rate swap agreements as fair value hedges of the risk of changes in the value of fixed-rate debt due to changes in interest rates for a portion of our fixed-rate borrowings. In August 2019, we terminated the April 2016 and October 2016 interest rate swaps which resulted in a loss of \$2.3 million that will be deferred as an offset to the carrying value of the related debt and will be recognized to interest expense through October 2025. As of December 31, 2019, \$2.2 million of this loss was included in long-term debt in the consolidated balance sheet. For the years ended December 31, 2019 and 2018, \$2.6 million and \$2.1 million, respectively, of expense and for the year ended December 31, 2017, \$2.9 million of income was recorded to interest expense on the accompanying consolidated statements of operations related to these swap agreements.

Financial Statement Impacts

We present our derivative assets and liabilities in our consolidated balance sheets on a net basis whenever we have a legally enforceable master netting agreement with the counterparty to our derivative contracts. We use these agreements to manage and substantially reduce our potential counterparty credit risk.

The following table summarizes the location and fair value of the derivative instruments on our consolidated balance sheets. The table disaggregates our net derivative assets and liabilities into gross components on a contract-by-contract basis before giving effect to master netting arrangements:

	<i>December 31,</i>	
	<i>2019</i>	<i>2018</i>
	<i>(\$ in millions)</i>	
Asset Derivatives:		
Other current assets		
Derivatives designated as hedging instruments:		
Interest rate contracts - gains	\$ —	\$ 5.3
Commodity contracts - gains	1.8	—
Commodity contracts - losses	(0.5)	—
Derivatives not designated as hedging instruments:		
Foreign exchange contracts - gains	1.1	0.9
Foreign exchange contracts - losses	(0.5)	(0.5)
Total other current assets	<u>1.9</u>	<u>5.7</u>
Other assets		
Derivatives designated as hedging instruments:		
Commodity contracts - gains	0.8	0.9
Commodity contracts - losses	(0.1)	(0.2)
Total other assets	<u>0.7</u>	<u>0.7</u>
Total Asset Derivatives ⁽¹⁾	<u>\$ 2.6</u>	<u>\$ 6.4</u>
Liability Derivatives:		
Accrued liabilities		
Derivatives designated as hedging instruments:		
Commodity contracts - losses	\$ 18.0	\$ 4.9
Commodity contracts - gains	(0.2)	(1.9)
Derivatives not designated as hedging instruments:		
Foreign exchange contracts - losses	1.4	0.6
Foreign exchange contracts - gains	(0.2)	(0.1)
Total accrued liabilities	<u>19.0</u>	<u>3.5</u>
Other liabilities		
Derivatives designated as hedging instruments:		
Interest rate contracts - losses	—	33.7
Commodity contract - losses	1.8	0.5
Commodity contract - gains	—	(0.1)
Total other liabilities	<u>1.8</u>	<u>34.1</u>
Total Liability Derivatives ⁽¹⁾	<u>\$ 20.8</u>	<u>\$ 37.6</u>

(1) Does not include the impact of cash collateral received from or provided to counterparties.

The following table summarizes the effects of derivative instruments on our consolidated statements of operations:

	<i>Location of (Loss) Gain</i>	<i>Amount of (Loss) Gain</i>		
		<i>Years Ended December 31,</i>		
		<i>2019</i>	<i>2018</i>	<i>2017</i>
<i>(\$ in millions)</i>				
Derivatives – Cash Flow Hedges				
Recognized in other comprehensive loss:				
Commodity contracts	————	\$ (46.1)	\$ (4.8)	\$ (2.1)
Interest rate contracts	————	(1.0)	3.7	4.0
		<u>\$ (47.1)</u>	<u>\$ (1.1)</u>	<u>\$ 1.9</u>
Reclassified from accumulated other comprehensive loss into income:				
Interest rate contracts	Interest expense	\$ 4.3	\$ 8.9	\$ 3.1
Commodity contracts	Cost of goods sold	(31.1)	5.4	1.5
		<u>\$ (26.8)</u>	<u>\$ 14.3</u>	<u>\$ 4.6</u>
Derivatives – Fair Value Hedges				
Interest rate contracts	Interest expense	\$ (2.6)	\$ (2.1)	\$ 3.0
Derivatives Not Designated as Hedging Instruments				
Foreign exchange contracts	Selling and administration	\$ (4.0)	\$ (5.4)	\$ 1.8

Credit Risk and Collateral

By using derivative instruments, we are exposed to credit and market risk. If a counterparty fails to fulfill its performance obligations under a derivative contract, our credit risk will equal the fair value gain in a derivative. Generally, when the fair value of a derivative contract is positive, this indicates that the counterparty owes us, thus creating a repayment risk for us. When the fair value of a derivative contract is negative, we owe the counterparty and, therefore, assume no repayment risk. We minimize the credit (or repayment) risk in derivative instruments by entering into transactions with high-quality counterparties. We monitor our positions and the credit ratings of our counterparties, and we do not anticipate non-performance by the counterparties.

Based on the agreements with our various counterparties, cash collateral is required to be provided when the net fair value of the derivatives, with the counterparty, exceeds a specific threshold. If the threshold is exceeded, cash is either provided by the counterparty to us if the value of the derivatives is our asset, or cash is provided by us to the counterparty if the value of the derivatives is our liability. As of December 31, 2019 and 2018, this threshold was not exceeded. In all instances where we are party to a master netting agreement, we offset the receivable or payable recognized upon payment of cash collateral against the fair value amounts recognized for derivative instruments that have also been offset under such master netting agreements.

NOTE 26. FAIR VALUE MEASUREMENTS

Assets and liabilities recorded at fair value in the consolidated balance sheets are categorized based upon the level of judgment associated with the inputs used to measure their fair value. Hierarchical levels are directly related to the amount of subjectivity associated with the inputs to fair valuation of these assets and liabilities. We are required to separately disclose assets and liabilities measured at fair value on a recurring basis, from those measured at fair value on a nonrecurring basis. Nonfinancial assets measured at fair value on a nonrecurring basis are intangible assets and goodwill, which are reviewed for impairment annually in the fourth quarter and/or when circumstances or other events indicate that impairment may have occurred. Determining which hierarchical level an asset or liability falls within requires significant judgment. The following table summarizes the assets and liabilities measured at fair value in the consolidated balance sheets:

<i>Balance at December 31, 2019</i>	<i>Quoted Prices in Active Markets for Identical Assets (Level 1)</i>	<i>Significant Other Observable Inputs (Level 2)</i>	<i>Significant Unobservable Inputs (Level 3)</i>	<i>Total</i>
	<i>(\$ in millions)</i>			
Assets				
Commodity contracts	—	2.0	—	2.0
Foreign exchange contracts	—	0.6	—	0.6
Total Assets	\$ —	\$ 2.6	\$ —	\$ 2.6
Liabilities				
Commodity contracts	—	19.6	—	19.6
Foreign exchange contracts	—	1.2	—	1.2
Total Liabilities	\$ —	\$ 20.8	\$ —	\$ 20.8
<i>Balance at December 31, 2018</i>				
Assets				
Interest rate swaps	\$ —	\$ 5.3	\$ —	\$ 5.3
Commodity contracts	—	0.7	—	0.7
Foreign exchange contracts	—	0.4	—	0.4
Total Assets	\$ —	\$ 6.4	\$ —	\$ 6.4
Liabilities				
Interest rate swaps	\$ —	\$ 33.7	\$ —	\$ 33.7
Commodity contracts	—	3.4	—	3.4
Foreign exchange contracts	—	0.5	—	0.5
Total Liabilities	\$ —	\$ 37.6	\$ —	\$ 37.6

Interest Rate Swaps

Interest rate swap financial instruments were valued using the “income approach” valuation technique. This method used valuation techniques to convert future amounts to a single present amount. The measurement was based on the value indicated by current market expectations about those future amounts. We use interest rate swaps as a means of managing interest expense and floating interest rate exposure to optimal levels.

Commodity Contracts

Commodity contract financial instruments were valued primarily based on prices and other relevant information observable in market transactions involving identical or comparable assets or liabilities including both forward and spot prices for commodities. We use commodity derivative contracts for certain raw materials and energy costs such as copper, zinc, lead, ethane, electricity and natural gas to provide a measure of stability in managing our exposure to price fluctuations.

Foreign Currency Contracts

Foreign currency contract financial instruments were valued primarily based on relevant information observable in market transactions involving identical or comparable assets or liabilities including both forward and spot prices for currencies. We enter into forward sales and purchase contracts to manage currency risk resulting from purchase and sale commitments denominated in foreign currencies.

Financial Instruments

The carrying values of cash and cash equivalents, accounts receivable and accounts payable approximated fair values due to the short-term maturities of these instruments. The fair value of our long-term debt was determined based on current market rates for debt of similar risk and maturities. The following table summarizes the fair value measurements of debt and the actual debt recorded on our balance sheets:

	<i>Fair Value Measurements</i>				<i>Amount recorded on balance sheets</i>
	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Total</i>	
	<i>(\$ in millions)</i>				
Balance at December 31, 2019	\$ —	\$3,417.5	\$ 153.0	\$3,570.5	\$ 3,340.8
Balance at December 31, 2018	—	3,137.2	153.0	3,290.2	3,230.3

Nonrecurring Fair Value Measurements

In addition to assets and liabilities that are recorded at fair value on a recurring basis, we record assets and liabilities at fair value on a nonrecurring basis as required by ASC 820. There were no assets measured at fair value on a nonrecurring basis as of December 31, 2019 and 2018.

NOTE 27. SUPPLEMENTAL GUARANTOR FINANCIAL INFORMATION

In October 2015, Blue Cube Spinco LLC (the Issuer) issued \$720.0 million aggregate principal amount of 9.75% senior notes due October 15, 2023 and \$500.0 million aggregate principal amount 10.00% senior notes due October 15, 2025 (2025 Notes and, together with the 2023 Notes, the Notes). During 2016, the Notes were registered under the Securities Act of 1933, as amended. The Issuer was formed on March 13, 2015 as a wholly owned subsidiary of Dow and upon closing of the Acquisition became a 100% owned subsidiary of Olin (the Parent Guarantor). The Notes are fully and unconditionally guaranteed by the Parent Guarantor.

The following condensed consolidating financial information presents the condensed consolidating balance sheets as of December 31, 2019 and 2018, and the related condensed consolidating statements of operations, comprehensive income (loss) and cash flows for each of the years in the three-year period ended December 31, 2019 of (a) the Parent Guarantor, (b) the Issuer, (c) the non-guarantor subsidiaries, (d) elimination entries necessary to consolidate the Parent Guarantor with the Issuer and the non-guarantor subsidiaries and (e) Olin on a consolidated basis. Investments in consolidated subsidiaries are presented under the equity method of accounting.

CONDENSED CONSOLIDATING BALANCE SHEETS
December 31, 2019
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Assets					
Current assets:					
Cash and cash equivalents	\$ 11.6	\$ —	\$ 209.3	\$ —	\$ 220.9
Receivables, net	78.3	—	686.8	(4.7)	760.4
Intercompany receivables	—	—	2,815.5	(2,815.5)	—
Income taxes receivable	1.6	—	12.3	—	13.9
Inventories, net	157.1	—	538.6	—	695.7
Other current assets	231.4	—	0.2	(208.5)	23.1
Total current assets	480.0	—	4,262.7	(3,028.7)	1,714.0
Property, plant and equipment, net	699.0	—	2,624.8	—	3,323.8
Operating lease assets, net	47.4	—	330.4	—	377.8
Investment in subsidiaries	7,048.2	4,353.5	—	(11,401.7)	—
Deferred income taxes	1.7	—	34.7	(1.1)	35.3
Other assets	20.9	—	1,148.2	—	1,169.1
Long-term receivables—affiliates	73.4	605.8	—	(679.2)	—
Intangible assets, net	0.3	—	447.8	—	448.1
Goodwill	—	966.3	1,153.4	—	2,119.7
Total assets	<u>\$ 8,370.9</u>	<u>\$ 5,925.6</u>	<u>\$ 10,002.0</u>	<u>\$ (15,110.7)</u>	<u>\$ 9,187.8</u>
Liabilities and Shareholders' Equity					
Current liabilities:					
Current installments of long-term debt	\$ 2.1	\$ —	\$ —	\$ —	\$ 2.1
Accounts payable	—	—	660.6	(8.7)	651.9
Intercompany payables	2,815.5	—	—	(2,815.5)	—
Income taxes payable	11.5	—	8.3	—	19.8
Current operating lease liabilities	8.2	—	71.1	—	79.3
Accrued liabilities	183.7	—	350.8	(205.4)	329.1
Total current liabilities	3,021.0	—	1,090.8	(3,029.6)	1,082.2
Long-term debt	2,130.0	1,208.7	—	—	3,338.7
Operating lease liabilities	40.4	—	263.0	—	303.4
Accrued pension liability	496.9	—	300.8	—	797.7
Deferred income taxes	—	6.5	449.2	(1.2)	454.5
Long-term payables—affiliates	—	—	679.2	(679.2)	—
Other liabilities	265.1	5.6	523.1	—	793.8
Total liabilities	<u>5,953.4</u>	<u>1,220.8</u>	<u>3,306.1</u>	<u>(3,710.0)</u>	<u>6,770.3</u>
Commitments and contingencies					
Shareholders' equity:					
Common stock	157.7	—	14.6	(14.6)	157.7
Additional paid-in capital	2,122.1	4,125.7	4,808.2	(8,933.9)	2,122.1
Accumulated other comprehensive loss	(803.4)	—	(6.5)	6.5	(803.4)
Retained earnings	941.1	579.1	1,879.6	(2,458.7)	941.1
Total shareholders' equity	<u>2,417.5</u>	<u>4,704.8</u>	<u>6,695.9</u>	<u>(11,400.7)</u>	<u>2,417.5</u>
Total liabilities and shareholders' equity	<u>\$ 8,370.9</u>	<u>\$ 5,925.6</u>	<u>\$ 10,002.0</u>	<u>\$ (15,110.7)</u>	<u>\$ 9,187.8</u>

CONDENSED CONSOLIDATING BALANCE SHEETS
December 31, 2018
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Assets					
Current assets:					
Cash and cash equivalents	\$ 92.0	\$ —	\$ 86.8	\$ —	\$ 178.8
Receivables, net	99.7	—	676.6	—	776.3
Intercompany receivables	—	—	2,558.2	(2,558.2)	—
Income taxes receivable	2.6	—	3.3	—	5.9
Inventories, net	161.4	—	550.0	—	711.4
Other current assets	220.2	—	1.8	(187.0)	35.0
Total current assets	575.9	—	3,876.7	(2,745.2)	1,707.4
Property, plant and equipment, net	651.4	—	2,830.7	—	3,482.1
Investment in subsidiaries	6,943.3	4,286.9	—	(11,230.2)	—
Deferred income taxes	7.3	—	27.4	(8.4)	26.3
Other assets	24.3	—	1,126.1	—	1,150.4
Long-term receivables—affiliates	—	1,247.2	—	(1,247.2)	—
Intangible assets, net	0.3	—	511.3	—	511.6
Goodwill	—	966.3	1,153.3	—	2,119.6
Total assets	\$ 8,202.5	\$ 6,500.4	\$ 9,525.5	\$ (15,231.0)	\$ 8,997.4
Liabilities and Shareholders' Equity					
Current liabilities:					
Current installments of long-term debt	\$ 0.9	\$ —	\$ 125.0	\$ —	\$ 125.9
Accounts payable	90.1	—	549.4	(3.0)	636.5
Intercompany payables	2,558.2	—	—	(2,558.2)	—
Income taxes payable	3.9	—	18.7	—	22.6
Accrued liabilities	150.3	—	367.5	(184.5)	333.3
Total current liabilities	2,803.4	—	1,060.6	(2,745.7)	1,118.3
Long-term debt	1,357.5	1,746.9	—	—	3,104.4
Accrued pension liability	439.1	—	235.2	—	674.3
Deferred income taxes	—	6.0	521.3	(8.4)	518.9
Long-term payables—affiliates	469.6	—	777.6	(1,247.2)	—
Other liabilities	300.7	5.5	443.1	—	749.3
Total liabilities	5,370.3	1,758.4	3,037.8	(4,001.3)	6,165.2
Commitments and contingencies					
Shareholders' equity:					
Common stock	165.3	—	14.6	(14.6)	165.3
Additional paid-in capital	2,247.4	4,125.7	4,808.2	(8,933.9)	2,247.4
Accumulated other comprehensive loss	(651.0)	—	(6.9)	6.9	(651.0)
Retained earnings	1,070.5	616.3	1,671.8	(2,288.1)	1,070.5
Total shareholders' equity	2,832.2	4,742.0	6,487.7	(11,229.7)	2,832.2
Total liabilities and shareholders' equity	\$ 8,202.5	\$ 6,500.4	\$ 9,525.5	\$ (15,231.0)	\$ 8,997.4

CONDENSED CONSOLIDATING STATEMENTS OF OPERATIONS
Year Ended December 31, 2019
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Sales	\$ 1,340.6	\$ —	\$ 5,239.7	\$ (470.3)	\$ 6,110.0
Operating expenses:					
Cost of goods sold	1,210.4	—	4,699.1	(470.3)	5,439.2
Selling and administration	211.0	—	205.9	—	416.9
Restructuring charges	1.4	—	75.1	—	76.5
Other operating (expense) income	(16.2)	—	16.6	—	0.4
Operating (loss) income	(98.4)	—	276.2	—	177.8
Equity income in subsidiaries	96.9	66.6	—	(163.5)	—
Interest expense	94.5	136.2	20.5	(8.0)	243.2
Interest income	5.4	—	3.6	(8.0)	1.0
Non-operating pension income (expense)	22.2	—	(5.9)	—	16.3
Other income	11.2	—	—	—	11.2
Income (loss) before taxes	(57.2)	(69.6)	253.4	(163.5)	(36.9)
Income tax (benefit) provision	(45.9)	(32.4)	52.7	—	(25.6)
Net (loss) income	<u>\$ (11.3)</u>	<u>\$ (37.2)</u>	<u>\$ 200.7</u>	<u>\$ (163.5)</u>	<u>\$ (11.3)</u>

CONDENSED CONSOLIDATING STATEMENTS OF OPERATIONS
Year Ended December 31, 2018
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Sales	\$ 1,423.8	\$ —	\$ 5,937.0	\$ (414.7)	\$ 6,946.1
Operating expenses:					
Cost of goods sold	1,153.1	—	5,083.7	(414.7)	5,822.1
Selling and administration	206.0	—	224.6	—	430.6
Restructuring charges	—	—	21.9	—	21.9
Acquisition-related costs	1.0	—	—	—	1.0
Other operating (expense) income	(3.0)	—	9.4	—	6.4
Operating income	60.7	—	616.2	—	676.9
Losses of non-consolidated affiliates	(19.7)	—	—	—	(19.7)
Equity income in subsidiaries	310.7	289.6	—	(600.3)	—
Interest expense	68.6	153.3	26.9	(5.6)	243.2
Interest income	5.8	—	1.4	(5.6)	1.6
Non-operating pension income (expense)	26.6	—	(4.9)	—	21.7
Income before taxes	315.5	136.3	585.8	(600.3)	437.3
Income tax (benefit) provision	(12.4)	(35.1)	156.9	—	109.4
Net income	<u>\$ 327.9</u>	<u>\$ 171.4</u>	<u>\$ 428.9</u>	<u>\$ (600.3)</u>	<u>\$ 327.9</u>

CONDENSED CONSOLIDATING STATEMENTS OF OPERATIONS
Year Ended December 31, 2017
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Sales	\$ 1,330.3	\$ —	\$ 5,344.9	\$ (406.8)	\$ 6,268.4
Operating expenses:					
Cost of goods sold	1,195.5	—	4,766.2	(406.8)	5,554.9
Selling and administration	157.0	—	212.8	—	369.8
Restructuring charges	1.7	—	35.9	—	37.6
Acquisition-related costs	12.8	—	—	—	12.8
Other operating (expense) income	(11.1)	—	14.4	—	3.3
Operating (loss) income	(47.8)	—	344.4	—	296.6
Earnings of non-consolidated affiliates	1.8	—	—	—	1.8
Equity income in subsidiaries	638.4	357.6	—	(996.0)	—
Interest expense	44.5	165.8	13.0	(5.9)	217.4
Interest income	6.3	—	1.4	(5.9)	1.8
Non-operating pension income (expense)	38.5	—	(4.1)	—	34.4
Income before taxes	592.7	191.8	328.7	(996.0)	117.2
Income tax provision (benefit)	43.2	(310.0)	(165.5)	—	(432.3)
Net income	\$ 549.5	\$ 501.8	\$ 494.2	\$ (996.0)	\$ 549.5

CONDENSED CONSOLIDATING STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
Year Ended December 31, 2019
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net (loss) income	\$ (11.3)	\$ (37.2)	\$ 200.7	\$ (163.5)	\$ (11.3)
Other comprehensive loss, net of tax:					
Foreign currency translation adjustments, net	—	—	(9.1)	—	(9.1)
Unrealized losses on derivative contracts, net	(15.4)	—	—	—	(15.4)
Pension and postretirement liability adjustments, net	(95.8)	—	(54.4)	—	(150.2)
Amortization of prior service costs and actuarial losses, net	19.9	—	2.4	—	22.3
Total other comprehensive loss, net of tax	(91.3)	—	(61.1)	—	(152.4)
Comprehensive (loss) income	\$ (102.6)	\$ (37.2)	\$ 139.6	\$ (163.5)	\$ (163.7)

CONDENSED CONSOLIDATING STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

Year Ended December 31, 2018

(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net income	\$ 327.9	\$ 171.4	\$ 428.9	\$ (600.3)	\$ 327.9
Other comprehensive loss, net of tax:					
Foreign currency translation adjustments, net	—	—	(22.2)	—	(22.2)
Unrealized losses on derivative contracts, net	(11.7)	—	—	—	(11.7)
Pension and postretirement liability adjustments, net	(69.6)	—	(5.3)	—	(74.9)
Amortization of prior service costs and actuarial losses, net	26.3	—	2.0	—	28.3
Total other comprehensive loss, net of tax	(55.0)	—	(25.5)	—	(80.5)
Comprehensive income	\$ 272.9	\$ 171.4	\$ 403.4	\$ (600.3)	\$ 247.4

CONDENSED CONSOLIDATING STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

Year Ended December 31, 2017

(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net income	\$ 549.5	\$ 501.8	\$ 494.2	\$ (996.0)	\$ 549.5
Other comprehensive income, net of tax:					
Foreign currency translation adjustments, net	—	—	31.7	—	31.7
Unrealized losses on derivative contracts, net	(1.7)	—	—	—	(1.7)
Pension and postretirement liability adjustments, net	(12.3)	—	(9.3)	—	(21.6)
Amortization of prior service costs and actuarial losses, net	15.3	—	1.7	—	17.0
Total other comprehensive income, net of tax	1.3	—	24.1	—	25.4
Comprehensive income	\$ 550.8	\$ 501.8	\$ 518.3	\$ (996.0)	\$ 574.9

CONDENSED CONSOLIDATING STATEMENTS OF CASH FLOWS
Year Ended December 31, 2019
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net operating activities	\$ 133.2	\$ —	\$ 484.1	\$ —	\$ 617.3
Investing Activities					
Capital expenditures	(152.4)	—	(233.2)	—	(385.6)
Proceeds from disposition of affiliated companies	20.0	—	—	—	20.0
Distributions from consolidated subsidiaries, net	3.1	—	—	(3.1)	—
Net investing activities	(129.3)	—	(233.2)	(3.1)	(365.6)
Financing Activities					
Long-term debt:					
Borrowings	800.0	—	25.0	—	825.0
Repayments	(51.2)	(543.0)	(150.0)	—	(744.2)
Common stock repurchased and retired	(145.9)	—	—	—	(145.9)
Stock options exercised	1.7	—	—	—	1.7
Dividends paid	(129.3)	—	(3.1)	3.1	(129.3)
Debt issuance costs	(16.6)	—	—	—	(16.6)
Intercompany financing activities	(543.0)	543.0	—	—	—
Net financing activities	(84.3)	—	(128.1)	3.1	(209.3)
Effect of exchange rate changes on cash and cash equivalents	—	—	(0.3)	—	(0.3)
Net (decrease) increase in cash and cash equivalents	(80.4)	—	122.5	—	42.1
Cash and cash equivalents, beginning of year	92.0	—	86.8	—	178.8
Cash and cash equivalents, end of year	\$ 11.6	\$ —	\$ 209.3	\$ —	\$ 220.9

CONDENSED CONSOLIDATING STATEMENTS OF CASH FLOWS
Year Ended December 31, 2018
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net operating activities	\$ 529.8	\$ —	\$ 378.0	\$ —	\$ 907.8
Investing Activities					
Capital expenditures	(149.8)	—	(235.4)	—	(385.2)
Proceeds from disposition of property, plant and equipment	—	—	2.9	—	2.9
Distribution from consolidated subsidiaries, net	95.0	95.0	—	(190.0)	—
Net investing activities	(54.8)	95.0	(232.5)	(190.0)	(382.3)
Financing Activities					
Long-term debt:					
Borrowings	550.0	—	20.0	—	570.0
Repayments	(21.0)	(780.4)	(144.7)	—	(946.1)
Common stock repurchased and retired	(50.0)	—	—	—	(50.0)
Stock options exercised	3.4	—	—	—	3.4
Dividends paid	(133.6)	(95.0)	(95.0)	190.0	(133.6)
Debt issuance costs	(8.5)	—	—	—	(8.5)
Intercompany financing activities	(780.4)	780.4	—	—	—
Net financing activities	(440.1)	(95.0)	(219.7)	190.0	(564.8)
Effect of exchange rate changes on cash and cash equivalents	—	—	(0.3)	—	(0.3)
Net increase (decrease) in cash and cash equivalents	34.9	—	(74.5)	—	(39.6)
Cash and cash equivalents, beginning of year	57.1	—	161.3	—	218.4
Cash and cash equivalents, end of year	\$ 92.0	\$ —	\$ 86.8	\$ —	\$ 178.8

CONDENSED CONSOLIDATING STATEMENTS OF CASH FLOWS
Year Ended December 31, 2017
(In millions)

	<i>Parent Guarantor</i>	<i>Issuer</i>	<i>Subsidiary Non- Guarantor</i>	<i>Eliminations</i>	<i>Total</i>
Net operating activities	\$ 472.0	\$ —	\$ 176.8	\$ —	\$ 648.8
Investing Activities					
Capital expenditures	(89.1)	—	(205.2)	—	(294.3)
Payments under long-term supply contracts	—	—	(209.4)	—	(209.4)
Proceeds from disposition of property, plant and equipment	—	—	5.2	—	5.2
Distribution from consolidated subsidiaries, net	2.7	—	—	(2.7)	—
Net investing activities	(86.4)	—	(409.4)	(2.7)	(498.5)
Financing Activities					
Long-term debt:					
Borrowings	620.0	1,375.0	40.5	—	2,035.5
Repayments	(690.8)	(1,334.1)	(13.0)	—	(2,037.9)
Stock options exercised	29.8	—	—	—	29.8
Dividends paid	(133.0)	—	(2.7)	2.7	(133.0)
Debt issuance costs	(8.3)	(2.9)	—	—	(11.2)
Intercompany financing activities	(171.4)	(38.0)	209.4	—	—
Net financing activities	(353.7)	—	234.2	2.7	(116.8)
Effect of exchange rate changes on cash and cash equivalents	—	—	0.4	—	0.4
Net increase in cash and cash equivalents	31.9	—	2.0	—	33.9
Cash and cash equivalents, beginning of year	25.2	—	159.3	—	184.5
Cash and cash equivalents, end of year	\$ 57.1	\$ —	\$ 161.3	\$ —	\$ 218.4

NOTE 28. OTHER FINANCIAL DATA

Quarterly Data (Unaudited)

(\$ in millions, except per share data)

2019	<i>First Quarter</i>	<i>Second Quarter</i>	<i>Third Quarter</i>	<i>Fourth Quarter</i>	<i>Year</i>
Sales	\$ 1,553.4	\$ 1,592.9	\$ 1,576.6	\$ 1,387.1	\$ 6,110.0
Cost of goods sold	1,347.3	1,463.7	1,357.6	1,270.6	5,439.2
Net income (loss)	41.7	(20.0)	44.2	(77.2)	(11.3)
Net income (loss) per common share:					
Basic	0.25	(0.12)	0.27	(0.49)	(0.07)
Diluted	0.25	(0.12)	0.27	(0.49)	(0.07)
Common dividends per share	0.20	0.20	0.20	0.20	0.80

2018	<i>First Quarter</i>	<i>Second Quarter</i>	<i>Third Quarter</i>	<i>Fourth Quarter</i>	<i>Year</i>
Sales	\$ 1,710.3	\$ 1,728.4	\$ 1,872.4	\$ 1,635.0	\$ 6,946.1
Cost of goods sold	1,528.7	1,460.7	1,441.7	1,391.0	5,822.1
Net income	20.9	58.6	195.1	53.3	327.9
Net income per common share:					
Basic	0.13	0.35	1.17	0.32	1.97
Diluted	0.12	0.35	1.16	0.32	1.95
Common dividends per share	0.20	0.20	0.20	0.20	0.80

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

Not applicable.

Item 9A. CONTROLS AND PROCEDURES

Our chief executive officer and our chief financial officer evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2019. Based on that evaluation, our chief executive officer and chief financial officer have concluded that, as of such date, our disclosure controls and procedures were effective to ensure that information Olin is required to disclose in the reports that it files or submits with the SEC under the Securities Exchange Act of 1934 is recorded, processed, summarized and reported within the time periods specified in the Commission’s rules and forms, and to ensure that information we are required to disclose in such reports is accumulated and communicated to our management, including our chief executive officer and chief financial officer, as appropriate to allow timely decisions regarding required disclosure.

In 2017, we began a multi-year implementation of new enterprise resource planning, manufacturing, and engineering systems. The project includes the required information technology infrastructure (collectively, the Information Technology Project). Implementing the Information Technology Project involves significant changes in business processes and extensive organizational training. During the second and third quarters of 2019, we implemented portions of the Information Technology Project to support and integrate significant processes, some of which relate to internal control over financial reporting and disclosure controls and procedures. We believe we have taken and will continue to take the necessary steps to implement, monitor and maintain appropriate internal controls during the Information Technology Project transition period. In connection with the Information Technology Project, we expect there will be a significant redesign of our business processes, some of which relate to internal control over financial reporting and disclosure controls. Other than the aforementioned Information Technology Project, there have been no changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2019, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management’s report on internal control over financial reporting and the related report of Olin’s independent registered public accounting firm, KPMG LLP, are included in Item 8—“Consolidated Financial Statements and Supplementary Data.”

Item 9B. OTHER INFORMATION

Not applicable.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

We incorporate the biographical information relating to our Directors under the heading ITEM 1—“PROPOSAL FOR THE ELECTION OF DIRECTORS” in our Proxy Statement relating to our 2020 Annual Meeting of Shareholders (the “Proxy Statement”) by reference in this Report. We incorporate the biographical information regarding executive officers under the heading “EXECUTIVE OFFICERS” in our Proxy Statement by reference in this report.

The information with respect to our audit committee, including the audit committee financial expert, is incorporated by reference in this Report to the information contained in the paragraph entitled “CORPORATE GOVERNANCE MATTERS—What Are The Committees Of The Board?” in our Proxy Statement. We incorporate by reference in this Report information regarding procedures for shareholders to nominate a director for election, in the Proxy Statement under the headings “MISCELLANEOUS—How can I directly nominate a director for election to the board at the 2021 annual meeting?” and “CORPORATE GOVERNANCE MATTERS—What Is Olin’s Director Nomination Process?”.

We have adopted a code of business conduct and ethics for directors, officers and employees, known as the Code of Conduct. The Code of Conduct is available in the About, Our Values section of our website at www.olin.com. Olin intends to satisfy disclosure requirements under Item 5.05 of Form 8-K regarding an amendment to, or waiver from, any provision of the Code of Conduct with respect to its executive officers or directors by posting such amendment or waiver on its website.

Item 11. EXECUTIVE COMPENSATION

The information in the Proxy Statement under the heading “CORPORATE GOVERNANCE MATTERS—Compensation Committee Interlocks and Insider Participation,” and the information under the heading “COMPENSATION DISCUSSION AND ANALYSIS” through the information under the heading “COMPENSATION COMMITTEE REPORT,” are incorporated by reference in this Report.

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

We incorporate the information concerning holdings of our common stock by certain beneficial owners contained under the heading “CERTAIN BENEFICIAL OWNERS” in our Proxy Statement, and the information concerning beneficial ownership of our common stock by our directors and officers under the heading “SECURITY OWNERSHIP OF DIRECTORS AND OFFICERS” in our Proxy Statement by reference in this Report.

Equity Compensation Plan Information

<i>Plan Category</i>	<i>(a)</i> <i>Number of securities to be issued upon exercise of outstanding options, warrants and rights⁽¹⁾</i>	<i>(b)</i> <i>Weighted-average exercise price of outstanding options, warrants and rights</i>	<i>(c)</i> <i>Number of securities remaining available for future issuance under equity compensation plans excluding securities reflected in column (a)⁽¹⁾</i>
Equity compensation plans approved by security holders ⁽²⁾	8,319,865 ⁽³⁾	\$ 24.95 ⁽³⁾	7,948,895
Equity compensation plans not approved by security holders	N/A	N/A	N/A
Total	8,319,865	\$ 24.95 ⁽³⁾	7,948,895

- (1) Number of shares is subject to adjustment for changes in capitalization for stock splits and stock dividends and similar events.
- (2) Consists of the 2000 Long Term Incentive Plan, the 2003 Long Term Incentive Plan, the 2006 Long Term Incentive Plan, the 2009 Long Term Incentive Plan, the 2014 Long Term Incentive Plan, the 2016 Long Term Incentive Plan, the 2018 Long Term Incentive Plan and the 1997 Stock Plan for Non-employee Directors.
- (3) Includes:
- 7,210,551 shares issuable upon exercise of options with a weighted-average exercise price of \$24.95, and a weighted-average remaining term of 6.4 years,
 - 171,050 shares issuable under restricted stock unit grants, with a weighted-average remaining term of 1.9 years,
 - 757,200 shares issuable in connection with outstanding performance share awards, with a weighted-average term of 2.5 years remaining in the performance measurement period, and
 - 181,064 shares under the 1997 Stock Plan for Non-employee Directors which represent stock grants for retainers, other board and committee fees and dividends on deferred stock under the plan.

Item 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

We incorporate the information under the headings “CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS” and “CORPORATE GOVERNANCE MATTERS—Which Board Members Are Independent?” in our Proxy Statement by reference in this Report.

Item 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

We incorporate the information concerning the accounting fees and services of our independent registered public accounting firm, KPMG LLP, under the heading ITEM 3—“PROPOSAL TO RATIFY APPOINTMENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM” in our Proxy Statement by reference in this Report.

PART IV

Item 15. EXHIBITS AND CONSOLIDATED FINANCIAL STATEMENT SCHEDULES

(a) 1. Consolidated Financial Statements

Consolidated financial statements of the registrant are included in Item 8 above.

2. Financial Statement Schedules

Schedules not included herein are omitted because they are inapplicable or not required or because the required information is given in the consolidated financial statements and notes thereto.

3. Exhibits

The following exhibits are filed with this Annual Report on Form 10-K, unless incorporated by reference. Management contracts and compensatory plans and arrangements are listed as Exhibits 10(a) through 10(w). We are party to a number of other instruments defining the rights of holders of long-term debt. No such instrument authorizes an amount of securities in excess of 10% of the total assets of Olin and its subsidiaries on a consolidated basis. Olin agrees to furnish a copy of each instrument to the Commission upon request.

- 1 (a) [Underwriting Agreement dated as of July 11, 2019, between Olin Corporation and J.P. Morgan Securities LLC, as representative of the several underwriters named therein—Exhibit 1.1 to Olin’s Form 8-K dated July 16, 2019.*](#)
- 2 (a) [Merger Agreement dated as of March 26, 2015, among The Dow Chemical Company, Blue Cube Spinco Inc., Olin Corporation and Blue Cube Acquisition Corp.—Exhibit 2.1 to Olin’s Form 8-K dated March 27, 2015.*](#)
- 3 (a) [Amended and Restated Articles of Incorporation of Olin Corporation as amended effective October 1, 2015—Exhibit 3.1 to Olin’s Form 10-Q for the quarter ended September 30, 2015.*](#)
- (b) [Bylaws of Olin Corporation as amended effective August 8, 2019—Exhibit 3.1 to Olin’s Form 8-K dated June 14, 2019.*](#)
- (c) [Articles of Amendment of the Amended and Restated Articles of Incorporation of Olin Corporation, effective on October 1, 2015—Exhibit 3.1 to Olin’s Form 8-K dated October 5, 2015.*](#)
- 4 (a) [Description of Olin Corporation Securities registered under Section 12 of the Exchange Act.](#)
- (b) [Trust Indenture effective October 1, 2010 between The Industrial Development Authority of Washington County and U. S. Bank National Association, as trustee—Exhibit 4.1 to Olin’s Form 8-K dated October 20, 2010.*](#)
- (c) [Loan Agreement effective October 1, 2010 between The Industrial Development Authority of Washington County and Olin Corporation—Exhibit 4.2 to Olin’s Form 8-K dated October 20, 2010.*](#)
- (d) [Bond Purchase Agreement dated October 14, 2010 between The Industrial Development Authority of Washington County, Olin Corporation and PNC Bank, National Association, as administrative agent—Exhibit 4.3 to Olin’s Form 8-K dated October 20, 2010.*](#)
- (e) [Trust Indenture effective December 1, 2010 between Mississippi Business Finance Corporation and U. S. Bank National Association—Exhibit 4.1 to Olin’s Form 8-K dated December 10, 2010.*](#)
- (f) [Second Supplemental Indenture dated as of August 9, 2012 between Olin Corporation, The Bank of New York Mellon Trust Company, N.A. and U. S. Bank National Association—Exhibit 4.1 to Olin’s Form 8-K dated August 9, 2012.*](#)
- (g) [Third Supplemental Indenture dated as of August 22, 2012 between Olin Corporation and U. S. Bank National Association—Exhibit 4.1 to Olin’s Form 8-K dated August 22, 2012.*](#)
- (h) [Fourth Supplemental Indenture dated as of March 9, 2017 between Olin Corporation and U.S. Bank National Association—Exhibit 4.3 to Olin’s Form 8-K dated March 9, 2017.*](#)
- (i) [Fifth Supplemental Indenture dated January 16, 2018 between Olin Corporation and U.S. Bank National Association, as trustee, governing the Senior Notes—Exhibit 4.1 to Olin’s Form 8-K dated January 19, 2018.*](#)
- (j) [Sixth Supplemental Indenture dated July 16, 2019 between Olin Corporation and U.S. Bank National Association, as trustee, governing the Senior Notes—Exhibit 4.1 to Olin’s Form 8-K dated July 16, 2019.*](#)

- (k) [Loan Agreement effective December 1, 2010 between Mississippi Business Finance Corporation and Olin Corporation—Exhibit 4.2 to Olin’s Form 8-K dated December 10, 2010.*](#)
- (l) [Bond Purchase Agreement dated December 9, 2010 between Mississippi Business Finance Corporation, Olin Corporation and PNC Bank, National Association, as administrative agent—Exhibit 4.3 to Olin’s Form 8-K dated December 10, 2010.*](#)
- (m) [Amended and Restated Credit and Funding Agreement dated December 9, 2010 between Olin Corporation, as borrower; PNC Bank, National Association, as administrative agent; PNC Capital Markets LLC, as lead arranger; and the Lenders party thereto—Exhibit 4.4 to Olin’s Form 8-K dated December 10, 2010.*](#)
- (n) [First Amendment dated December 27, 2010 to the Amended and Restated Credit and Funding Agreement dated December 9, 2010 between Olin Corporation, as borrower; PNC Bank, National Association, as administrative agent; PNC Capital Markets LLC, as lead arranger; and the Lenders party thereto—Exhibit 4.4 to Olin’s Form 8-K dated December 30, 2010.*](#)
- (o) [Second Amendment dated April 27, 2012 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders, as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.2 to Olin’s Form 8-K dated May 3, 2012.*](#)
- (p) [Third Amendment dated June 23, 2014 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders, as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.2 to Olin’s Form 8-K dated June 25, 2014.*](#)
- (q) [Amendment No. 4 dated June 23, 2015 to the Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders, as defined therein, and PNC Bank, National Association, as administrative agent—Exhibit 10.3 to Olin’s Form 8-K dated June 29, 2015.*](#)
- (r) [Fifth Amendment dated September 29, 2016 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.1 to Olin’s Form 10-Q dated May 3, 2017.*](#)
- (s) [Sixth Amendment dated March 9, 2017 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.1 to Olin’s Form 8-K dated March 9, 2017.*](#)
- (t) [Seventh Amendment dated July 16, 2019 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.3 to Olin’s Form 8-K dated July 16, 2019.*](#)
- (u) [Eighth Amendment dated December 20, 2019 to Amended and Restated Credit and Funding Agreement dated December 9, 2010 among Olin Corporation, the Lenders as defined therein, and PNC Bank, National Association, as administrative agent for the Lenders—Exhibit 4.1 to Olin’s Form 8-K dated December 20, 2019.*](#)
- (v) [Form of 5.50% Senior Notes due 2022—Exhibit 4.2 to Olin’s Form 8-K dated August 22, 2012.*](#)
- (w) [Forward Purchase Agreement, dated as of March 9, 2017, among Olin Corporation, the Lenders, as defined therein, and PNC Bank, National Association, as administrative agent—Exhibit 4.1 to Olin’s Form 8-K dated March 9, 2017.*](#)
- (x) [Senior Notes Indenture dated October 5, 2015 between Blue Cube Spinco Inc., as issuer, and U. S. Bank National Association, as trustee, governing the 9.75% Senior Notes due 2023—Exhibit 4.1 to Olin’s Form 8-K dated October 5, 2015.*](#)
- (y) [Senior Notes Indenture dated October 5, 2015 between Blue Cube Spinco Inc., as issuer, and U. S. Bank National Association, as trustee, governing the 10.00% Senior Notes due 2025—Exhibit 4.2 to Olin’s Form 8-K dated October 5, 2015.*](#)
- (z) [First Supplemental Indenture dated October 5, 2015 between Blue Cube Spinco Inc., as issuer, and Olin Corporation, as guarantor, and U. S. Bank National Association, as trustee, governing the 9.75% Senior Notes due 2023—Exhibit 4.3 to Olin’s Form 8-K dated October 5, 2015.*](#)
- (aa) [First Supplemental Indenture dated October 5, 2015 between Blue Cube Spinco Inc., as issuer, and Olin Corporation, as guarantor, and U. S. Bank National Association, as trustee, governing the 10.00% Senior Notes due 2025—Exhibit 4.4 to Olin’s Form 8-K dated October 5, 2015.*](#)
- (bb) [Form of 9.75% Senior Notes due 2023—Exhibit 4.5 \(included in Exhibit 4.1\) to Olin’s Form 8-K dated October 5, 2015.*](#)
- (cc) [Form of 10.00% Senior Notes due 2025—Exhibit 4.6 \(included in Exhibit 4.2\) to Olin’s Form 8-K dated October 5, 2015.*](#)
- (dd) [Form of 5.125% Senior Notes due 2027—Exhibit 4.4 \(included in Exhibit 4.3\) to Olin’s Form 8-K dated March 9, 2017.*](#)
- (ee) [Form of 5.000% Senior Notes due 2030—Exhibit 4.1 to Olin’s Form 8-K dated January 19, 2018.*](#)
- (ff) [Form of 5.625% Senior Notes due 2029—Exhibit 4.2 \(included in Exhibit 4.1\) to Olin’s Form 8-K dated July 16, 2019.*](#)

- (gg) [Registration Rights Agreement dated October 5, 2015 relating to the 9.75% Senior Notes due 2023 and 10.00% Senior Notes due 2025 by and among Blue Cube Spinco Inc., Olin Corporation, J.P. Morgan Securities LLC and Wells Fargo Securities LLC for themselves and as representatives of other initial purchasers—Exhibit 4.7 to Olin’s Form 8-K dated October 5, 2015.*](#)
- (hh) [Receivables Financing Arrangement dated December 20, 2016 by and among Olin Finance Company, LLC, PNC Bank, National Association, Olin Corporation, PNC Capital Markets LLC and the Lender parties thereto—Exhibit 4\(x\) to Olin’s Form 10-K for 2016.*](#)
- (ii) [Amendment No. 1 to Receivables Financing Arrangement and Reaffirmation of Performance Guaranty dated July 16, 2019 among Olin Corporation, Olin Finance Company, LLC, PNC Bank, National Association, Olin Corporation, PNC Capital Markets LLC and the Lender parties thereto—Exhibit 10.2 to Olin’s Form 8-K dated July 16, 2019.*](#)
- 10 (a) [Senior Executive Pension Plan amended and restated effective October 24, 2008—Exhibit 10.1 to Olin’s Form 10-Q for the quarter ended September 30, 2008.*](#)
- (b) [Supplemental Contributing Employee Ownership Plan as amended and restated effective January 1, 2018—Exhibit 99.1 to Olin’s Form 8-K dated December 12, 2017.*](#)
- (c) [Olin Corporation Key Executive Life Insurance Program—Exhibit 10\(e\) to Olin’s Form 10-K for 2002.*](#)
- (d) [Olin Corporation Change in Control Severance Plan for Section 16\(b\) Officers effective January 27, 2019—Exhibit 10.1 to Olin’s Form 8-K filed December 14, 2018.*](#)
- (e) [Olin Corporation Severance Plan for Section 16\(b\) Officers effective January 27, 2019—Exhibit 10.2 to Olin’s Form 8-K filed December 14, 2018.*](#)
- (f) [Amended and Restated 1997 Stock Plan for Non-employee Directors codified to reflect amendments adopted through January 1, 2020.](#)
- (g) [Description of Restricted Stock Unit Awards granted under the 2000, 2003, 2006, 2009, 2014, 2016 or 2018 Long Term Incentive Plans—Exhibit 10\(p\) to Olin’s Form 10-K for 2008.*](#)
- (h) [Supplementary and Deferral Benefit Pension Plan as amended and restated effective October 24, 2008—Exhibit 10.2 to Olin’s Form 10-Q for the quarter ended September 30, 2008.*](#)
- (i) [Amended and Restated Olin Corporation 2000 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.1 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (j) [Amended and Restated Olin Corporation 2003 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.2 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (k) [Amended and Restated Olin Corporation 2006 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.3 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (l) [Amended and Restated Olin Corporation 2009 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.4 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (m) [Amended and Restated Olin Corporation 2014 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.5 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (n) [Amended and Restated Olin Corporation 2016 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.6 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (o) [Amended and Restated Olin Corporation 2018 Long Term Incentive Plan codified as of January 27, 2019—Exhibit 10.7 to Olin’s Form 8-K dated January 30, 2019.*](#)
- (p) [Olin Corporation Short Term Incentive Program dated February 18, 2020—Exhibit 10.1 to Olin’s Form 8-K dated February 21, 2020.*](#)
- (q) [Performance Share Program as amended through January 24, 2019—Exhibit 10.1 to Olin’s Form 10-Q for the quarter ended March 31, 2019.*](#)
- (r) [Form of Non-Qualified Stock Option Award Certificate](#)
- (s) [Form of Restricted Stock Unit Award Certificate](#)
- (t) [Form of Performance Award Certificate](#)
- (u) [Summary of Stock Option/Performance Share Continuation Provisions for Olin Employees as amended effective August 20, 2019—Exhibit 10.1 to Olin’s Form 8-K dated August 22, 2019.*](#)
- (v) [Master Confirmation - Accelerated Share Repurchase dated August 5, 2019 between Olin Corporation and Goldman Sachs & Co LLC—Exhibit 10.1 to Olin’s Form 8-K dated August 5, 2019.*](#)
- (w) [Olin Corporation Contributing Employee Ownership Plan Amended and Restated effective as of October 24, 2008, and as amended effective September 29, 2015—Exhibit 99.1 to Olin’s Form S-8 filed February 16, 2016.*](#)
- (x) [Distribution Agreement between Olin Corporation and Arch Chemicals, Inc., dated as of February 1, 1999—Exhibit 2.1 to Olin’s Form 8-K dated February 23, 1999.*](#)

(y)	Purchase Agreement dated as of February 28, 2011, by and among PolyOne Corporation, 1997 Chloralkali Venture, LLC, Olin Corporation and Olin SunBelt II, Inc.—Exhibit 2.1 to Olin’s Form 8-K dated March 3, 2011.*
(z)	Note Purchase Agreement dated December 22, 1997 between the SunBelt Chlor Alkali Partnership and the Purchasers named therein—Exhibit 99.5 to Olin’s Form 8-K dated December 3, 2001.*
(aa)	Guarantee Agreement dated December 22, 1997 between Olin Corporation and the Purchasers named therein—Exhibit 99.6 to Olin’s Form 8-K dated December 3, 2001.*
(bb)	Subordination Agreement dated December 22, 1997 between Olin Corporation and the Subordinated Parties named therein—Exhibit 99.7 to Olin’s Form 8-K dated December 3, 2001.*
(cc)	Stock Purchase Agreement dated as of July 17, 2012, by and among K. A. Steel Chemicals Inc., the stockholders of K. A. Steel Chemicals Inc. and Robert F. Steel, as the sellers’ representative, and Olin Corporation, as Purchaser—Exhibit 2.1 to Olin’s Form 8-K dated July 18, 2012.*
(dd)	Credit Agreement dated June 23, 2015 among Olin Corporation, Olin Canada ULC, the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.1 to Olin’s Form 8-K dated June 29, 2015.*
(ee)	Credit Agreement dated June 23, 2015 among Blue Cube Spinco Inc., the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.2 to Olin’s Form 8-K dated June 29, 2015.*
(ff)	Amendment Agreement dated June 23, 2015 among Olin, Olin Canada ULC, Blue Cube Spinco Inc., the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.5 to Olin’s Form 8-K dated October 5, 2015.*
(gg)	Second Amendment Agreement, dated as of March 9, 2017 among Olin Corporation, Olin Canada ULC and Blue Cube Spinco Inc., the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.1 to Olin’s Form 8-K dated March 9, 2017.*
(hh)	Third Amendment Agreement, dated as of June 28, 2018, among Olin Corporation, Olin Canada ULC and Blue Cube Spinco LLC, the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.2 to Olin’s Form 10-Q for the quarter ended June 30, 2018.*
(ii)	Separation Agreement dated March 26, 2015 between The Dow Chemical Company and Blue Cube Spinco Inc.—Exhibit 10.1 to Olin’s Form 8-K dated March 27, 2015.*
(jj)	Credit Agreement dated August 25, 2015 among Olin Corporation, Olin subsidiaries, the Lenders (as defined therein) and Sumitomo Mitsui Banking Corporation, as administrative agent—Exhibit 10.1 to Olin’s Form 8-K dated August 25, 2015.*
(kk)	Amended and Restated Credit Agreement, dated as of October 5, 2015 as Amended and Restated by the Second Amendment Agreement dated as of March 9, 2017 among Olin Corporation, Olin Canada ULC and Blue Cube Spinco Inc., the Lenders named therein and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.2 to Olin’s Form 8-K dated March 9, 2017.*
(ll)	Credit Agreement dated July 16, 2019 among Olin Corporation, Blue Cube Spinco, LLC, the Lenders and Issuing Banks (as defined therein) and Wells Fargo Bank, National Association—Exhibit 10.1 to Olin’s Form 8-K dated July 16, 2019.*
(mm)	First Amendment dated December 20, 2019 to Credit Agreement dated July 16, 2019 among Olin Corporation, Blue Cube Spinco, LLC, the Lenders and Issuing Banks (as defined therein) and Wells Fargo Bank, National Association—Exhibit 10.1 to Olin’s Form 8-K dated December 20, 2019.*
(nn)	Guaranty Agreement dated October 5, 2015 among Blue Cube Spinco Inc., Olin Corporation and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.2 to Olin’s Form 8-K dated October 5, 2015.*
(oo)	Borrowing Subsidiary Agreement dated October 5, 2015 among Olin Corporation, Blue Cube Spinco Inc. and Wells Fargo Bank, National Association, as administrative agent—Exhibit 10.3 to Olin’s Form 8-K dated October 5, 2015.*
(pp)	Guaranty Joinder dated October 5, 2015 among Olin subsidiaries, Blue Cube Spinco Inc. and Sumitomo Mitsui Banking Corporation, as administrative agent—Exhibit 10.4 to Olin’s Form 8-K dated October 5, 2015.*
(qq)	Incremental Term Loan Agreement dated November 3, 2015 among Olin Corporation, Blue Cube Spinco Inc., the Lenders (as defined therein) and Sumitomo Mitsui Banking Corporation, as administrative agent—Exhibit 10.1 to Olin’s Form 8-K dated November 9, 2015.*
11	Computation of Per Share Earnings (included in Note 6 “Earnings Per Share” to Notes to Consolidated Financial Statements in Item 8).
21	List of Subsidiaries.
23	Consent of KPMG LLP.
31.1	Section 302 Certification Statement of Chief Executive Officer.

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31.2	<u>Section 302 Certification Statement of Chief Financial Officer.</u>
32	<u>Section 906 Certification Statement of Chief Executive Officer and Chief Financial Officer.</u>
101.INS	XBRL Instance Document**
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File (embedded in the Exhibit 101 Interactive Data Files)

*Previously filed as indicated and incorporated herein by reference. Exhibits incorporated by reference are located in SEC file No. 1-1070 unless otherwise indicated.

**The instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline eXtensible Business Reporting Language (iXBRL) document. The consolidated financial statements and notes thereto contained in Part II, Item 8 were formatted in iXBRL in this Annual Report on Form 10-K.

Any exhibit is available from Olin by writing to the Secretary, Olin Corporation, 190 Carondelet Plaza, Suite 1530, Clayton, MO 63105 USA.

Shareholders may obtain information from EQ Shareowner Services, our registrar and transfer agent, who also manages our Automatic Dividend Reinvestment Plan by writing to: EQ Shareowner Services, 1110 Centre Pointe Curve, Suite 101, Mendota Heights, MN 55120 USA, by telephone from the United States at 800-401-1957 or outside the United States at 651-450-4064 or via the Internet under "Contact Us" at www.shareowneronline.com.

Item 16. FORM 10-K SUMMARY

None.

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.

Date: February 24, 2020

OLIN CORPORATION

By: /s/ John E. Fischer

John E. Fischer

Chairman, President and Chief Executive Officer

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

<i>Signature</i>	<i>Title</i>	<i>Date</i>
<u>/s/ JOHN E. FISCHER</u> John E. Fischer	Chairman, President and Chief Executive Officer and Director (Principal Executive Officer)	February 24, 2020
<u>/s/ HEIDI S. ALDERMAN</u> Heidi S. Alderman	Director	February 24, 2020
<u>/s/ BEVERLEY A. BABCOCK</u> Beverley A. Babcock	Director	February 24, 2020
<u>/s/ GRAY G. BENOIST</u> Gray G. Benoist	Director	February 24, 2020
<u>/s/ C. ROBERT BUNCH</u> C. Robert Bunch	Director	February 24, 2020
<u>/s/ RANDALL W. LARRIMORE</u> Randall W. Larrimore	Director	February 24, 2020
<u>/s/ JOHN M. B. O'CONNOR</u> John M. B. O'Connor	Director	February 24, 2020
<u>/s/ EARL L. SHIPP</u> Earl L. Shipp	Director	February 24, 2020
<u>/s/ VINCENT J. SMITH</u> Vincent J. Smith	Director	February 24, 2020
<u>/s/ SCOTT M. SUTTON</u> Scott M. Sutton	Director	February 24, 2020

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/s/ WILLIAM H. WEIDEMAN	Director	February 24, 2020
<hr/> William H. Weideman		
/s/ CAROL A. WILLIAMS	Director	February 24, 2020
<hr/> Carol A. Williams		
/s/ TODD A. SLATER	Vice President and Chief Financial Officer (Principal Financial Officer)	February 24, 2020
<hr/> Todd A. Slater		
/s/ RANDEE N. SUMNER	Vice President and Controller (Principal Accounting Officer)	February 24, 2020
<hr/> Randee N. Sumner		

OLIN CORPORATION
DESCRIPTION OF SECURITIES

DESCRIPTION OF COMMON STOCK

The following summary description of our common stock is not complete and is qualified in its entirety by reference to the detailed provisions of our Amended and Restated Articles of Incorporation, as further amended or restated, which we refer to in this exhibit as the Articles of Incorporation, our bylaws, as amended, which we refer to in this exhibit as the Bylaws, and applicable provisions of the laws of Virginia, our state of incorporation, including without limitation the Virginia Stock Corporation Act (VSCA). These statements do not purport to be complete, or to give full effect to the terms of the provisions of statutory or common law, and are subject to, and are qualified in their entirety by reference to, the terms of the Articles of Incorporation and the Bylaws, each of which has been filed as an exhibit to (or incorporated by reference in) our Annual Report on Form 10-K filed with the Securities and Exchange Commission, and to applicable provisions of Virginia law.

General

Under the Articles of Incorporation, our authorized capital stock consists of 240,000,000 shares of common stock, par value \$1.00 per share, and 10,000,000 shares of preferred stock, par value \$1.00 per share, issuable in one or more series. While at present we have only shares of common stock issued and outstanding, our Board of Directors is authorized by the Articles of Incorporation to provide in the future for issuance of the authorized preferred stock in one or more series, with such voting powers and with such designations, preferences and relative, participating, optional or other special rights, and qualifications, limitations or restrictions thereof, as shall be established by our board of directors or by a duly authorized committee thereof at such time.

The common stock is listed on The New York Stock Exchange under the trading symbol "OLN." All outstanding shares of our common stock are validly issued, fully paid and nonassessable. The transfer agent and registrar for our common stock is EQ by Equiniti Shareowner Services.

Voting Rights and Election of Directors

Except as might otherwise be provided in any resolutions of the Board of Directors establishing the terms of a future series of preferred stock, holders of our common stock have the exclusive right to elect directors and are entitled to one vote per share on all matters submitted for action by the shareholders. Shares representing a majority of the votes entitled to be cast on any matter, represented in person or by proxy at any meeting of shareholders, constitute a quorum for the transaction of business with respect to such matter.

Holders of common stock may not cumulate votes for the election of directors. Under our Articles of Incorporation and Bylaws, the Board of Directors is divided into three classes, being as nearly equal in number as possible, with the directors in each class being elected to serve for a three-year term and until his or her successor shall have been duly elected or until such director's death, resignation or removal.

Our Bylaws provide that in an uncontested election of directors (that is, an election where the number of director nominees does not exceed the number of directors to be elected), each director nominee must receive the affirmative vote of a majority of the votes cast with respect to his or her election in order to be elected, meaning that the number of shares voted "for" a director must exceed the number of shares voted "against" that director. The Bylaws provide that in any election of directors where there are more nominees for election than the number of directors to be elected, one or more of whom are properly proposed by shareholders, director nominees shall be elected by a plurality of the votes cast.

Our Bylaws provide that any director may be removed at any time but only with cause, by the affirmative vote of the holders of a majority of the outstanding shares entitled to vote in the election of directors, taken at a special meeting the purpose of which (or one of the purposes, as stated in the meeting notice) is removal of the director. Any vacancy on our Board caused by a director's death, resignation, disqualification or removal, or an increase in the number of directors, or for any other reason, may be filled (a) by vote of the shareholders, but only at an annual meeting of shareholders, or (b) by the affirmative vote of a majority of the remaining directors, regardless of the presence of a quorum, at an regular or special meeting of the Board. A director so elected by the Board shall hold office only until the next annual election of directors, while a director so elected by shareholders shall hold office until the term of the class to which he or she has been elected expires, and in each case until his or her successor shall have been duly elected or until such director's death, resignation or removal.

Dividend and Liquidation Rights

Holders of our common stock are entitled to dividends as declared by our board of directors from time to time in the manner and upon the terms and conditions provided in Virginia law and in the Articles of Incorporation, after payment of, or provision for, full cumulative dividends on and any required redemptions of shares of any preferred stock then outstanding.

In the event of the liquidation, dissolution or winding up of our business, holders of common stock are entitled to receive pro rata all our remaining assets available for distribution, after satisfaction of the prior preferential rights of any then-outstanding preferred stock and the satisfaction of all our debts and liabilities.

Other Rights

Holders of our common stock have no preemptive or subscription rights and have no liability for further calls or assessments. Our common stock is not convertible or exchangeable into any other securities and is not subject to any redemption or sinking fund provisions.

Advance Notice for Shareholder Proposals and Nominations

Our Bylaws contain provisions requiring advance notice be delivered to the Company of any business to be brought by a shareholder before an annual meeting and providing for procedures to be followed by shareholders in nominating persons for election to our Board of Directors. For business to be brought by a shareholder before an annual meeting, or for shareholder nominations for election to the Board of Directors, a shareholder must give notice no later than 90 days prior to the anniversary of the date of the preceding year's annual meeting. In each case, the notice must contain the information required by our Bylaws, and the shareholder(s) and nominee(s) must comply with the information and other requirements required by our Bylaws.

Special Meetings of Shareholders

Our Bylaws provide that special meetings of shareholders, for any purpose or purposes, unless otherwise provided by law or the Articles of Incorporation, may be called by the Chairman of the Board of Directors, the President or the Board of Directors, or by the holders of a majority of the shares of the issued and outstanding stock entitled to vote at the meeting.

Anti-Takeover Provisions

Various provisions of the VSCA, as well as the provisions of our Articles of Incorporation and Bylaws governing the election of directors, could have the effect of delaying or discouraging some transactions involving an actual or potential change in control of our company or its management. However, Article VIII, Section 6 of our Bylaws provides that Article 14.1 - Control Share Acquisitions of the VSCA (which, in general, would limit the voting rights of holders engaging in certain acquisitions of our shares in excess of certain thresholds specified in that statute, absent the approval of our shareholders) shall not apply to acquisitions of our shares.

Amendments of Articles of Incorporation and Bylaws

In general, any amendment or restatement of the Articles of Incorporation is subject to approval by a majority of the votes entitled to be cast by each voting group of our stockholders entitled to vote thereon, unless the Board of Directors shall require a greater vote. Our Bylaws provide that they may be altered, amended or repealed, and new Bylaws adopted, by action of the Board (except as otherwise limited in the Bylaws) or by vote of our shareholders at an annual or special meeting where notice of such amendment has been duly given.

**OLIN CORPORATION AMENDED AND RESTATED
1997 STOCK PLAN FOR NON-EMPLOYEE DIRECTORS**

(Codified to reflect amendments adopted through January 1, 2020)

1. **Purpose.** The purpose of the Olin Corporation 1997 Stock Plan for Non-employee Directors (the “Plan”) is to promote the long-term growth and financial success of Olin Corporation by attracting and retaining non-employee directors of outstanding ability and by promoting a greater identity of interest between its non-employee directors and its shareholders.

2. **Definitions.** The following capitalized terms utilized herein have the following meanings:

“Board” means the Board of Directors of the Company.

“Cash Account” means an account established under the Plan for a Non-employee Director to which cash Board Chairman fees, Lead Director fees, Committee Chair fees and Cash Retainers, or other amounts under the Plan, have been or are to be credited in the form of cash.

“Cash Retainer” means with respect to a Non-employee Director the amount of the annual cash retainer payable to such Non-employee Director from time to time by the Company for service as a director. To be entitled to such amount for any Stock Grant Period, a Non-employee Director must be serving as such on the Retainer Credit Date immediately prior to the beginning of such Stock Grant Period; provided, however, that (i) in the event a person becomes in a Stock Grant Period a Non-employee Director subsequent to such Retainer Credit Date but prior to May 1, such person shall receive the full annual cash retainer on the next Credit Date; or (ii) in the event a person becomes a Non-employee Director subsequent to May 1, such Non-employee Director, on the Credit Date next following his or her becoming such, shall receive a cash retainer equal to one-twelfth of the full annual cash retainer payable to each other Non-employee Director as of the Retainer Credit Date for such Stock Grant Period, multiplied by the number of whole calendar months remaining in such Stock Grant Period following the date he or she becomes a Non-employee Director.

“Change in Control” means the occurrence of any of the following events:

(a) any person or Group acquires ownership of Olin’s stock that, together with stock held by such person or Group, constitutes more than 50% of the total fair market value or total voting power of Olin’s stock, (including an increase in the percentage of stock owned by any person or Group as a result of a transaction in which Olin acquires its stock in exchange for property, provided that the acquisition of additional stock by any person or Group deemed to own more than 50% of the total fair market value or total voting power of Olin’s stock on January 1, 2005, shall not constitute a Change in Control); or

(b) any person or Group acquires (or has acquired during the 12-month period ending on the date of the most recent acquisition by such person or Group) ownership of Olin stock possessing 30% or more of the total voting power of Olin stock; or

(c) a majority of the members of Olin’s board of directors is replaced during any 12-month period by directors whose appointment or election is not endorsed by a majority of the members of Olin’s board of directors prior to the date of the appointment or election; or

(d) any person or Group acquires (or has acquired during the 12-month period ending on the date of the most recent acquisition by such person or Group) assets from Olin that have a total Gross Fair Market Value equal to 40% or more of the total Gross Fair Market Value of all Olin assets immediately prior to such acquisition or acquisitions, provided that there is no Change in Control when Olin’s assets are transferred to:

(i) a shareholder of Olin (immediately before the asset transfer) in exchange for or with respect to Olin stock;

(ii) an entity, 50% or more of the total value or voting power of which is owned, directly or indirectly, by Olin;

(iii) a person or Group that owns, directly or indirectly, 50% or more of the total value or voting power of all outstanding Olin stock; or

(iv) an entity, at least 50% of the total value or voting power of which is owned, directly or indirectly, by a person described in paragraph (iii).

For purposes of this paragraph (d), a person's status is determined immediately after the transfer of the assets. For example, a transfer to a corporation in which Olin has no ownership interest before the transaction, but which is a majority-owned subsidiary of Olin after the transaction, is not a Change in Control.

“Code” means the Internal Revenue Code of 1986, as amended from time to time, and any applicable rules, regulations and/or other guidance thereunder. A reference to any provision of the Code shall include reference to any successor provision of the Code.

“Committee” means the Compensation Committee (or its successor) of the Board.

“Common Stock” means the Company's common stock, \$1.00 par value per share.

“Company” or “Olin” means Olin Corporation, a Virginia corporation, and any successor.

“Credit Date” means the second Thursday in February, May, August and November and one week after the regularly scheduled board meeting in December or, in the event the December board meeting extends for more than one day, one week after the first day of such regularly scheduled board meeting held in December.

“Fair Market Value” means, with respect to a date, on a per share basis, with respect to phantom shares of Common Stock, the average of the high and the low price of a share of Common Stock as reported on the consolidated tape of the New York Stock Exchange on such date or if the New York Stock Exchange is closed on such date, the next succeeding date on which it is open.

“Gross Fair Market Value” means the value of assets determined without regard to any liabilities associated with such assets.

“Group” means persons acting together for the purpose of acquiring Olin stock and includes owners of a corporation that enters into a merger, consolidation, purchase or acquisition of stock, or similar business transaction with Olin. If a person owns stock in both Olin and another corporation that enter into a merger, consolidation purchase or acquisition of stock, or similar transaction, such person is considered to be part of a Group only with respect to ownership prior to the merger or other transaction giving rise to the change and not with respect to the ownership interest in the other corporation. Persons will not be considered to be acting as a Group solely because they purchase assets of the same corporation at the same time, or as a result of the same public offering.

“Interest Rate” effective as of January 1, 2005, means the rate of interest equal to the Federal Reserve A1/P1 Composite rate for 90 day commercial paper plus 10 basis points, or such other specified, non-discretionary interest rate (or formula describing such rate) established by the Committee on a prospective basis.

“Exchange Act” means the Securities Exchange Act of 1934, as amended from time to time.

“Non-employee Director” means a member of the Board who is not an employee of the Company or any subsidiary thereof.

“Plan” means this Olin Corporation 1997 Stock Plan for Non-employee Directors as amended from time to time.

“Prior Plans” means the 1994 Plan and all of the Corporation's other directors' compensation plans, programs, or arrangements which provided for a deferred cash or stock account.

“Retainer Credit Date” means March 1 of each year or the first day in March on which the New York Stock Exchange is open for trading in such year.

“Retirement Date” means the date the Non-employee Director (i) ceases to be a member of the Board for any reason and (ii) effective as of January 1, 2005, has experienced a “separation from service” as that term is used in Code Section 409A.

“Stock Account” means an account established under the Plan for a Non-employee Director to which shares of Common Stock have been or are to be credited from time to time in the form of phantom stock.

“Stock Grant Period” means the twelve-month period commencing May 1 of a calendar year, and ending on April 30 of the immediately following calendar year.

3. **Term.** The Plan originally became effective January 1, 1997, and was last amended and restated effective as of February 26, 2016, and is now amended and restated as set forth herein. Notwithstanding the foregoing, those provisions required for compliance with Code Section 409A shall be generally effective as of January 1, 2005 or as otherwise specifically set forth herein.

4. **Administration.** Full power and authority to construe, interpret and administer the Plan shall be vested in the Committee. Decisions of the Committee shall be final, conclusive and binding upon all parties.

5. **Participation.** All Non-employee Directors shall participate in the Plan.

6. **Grants and Deferrals.**

(a) **Annual Stock Grant.** Subject to the terms and conditions of the Plan, on the Retainer Credit Date each year, each Non-employee Director shall be credited with a number of shares of Common Stock with an aggregate Fair Market Value on such Retainer Credit Date equal to \$115,000, rounded to the nearest 100 shares. To be entitled to such credit for any Stock Grant Period, a Non-employee Director must be serving as such on the Retainer Credit Date immediately prior to the beginning of such Stock Grant Period; provided, however, that (i) in the event a person becomes a Non-employee Director subsequent to the Retainer Credit Date but prior to May 1, such Non-employee Director shall receive the full Annual Stock Grant on the next Credit Date; or (ii) in the event a person becomes a Non-employee Director subsequent to May 1, such Non-employee Director, on the Credit Date next following his or her becoming such, shall be credited with that number of shares of Common Stock equal to one-twelfth of the number of shares issued to each other Non-employee Director as the Annual Stock Grant for such Stock Grant Period, multiplied by the number of whole calendar months remaining in such Stock Grant Period following the date he or she becomes a Non-employee Director (rounded up to the next whole share in the event of a fractional share). Actual receipt of shares shall be deferred and each eligible Non-employee Director shall receive a credit to his or her Stock Account for such shares on the date of such credit. A Non-employee Director may elect in accordance with Section 6(e) to defer to his or her Stock Account receipt of all or any portion of such shares after such Non-employee Director’s Retirement Date. Except with respect to any shares the director has so elected to defer, certificates representing such shares shall be delivered to the Non-employee Director (or in the event of death, to his or her beneficiary designated pursuant to Section 6(h)) on or as soon as practicable, but no later than thirty (30) days, following such Non-employee Director’s Retirement Date.

(b) **Annual Retainer Stock Grant.** Subject to the terms and conditions of the Plan, each Non-employee Director who is such on the Retainer Credit Date of that year shall receive that number of shares (rounded up to the next whole share) of Common Stock having an aggregate Fair Market Value of \$40,000 on such Retainer Credit Date. To be entitled to such credit for any Stock Grant Period, a Non-employee Director must be serving as such on the Retainer Credit Date immediately prior to the beginning of such Stock Grant Period; provided, however, that (i) in the event a person becomes in a Stock Grant Period a Non-employee Director subsequent to such Retainer Credit Date but prior to May 1, such person shall receive the full Annual Retainer Stock Grant on the next Credit Date; or (ii) in the event a person becomes a Non-employee Director subsequent to May 1, such Non-employee Director, on the Credit Date next following his or her becoming such, shall receive that number of shares of Common Stock equal to one-twelfth of the number of shares issued to each other Non-employee Director as the Annual Retainer Stock Grant for such Stock Grant Period, multiplied by the number of whole calendar months remaining in such Stock Grant Period following the date he or she becomes a Non-employee Director (rounded up to the next whole share in the event of a fractional share). A Non-employee Director may elect to defer receipt of all or any portion of such shares in accordance with Section 6(e). Except with respect to any shares the director has so elected to defer, certificates representing such shares shall be delivered to such Non-employee Director (or in the event of death, to his or her beneficiary designated pursuant to Section 6(h)) as soon as practicable, but no later than thirty (30) days, following the Retainer Credit Date (or the applicable Credit Date in the event a person becomes a Non-employee Director subsequent to the Retainer Credit Date).

(c) Payment of Chairman of the Board Fees, Lead Director Fees, Committee Chair Fees and Cash Retainer and Election to Receive Fees in Stock in Lieu of Cash. Cash payments of Committee Chair fees shall be made on the second Credit Date of each year, and cash payments of Chairman of the Board fees and Lead Director fees shall be made in four equal payments on the first four Credit Dates of each year. The Cash Retainer payable to the Non-employee Director shall be payable on the Retainer Credit Date of each year (or, in the event a person becomes a Non-employee Director subsequent to the Retainer Credit Date, the next applicable Credit Date). Except with respect to any cash payments the director has elected to defer in accordance with Section 6(e), such payment shall be delivered to the Non-employee Director on or as soon as practicable, but no later than thirty (30) days, following the applicable Credit Date (or, in the case of the Cash Retainer, the Retainer Credit Date or applicable Credit Date). Subject to the terms and conditions of the Plan, a Non-employee Director may elect to receive all or a portion of the fees as Chairman of the Board, fees as Lead Director, fees as a Committee Chair and the Cash Retainer payable in cash by the Company for his or her service as a director for the calendar year in the form of shares of Common Stock. Such election shall be made in accordance with Section 6(e). A Non-employee Director who so elects to receive all or a portion of the Cash Retainer in the form of shares for such year shall be paid on the Retainer Credit Date (or the applicable Credit Date). The number of shares (rounded up to the next whole share in the event of a fractional share) payable to a Non-employee Director who so elects to receive all or a portion of the Cash Retainer in the form of shares shall be equal to such cash amount divided by the Fair Market Value of a share of Common Stock on the Retainer Credit Date (or the applicable Credit Date) of such year. Except with respect to any shares the director has elected to defer in accordance with Section 6(e), certificates representing such shares shall be delivered to the Non-employee Director on or as soon as practicable, but no later than thirty (30) days, following the Retainer Credit Date (or the applicable Credit Date). A Non-employee Director who so elects to receive all or a portion of other fees in the form of shares for such year shall be paid on the applicable Retainer Credit Date or Credit Date on which the other fees, would have been paid. The number of shares (rounded up to the next whole share in the event of a fractional share) payable to a Non-employee Director who so elects to receive all or a portion of the Board Chairman fees, Lead Director fees or Committee Chair fees in the form of shares shall be equal to such cash amount divided by the Fair Market Value of a share of Common Stock on the relevant Credit Date. Except with respect to any shares the director has elected to defer in accordance with Section 6(e), certificates representing such shares shall be delivered to the Non-employee Director on or as soon as practicable, but no later than thirty (30) days, following the applicable Credit Date.

(d) Deferral of Chairman of the Board Fees, Lead Director Fees, Committee Chair Fees and Cash Retainer. Subject to the terms and conditions of the Plan, a Non-employee Director may elect to defer all or a portion of the shares payable under Section 6(c) and all or a portion of the fees as Chairman of the Board, fees as Lead Director, fees as a Committee Chair and Cash Retainer payable in cash by the Company for his or her service as a director for the calendar year. Such election shall be made in accordance with Section 6(e). A Non-employee Director who elects to so defer shall have any deferred shares deferred in the form of shares of Common Stock and any deferred cash fees and retainer deferred in the form of cash.

(e) Elections.

(1) Deferrals. Effective as of January 1, 2005, all elections to defer payment of compensation under this Plan shall:

- be made in writing and delivered to the Secretary of the Company,
- be irrevocable once the year to which the election relates commences,
- be made before January 1 of the year in which the shares of Common Stock or director's fees and retainer are to be earned (or, in the case of an individual who becomes a Non-employee Director during a calendar year, within 30 days of the date of his or her election as a director; notwithstanding the foregoing no amounts earned prior to an election shall be deferred by new participants), and
- specify the portions (in 25% increments) to be deferred.

(2) Stock and Cash Account Payments. Effective as of January 1, 2005, Stock and Cash Accounts shall be paid in a single lump sum payment within 30 days of the Non-employee Director's Retirement Date unless the Non-employee Director makes an election as set forth below:

- a payment election, if any, shall be made on or before the earlier of:

- the time such individual makes any deferral election under the Plan, or
 - the end of the 30 day period following the date an individual first becomes a Non-employee Director.
- a payment election may specify a payment date, provided such date is after the Non-employee Director's Retirement Date.
 - a payment election may specify the method of payment (lump sum or annual installments (up to 10)).

Notwithstanding any election, Plan payments will be made (or annual installments will begin) upon a Non-employee Director's death. All payments shall be made (or each annual installment shall be paid) within 30 days of the prescribed payment date, and any payment election shall be irrevocable except as permitted in Section 6(e)(4) below.

(3) Dividends and Interest on Stock and Cash Accounts. Dividends and interest on Stock and Cash Accounts shall be paid as provided in Section 6(e)(8) unless the Non-employee Director makes an election to have such amounts deferred and credited back to the appropriate account (and shall be payable in accordance with Sections 6(e)(2) and (4) herein), provided that such election is made within the time prescribed by Section 6(e)(2) above.

(4) Change in Payment Election. Any change with respect to a Non-employee Director's payment election under the Plan will not be effective for one year, must be made at least one (1) year in advance of the first date payment is scheduled and must further defer all payments by at least five (5) years from the prior scheduled payment date. Notwithstanding the foregoing, for the transition period beginning January 1, 2005 and ending December 31, 2008, any Non-employee Director may make a payment election in accordance with Code Section 409A (and applicable IRS transition relief), in the time and manner prescribed by the Committee and subject to the following provisions. As of December 31, 2008, any then effective transition payment elections shall be irrevocable for the duration of a Non-employee Director's participation in the Plan except as set forth in the first sentence of this Section 6(e)(4). No election made in 2008 under this transition relief will apply to amounts that would otherwise be payable in 2008, nor may such election cause an amount to be paid in 2008 that would not otherwise be payable in 2008. No election under this transition relief may be made retroactively, when Plan payments are imminent, or after a Non-employee Director has left the Board.

(5) Stock Account. A Non-employee Director who has elected to defer shares under Sections 6(b) or 6(d) shall receive a credit to his or her Stock Account (a) on the Retainer Credit Date for amounts deferred from the Annual Stock Retainer Grant or the Cash Retainer (or the applicable Credit Date in the event a person becomes a Non-employee Director subsequent to the Retainer Credit Date), and (b) on the applicable Credit Date for deferrals of other fees. The amount of such credit shall be the number of shares so deferred (rounded to the next whole share in the event of a fractional share). A Non-employee Director may elect to defer the cash dividends paid on his or her Stock Account in accordance with Section 6(e)(3).

(6) Cash Account. On the applicable Credit Date or in the case of the Cash Retainer, on the Retainer Credit Date (or applicable Credit Date), a Non-employee Director who has elected to defer cash fees and/or the Cash Retainer under Section 6(d) in the form of cash shall receive a credit to his or her Cash Account. The amount of the credit shall be the dollar amount of such Director's Board Chairman fees, Lead Director fees or Committee Chair fees earned during the immediately preceding quarterly period or the amount of the Cash Retainer to be paid for the calendar year, as the case may be, and in each case, specified for deferral in cash. A Non-employee Director may elect to defer interest paid on his or her Cash Account in accordance with Section 6(e)(3).

(7) Installment Payments. Installment payments from an Account shall be equal to the Account balance (expressed in shares in the case of the Stock Account, otherwise the cash value of the Account) at the time of the installment payment times a fraction, the numerator of which is one and the denominator of which is the number of installments not yet paid. Fractional shares to be paid in any installment shall be rounded up to the next whole share. In the event of an election under Section 6(c) for Board Chairman fees, Lead Director fees, Committee Chair fees or Cash Retainer to be paid in shares of Common Stock, the election shall specify the portion (in 25% increments) to be so paid.

(8) Dividends and Interest. Each time a cash dividend is paid on Common Stock, a Non-employee Director who has shares of such stock credited to his or her Stock Account shall be paid on the dividend payment date such cash dividend in an amount equal to the product of the number of shares credited to the Non-employee Director's Stock Account on the record date for such dividend times the dividend paid per applicable share unless the director has elected to defer such dividend to his or her Stock Account as provided herein. If the Non-employee Director has elected to defer such dividend, he or she shall receive a credit for such dividends on the dividend payment date to his or her Stock Account. The amount of the dividend credit shall be the number of shares (rounded to the nearest one-thousandth of a share) determined by multiplying the dividend amount per share by the number of shares credited to such director's Stock Account as of the record date for the dividend and dividing the product by the Fair Market Value per share of Common Stock on the dividend payment date. A Non-employee Director who has a Cash Account shall be paid interest directly on such account's balance at the end of each calendar quarter, payable at a rate equal to the Interest Rate in effect for such quarter unless such Non-employee Director has elected to defer such interest to his or her Cash Account, in which case such interest shall be credited to such Cash Account at the end of each calendar quarter. All amounts paid pursuant to this subsection (8) shall be paid on or as soon as practicable, but no later than thirty (30) days, following the applicable payment date (i.e., the applicable dividend payment date or end date of the fiscal quarter).

(9) Payouts. Cash Accounts will be paid out in cash and Stock Accounts shall be paid out in shares of Common Stock unless the Non-employee Director elects at the time the payment is due to take the Stock Account in cash.

(f) No Stock Rights. Except as expressly provided herein, the deferral of shares of Common Stock into a Stock Account shall confer no rights upon such Non-employee Director, as a shareholder of the Company or otherwise, with respect to the shares held in such Stock Account, but shall confer only the right to receive such shares credited as and when provided herein.

(g) Change in Control. Notwithstanding anything to the contrary in this Plan or any election, in the event a Change in Control occurs, amounts and shares credited to Cash Accounts (including interest accrued to the date of payout) and Stock Accounts shall be promptly (but no later than thirty (30) days following the Change in Control) distributed to Non-employee Directors except the Stock Account shall be paid out in cash and not in the form of shares of Common Stock. For this purpose, the cash value of the amount in the Stock Account shall be determined by multiplying the number of shares held in the Stock Account by the higher of (i) the highest Fair Market Value of Common Stock on any date within the period commencing thirty (30) days prior to such Change in Control and ending on the date of the Change in Control, or (ii) if the Change in Control occurs as a result of a tender or exchange offer or consummation of a corporate transaction, then the highest price paid per share of Common Stock pursuant thereto.

(h) Beneficiaries. A Non-employee Director may designate at any time and from time to time a beneficiary for his or her Stock and Cash Accounts in the event his or her Stock or Cash Account may be paid out following his or her death. Such designation shall be in writing and must be received by the Company prior to the death to be effective.

(i) Prior Plan Accounts. Any transfers made to a Cash Account or a Stock Account from Prior Plans shall be maintained and administered pursuant to the terms and conditions of this Plan; provided that prior annual 100- or 204-share grant deferrals shall be treated as deferrals of 204-share grants under this Plan, the \$25,000 annual share grant under the 1994 Plan shall be treated as deferrals under Paragraph 6(b) hereof and deferrals of meeting fees under all Prior Plans and of the excess retainer under the 1994 Plan shall be treated as deferrals under Paragraph 6(c) hereof. Prior elections and beneficiary designations under the 1994 Plan and this Plan shall govern this Plan unless changed subsequent to October 2, 1997.

7. Limitations and Conditions.

(a) Total Number of Shares. The total number of shares of Common Stock that may be issued to Non-employee Directors under the Plan is 850,000, which may be increased or decreased by the events set forth in Section 8. Such total number of shares may consist, in whole or in part, of authorized but unissued shares. If any shares granted under this Plan are not delivered to a Non-employee Director or a beneficiary because the payout of the grant is settled in cash, such shares shall not be deemed to have been delivered for purposes of determining the maximum number of shares available for delivery under the Plan. No fractional shares shall be issued hereunder. In the event a Non-employee Director is entitled to a fractional share, such share amount shall be rounded upward to the next whole share amount.

(b) No Additional Rights. Nothing contained herein shall be deemed to create a right in any Non-employee Director to remain a member of the Board, to be nominated for reelection or to be reelected as such or, after ceasing to be such a member, to receive any cash or shares of Common Stock under the Plan which are not already credited to his or her accounts.

8. Stock Adjustments. In the event of any merger, consolidation, stock or other non-cash dividend, extraordinary cash dividend, split-up, spin-off, combination or exchange of shares or recapitalization or change in capitalization, or any other similar corporate event, the Committee shall make such adjustments in (i) the aggregate number of shares of Common Stock that may be issued under the Plan as set forth in Section 7(a) and the number of shares that may be issued to a Non-employee Director with respect to any year as set forth in Section 6(a) and the number of shares of Common Stock held in a Stock Account, (ii) the class of shares that may be issued under the Plan, and (iii) the amount and type of payment that may be made in respect of unpaid dividends on shares of Common Stock whose receipt has been deferred pursuant to Section 6(e), as the Committee shall deem appropriate in the circumstances. The determination by the Committee as to the terms of any of the foregoing adjustments shall be final, conclusive and binding for all purposes of the Plan.

9. Amendment and Termination. This Plan may be amended, suspended or terminated by action of the Board, except to the extent that amendments are required to be approved by the Company's shareholders under applicable law or the rules of the New York Stock Exchange or any other exchange or market system on which the Common Stock is listed or traded. No termination of the Plan shall adversely affect the rights of any Non-employee Director with respect to any amounts otherwise payable or credited to his or her Cash Account or Stock Account.

10. Nonassignability. No right to receive any payments under the Plan or any amounts credited to a Non-employee Director's Cash or Stock Account shall be assignable or transferable by such Non-employee Director other than by will or the laws of descent and distribution or pursuant to a domestic relations order. The designation of a beneficiary under Section 6(h) by a Non-employee Director does not constitute a transfer.

11. Unsecured Obligation. Benefits payable under this Plan shall be an unsecured obligation of the Company.

12. Rule 16b-3 Compliance. It is the intention of the Company that all transactions under the Plan be exempt from liability imposed by Section 16(b) of the Exchange Act. Therefore, if any transaction under the Plan is found not to be in compliance with an exemption from such Section 16(b), the provision of the Plan governing such transaction shall be deemed amended so that the transaction does so comply and is so exempt, to the extent permitted by law and deemed advisable by the Committee, and in all events the Plan shall be construed in favor of its meeting the requirements of an exemption. Scheduled Plan payments will be delayed where the Committee reasonably anticipates that the making of the payment will violate Federal securities laws or other applicable law; provided that such payment shall be made at the earliest date at which the Committee reasonably anticipates that the making of the payment will not cause such violation.

13. Code Section 409A Compliance. To the extent any provision of the Plan or action by the Board or Committee would subject any Non-employee Director to liability for interest or additional taxes under Code Section 409A, it will be deemed null and void, to the extent permitted by law and deemed advisable by the Committee. It is intended that the Plan will comply with Code Section 409A, and the Plan shall be interpreted and construed on a basis consistent with such intent. The Plan may be amended in any respect deemed necessary (including retroactively) by the Committee in order to preserve compliance with Code Section 409A. If, regardless of the foregoing, any Non-employee Director is liable for interest or additional taxes under Code Section 409A with respect to his or her Account (or a portion thereof), such Account (or applicable portion thereof) shall be paid at such time. The preceding shall not be construed as a guarantee of any particular tax effect for any benefits or amounts deferred or paid out under the Plan.

OLIN CORPORATION
Non-Qualified Stock Option

The optionee named below is hereby granted an option to purchase the number of shares of Common Stock of Olin Corporation at the price set forth below, in accordance with and subject to the terms and restrictions of the Olin Corporation 2018 Long Term Incentive Plan (the "Plan"), and of this option:

OPTIONEE:

<u>Number of Shares for which Option is Granted</u>	<u>Option Price Per Share</u>	<u>Exercise Date</u>
	\$	
	\$	
	\$	

Date of Grant:

Date Option Expires:

This option becomes exercisable on the dates shown above for the Shares shown above, and is subject to all of the terms of the Plan.

The option price may be paid with Shares in accordance with the relevant provisions of the Plan.

This option may be exercised by you, or, if applicable, your estate, executor, administrator, personal representative, heirs, or beneficiaries by giving written notice to Olin of the intention to exercise the option, accompanied by full payment of the purchase price of the Shares with respect to which the option is exercised. Ownership of the Shares acquired upon exercise of this option shall vest when Olin's secretary or transfer agent (as the case may be) records the transfer of such Shares to you on the stock records of Olin. This option is exercisable as to full Shares only, and may not be exercised as to less than twenty-five (25) at any one time. You shall not have any of the rights of a shareholder with respect to the Shares covered by the option until Shares are issued upon the due exercise of the option.

This option shall not be transferable otherwise than by will or the laws of descent and distribution, and may be exercised during the lifetime of the optionee only by the optionee.

It is the parties' intention that all income tax liability on these options be deferred in accordance with the requirements of Section 409A of the Internal Revenue Code of 1986, as amended, for non-qualified deferred compensation plans, until the participant exercises such options. To the extent Section 409A applies to these stock options, this award and the Plan shall be deemed amended to comply to the extent permitted by law and this option and the Plan shall be construed in favor of meeting the requirements for deferral of compensation under Section 409A.

OLIN CORPORATION

By the Compensation Committee

Authorized Signature

I hereby accept the above option and agree that, during my employment, I will devote the expected time, energy and effort to the service of Olin Corporation or a subsidiary and the promotion of its interests. I further state that I am familiar with the Plan and agree to be bound by the terms and restrictions of the Plan.

Optionee

OLIN CORPORATION
2018 Long Term Incentive Plan
Restricted Stock Unit Award

Restricted Stock Unit Certificate

This certificate certifies that the employee named below has been awarded on the date hereof the number of Restricted Stock Units shown below.

Subject to the terms and conditions of the Olin Corporation 2018 Long Term Incentive Plan and related Award Description and the rules adopted by the Committee administering such Plan, this certificate will entitle the recipient following employment through the Vesting Date, to a payment of one share of Olin Common Stock for each Restricted Stock Unit awarded.

Employee:

Number of Restricted Stock Units:

Vesting Date:

OLIN CORPORATION

By the Compensation Committee

Authorized Signature

Employee Signature

Dated:

OLIN CORPORATION
Performance Share Award Certificate
Under Performance Share Program

This certifies that _____ has been awarded:

_____ TSR Performance Shares, and
_____ Net Income Performance Shares,

subject to the terms and conditions of the Olin Corporation Performance Share Program (the "Program"), a copy of which is attached. This Performance Share Award has been issued pursuant to the Olin Corporation 2018 Long Term Incentive Plan (the "Plan") and is also subject to the provisions of the Plan.

The Performance Shares vest on December 31, _____. The number of Performance Shares will be adjusted as set forth in the Program, and will be paid as soon as practicable after December 31, _____, but no later than December 31, _____.

The Performance Shares are not transferable other than by will or the laws of descent and distribution. In case of termination of employment, paragraph 4 of the Program applies.

OLIN CORPORATION
By the Compensation Committee

Authorized Signature

I hereby accept the above Performance Share Award and agree that, during my employment, I will devote the expected time, energy and effort to the service of Olin Corporation or a subsidiary and the promotion of its interests. I further state that I am familiar with the Plan and the Program and agree to be bound by the terms and restrictions of the Plan and the Program.

Participant

OLIN CORPORATION
PERFORMANCE SHARE PROGRAM
As Amended through January 24, 2019

1. *Terms and Conditions*

The terms and conditions of the Performance Share Awards granted under this Program are contained in the Performance Share Certificate evidencing such Award, this Program and the LTIP.

2. *Definitions*

“Common Stock” means the common stock of Olin, par value \$1.00 per share.

“Final Share Number” has the meaning specified in Section 3 of this Program.

“LTIP” means the Olin Corporation 2018 Long Term Incentive Plan and any successor plan.

“Net Income” means Olin’s actual net income for the relevant Performance Cycle, calculated in accordance with generally accepted accounting principles, adjusted to exclude unusual gains and losses (as determined by the Committee).

“Net Income Goal” means the Net Income target set by the Committee for the relevant three-year Performance Cycle.

“Net Income Performance Shares” means the Performance Shares awarded based on Olin’s Net Income performance against the Net Income Goal for the relevant Performance Cycle.

“Olin” means Olin Corporation.

“Performance Cycle” means, with respect to a Performance Share Award, a period of three calendar years, beginning with the calendar year in which such Performance Share Award is granted.

“Performance Share Award” means grants of “Performance Shares.”

“Performance Share” means a unit granted under the LTIP and this Program, maintained on the books of the Company during the Performance Cycle, denominated as one phantom share of Common Stock, and paid in cash or Common Stock in accordance with this Program, and includes both TSR Performance Shares and Net Income Performance Shares.

“Performance Share Comparison Group” means the Standard & Poor’s 1000 Material companies plus Occidental Petroleum Corporation and Westlake Chemical Corporation.

“Program” means this Performance Share Program.

“TSR” means total shareholder return, calculated as the change in the fair market value of the common stock, including reinvestment of dividends, over the relevant Performance Cycle.

“TSR Performance Shares” means the Performance Shares awarded based on Olin’s relative TSR compared to the Performance Share Comparison Group.

Capitalized terms not otherwise defined in this Program shall have the meaning specified in the LTIP.

3. *Performance Share Awards*

- a. One-half (1/2) of the total target Performance Share Award shall be designated in TSR Performance Shares, and the remaining one-half in Net Income Performance Shares.

- b. The number of target TSR Performance Shares for each Participant shall be adjusted based upon a comparison of Olin’s TSR during the Performance Cycle with the TSR of the Performance Share Comparison Group over the same period, in accordance with the following chart:

<i>If Olin’s TSR for a Performance Cycle is:</i>	<i>The number of TSR Performance Shares paid as a percentage of the target TSR Performance Share Award will be:</i>
At or above the 80 th Percentile of the Performance Share Comparison Group	200%
Above the 50 th Percentile, but below the 80 th Percentile of the TSR for the Performance Share Comparison Group	100% of target number of TSR Performance Shares plus 3.33% of the target number of TSR Performance Shares for each incremental percentile position above the 50 th Percentile
At the 50 th Percentile of the TSR for the Performance Share Comparison Group	100% of the target number of TSR Performance Shares
Above the 20 th Percentile, but below the 50 th Percentile of the TSR for the Performance Share Comparison Group	25% of the target number of TSR Performance Shares plus 2.5% of the target number of TSR Performance Shares for each incremental percentile position above the 20 th Percentile
At the 20 th Percentile of the TSR for the Performance Share Comparison Group	25% of the target number of TSR Performance Shares
Below the 20 th Percentile of the TSR for the Performance Share Comparison Group	0

- c. The number of target Net Income Performance Shares for each Participant shall be adjusted based upon a comparison of Olin’s actual Net Income for the relevant Performance Cycle with the target Net Income established by the Committee for such Performance Cycle, in accordance with the following chart:

<i>If Olin’s Net Income for a Performance Cycle is:</i>	<i>The number of Net Income Performance Shares paid as a percentage of the target Net Income Performance Share Award will be:</i>
At least 140% of the Net Income Goal	200%
More than 100% but less than 140% of the Net Income Goal	100% of the target number of Net Income Performance Shares plus a proportionate number of target Net Income Performance Shares determined using linear interpolation
100% of the Net Income Goal	100%
More than 60% but less than 100% of the Net Income Goal	50% of the target number of Net Income Performance Shares plus a proportionate number of target Net Income Performance Shares determined using linear interpolation
60% of the Net Income Goal	50%
Less than 60% of the Net Income Goal	0

- d. The Company shall use linear interpolation to determine the number of additional Net Income Performance Shares for performance between 60% and 100% and for 100% and 140% of the Net Income Goal. For example, if the Net Income Goal for a three-year Performance Cycle is \$300 million, and a Participant’s target number of Net Income Performance Shares is 10,000, the Participant would receive the number of Net Income Performance Shares set forth below opposite the relevant Net Income for that Performance Cycle:

Net Income	Percent of Target Net Income	Net Income Performance Shares
\$405 million	135%	18,750
\$360 million	120%	15,000
\$255 million	85%	8,125
\$210 million	70%	6,250

- e. As soon as practicable in the calendar year following the end of the Performance Cycle, the Company shall calculate the number of Performance Shares that vested (the “Final Share Number”) for all

Participants whose Performance Share Awards have vested during or at the end of such Performance Cycle.

4. *Vesting and Forfeiture*

- a. Except as otherwise provided by the Committee, the LTIP, this Program or the Performance Share Award certificate, an interest in a Performance Share Award shall vest only if the Participant is an employee of the Company or a subsidiary on the last day of the relevant Performance Cycle.
- b. If a Participant's employment with the Company or a subsidiary terminates for cause or without the Company's consent (other than as the result of the Participant's death, disability or retirement) before a Performance Share Award has vested, his or her Performance Share Award shall terminate and all rights under such Award shall be forfeited.
- c. If a Participant's employment with the Company or a subsidiary terminates as the result of his or her disability, (as that term is defined in Section 409A of the Code or any successor provision), or retirement under any of the Company's retirement plans before a Performance Share Award has vested, the Participant shall be entitled to a pro rata Performance Share Award, payable solely in cash at the time that the Performance Share Award would otherwise be payable under Section 5. The cash payment shall be equal to the Final Share Number calculated in accordance with Sections 3 and 5 of this Program, multiplied by the Fair Market Value on the last day of the relevant Performance Cycle, multiplied by a fraction with a numerator equal to the number of months during the Performance Cycle the Participant was employed by the Company or a subsidiary (rounded up to the nearest whole month) and a denominator of 36.
- d. If a Participant's employment with the Company or a subsidiary terminates as the result of his or her death before a Performance Share Award has vested, the Participant shall be entitled to a pro rata Performance Share Award, payable solely in cash within ninety (90) days of the Participant's death. The cash payment shall be equal to the Participant's target number of Performance Shares, as the case may be, multiplied by the Fair Market Value on the date of the Participant's death (or the next trading day, if the Common Stock was not traded on such date), multiplied by a fraction with a numerator equal to the number of months during the Performance Cycle the Participant was employed by the Company or a subsidiary (rounded up to the nearest whole month) and a denominator of 36.
- e. If a Participant's employment with the Company or a subsidiary terminates for any other reason, the Company shall determine the portion, if any, of the Performance Share Award that shall not be forfeited, and the form of payment (cash or shares or a combination) that the Participant shall receive. That determination shall be made by the Committee in the case of any officer, and by the Chairman of the Board, President, Chief Executive Officer, or any Vice President, in the case of any non-officer employee. Notwithstanding this Section 4, payment shall be made pursuant to Section 5.

5. *Payment and Timing*

- a. As soon as is administratively practicable after the determination of the Final Share Number, but not later than the last day of the calendar year following the Performance Cycle, the Company will (i) issue to each Participant a number of shares of the Common Stock equal to one-half of the Final Share Number, rounded down to the nearest whole share if such number is not a whole number, and (ii) pay the Participant in cash an amount equal to the Fair Market Value of one-half of the Final Share Number of shares of Common Stock on the last day of the Performance Cycle, rounded up to the nearest whole share if such number is not a whole number.
- b. No dividends or dividend equivalents shall be paid on any Performance Shares.
- c. In calculating the number of Performance Shares, all percentages and percentile numbers will be rounded to the nearest one-hundredth of a percent.

6. *Miscellaneous*

- a. By acceptance of the Performance Share Award, each Participant agrees that such Award is special compensation, and that any amount paid will not affect:
 - i. the amount of any pension under any pension or retirement plan in which he or she participates as an employee of Olin,
 - ii. the amount of coverage under any group life insurance plan in which he or she participates as an employee of Olin, or
 - iii. the benefits under any other benefit plan of any kind heretofore or hereafter in effect, under which the availability or amount of benefits is related to compensation.
- b. The Company will withhold from the distribution of any cash pursuant to Performance Share Awards the amount necessary to satisfy the Participant's federal, state and local withholding tax requirements. It is the Company's intention that all income tax liability on Performance Share Awards be deferred in accordance with the applicable requirements of Code Section 409A, until the Participant actually receives such shares or payment thereof.
- c. To the extent any provision of the Program (or any Performance Share Award) or action by the Board of Directors or Committee would subject any Participant to liability for interest or additional taxes under Code Section 409A, it will be deemed null and void, to the extent permitted by law and deemed advisable by the Committee. It is intended that the Program (and any Performance Share Award) will comply with Code Section 409A, and the Program (and any Performance Share Award) shall be interpreted and construed on a basis consistent with such intent. The Program (and any Performance Share Award) may be amended in any respect deemed necessary (including retroactively) by the Committee in order to preserve compliance with Code Section 409A. The preceding shall not be construed as a guarantee of any particular tax effect for Program benefits or Performance Share Awards. Except as specifically provided in the LTIP, a Participant (or beneficiary) is solely responsible and liable for the satisfaction of all taxes and penalties that may be imposed on the Participant (or beneficiary) in connection with any distributions to such Participant (or beneficiary) under the Program (including any taxes and penalties under Code Section 409A), and neither Olin nor any Affiliate shall have any obligation to indemnify or otherwise hold a Participant (or beneficiary) harmless from any or all of such taxes or penalties.

SUBSIDIARIES OF OLIN CORPORATION¹
(As of December 31, 2019)

Company	Shareholders/Members	% Ownership	Jurisdiction
Blue Cube Holding LLC	Blue Cube Spinco LLC	100	DE
Blue Cube Intermediate Holding 1 LLC	Blue Cube Holdings C.V.	100	DE
Blue Cube Intermediate Holding 2 LLC	Blue Cube Holdings C.V.	100	DE
Blue Cube International Holdings LLC	Blue Cube Spinco LLC	100	DE
Blue Cube IP LLC	Blue Cube Holding LLC	100	DE
Blue Cube Operations LLC	Blue Cube Holding LLC	100	DE
Blue Cube Spinco LLC	Olin	100	DE
Henderson Groundwater LLC	Pioneer Americas LLC has a 1/3 ownership in this limited liability company that will be treated as a partnership for income tax purposes	33	NV
HPCM LLC	K. A. Steel Chemicals Inc.	100	DE
Hunt Trading Co.	Olin	100	MO
Imperial West Chemical Co.	Pioneer Companies, LLC	100	NV
K. A. Steel Chemicals Inc.	Olin	100	DE
K. A. Steel International Inc.	K. A. Steel Chemicals Inc.	100	DE
KAS Muscatine LLC	K. A. Steel Chemicals Inc.	100	IA
KNA California, Inc. <i>(see footnote 2)</i>	Imperial West Chemical Co.	100	DE
KWT, Inc.	Pioneer Water Technologies, Inc.	100	DE
Monarch Brass & Copper Corp.	Olin	100	NY
Monarch Brass & Copper of New England Corp.	Monarch Brass & Copper Corp.	100	RI
New Haven Copper Company	Monarch Brass & Copper Corp.	100	CT
Olin Benefits Management, Inc.	Olin	100	CA
Olin Business Holdings	Olin; Olin Engineered Systems, Inc.; Pioneer Americas LLC	62.05 36.15 1.80	DE
Olin Chlor Alkali Logistics Inc.	Olin; Olin Sunbelt II, Inc.	50 50	DE
Olin Chlorine 7, LLC	Blue Cube Holding LLC	100	DE
Olin Engineered Systems, Inc.	Olin	100	DE
Olin Far East, Limited	Olin	100	DE
Olin Finance Company, LLC	Olin	100	DE
Olin Financial Services Inc.	Olin	100	DE
Olin Funding Company LLC	Olin	100	DE
Olin Russellville Cell Technologies LLC	Olin	100	DE
Olin North American Holdings, Inc.	Olin	100	DE
Olin Sunbelt II, Inc.	Olin	100	DE
Olin Winchester, LLC	Olin	100	DE
Pioneer Americas LLC	Olin Canada ULC	100	DE
Pioneer Companies, LLC	Olin North American Holdings, Inc.	100	DE
Pioneer (East), Inc.	Pioneer Companies, LLC	100	DE
Pioneer Licensing, Inc.	Pioneer Companies, LLC	100	DE
Pioneer Transportation LLC	Olin Business Holdings	100	DE
Pioneer Water Technologies, Inc.	Pioneer Companies, LLC	100	DE
Ravenna Arsenal, Inc.	Olin	100	OH
Sunbelt Chlor Alkali Partnership	Olin; Olin Sunbelt II, Inc.	69.3 30.7	DE
TriOlin, LLC	Olin	100	DE
Waterbury Rolling Mills, Inc.	Monarch Brass & Copper Corp.	100	CT
Winchester Ammunition, Inc.	Olin Winchester, LLC	100	DE
Winchester Defense, LLC	Olin	100	DE
INTERNATIONAL			

3229897 Nova Scotia Co.	Blue Cube Holding LLC	100	Nova Scotia, Canada
BC Switzerland GmbH	Nedastra Holding B.V.	100	Switzerland
Blue Cube Argentina Srl	Blue Cube Holding LLC	100	Argentina
Blue Cube Australia Pty Ltd	Blue Cube Chemicals Singapore Pte. Ltd.	100	Australia
Blue Cube Belgium BVBA	Nedastra Holding B.V.	100	Belgium
Blue Cube Brasil Comércio de Produtos Químicos Ltda. (See footnote 3 for Subordinates)	Nedastra Holding B.V.	100	Brazil
Blue Cube Chemicals FZE	Nedastra Holding B.V.	100	UAE
Blue Cube Chemicals Hong Kong Limited	Blue Cube Chemicals Singapore Pte. Ltd.	100	Hong Kong
Blue Cube Chemicals India Private Limited	Blue Cube Chemicals Singapore Pte. Ltd. (41,259,999 equity shares) Blue Cube Chemicals Hong Kong Limited (1 equity share)	100	India
Blue Cube Chemicals Italy S.r.l.	Nedastra Holding B.V.	100	Italy
Blue Cube Chemical Korea Ltd.	Blue Cube Chemicals (Zhangjiagang) Co., Ltd.	100	Korea
Blue Cube Chemicals Singapore Pte. Ltd.	Nedastra Holding B.V.	100	Singapore
Blue Cube Chemicals Singapore Pte. Ltd. Taiwan Branch	Blue Cube Chemicals Singapore Pte. Ltd.	100	Taiwan
Blue Cube Chemicals South Africa Pty Ltd	Nedastra Holding B.V.	100	South Africa
Blue Cube Chemicals (UK) Limited	Nedastra Holding B.V.	100	United Kingdom
Blue Cube Chemicals (Zhangjiagang) Co., Ltd.	Blue Cube Chemicals Singapore Pte. Ltd.	100	China
Blue Cube Chemicals (Zhangjiagang) Co., Ltd. Shanghai Branch	Blue Cube Chemicals (Zhangjiagang) Co., Ltd.	100	China
Blue Cube Colombia Ltda	Blue Cube Holding LLC; 1% minority interest owned by Blue Cube Operations LLC	99 01	Colombia
Blue Cube Denmark ApS	Nedastra Holding B.V.	100	Denmark
Blue Cube France	Nedastra Holding B.V.	100	France
Blue Cube Germany Assets GmbH & Co. KG	Blue Cube Germany Assets Management GmbH (General partner); Nedastra Holding B.V. (Limited partner)	0 100	Germany
Blue Cube Germany Assets Management GmbH	Nedastra Holding B.V.	100	Germany
Blue Cube Germany Productions GmbH & Co. KG	Blue Cube Germany Productions Management GmbH (General partner); Nedastra Holding B.V. (Limited partner)	0 100	Germany
Blue Cube Germany Productions Management GmbH	Nedastra Holding B.V.	100	Germany
Blue Cube Holdings C.V.	Blue Cube International Holdings LLC; Blue Cube Holding LLC	99.99 0.01	Netherlands
Blue Cube Japan LLC	Blue Cube Chemicals Singapore Pte. Ltd.	100	Japan
Blue Cube Mexico, S. de R.L. de C.V.	Blue Cube Holding LLC; 2% minority interest owned by Blue Cube Operations LLC	98 02	Mexico
Blue Cube Netherlands B.V.	Olin International Holdings Limited	100	Netherlands
Blue Cube Poland Sp.z.o.o.	Nedastra Holding B.V.	100	Poland
Blue Cube Rasha OOO	Nedastra Holding B.V.; Blue Cube Netherlands B.V.	99.995 0.005	Russia
Blue Cube Servicios Administrativos S. de R. L. de C.V.	Blue Cube Holding LLC; 10% minority interest owned by Blue Cube Operations LLC	90 10	Mexico
Blue Cube (Thailand) Company Limited	Blue Cube Holding LLC; 0.001% minority interest owned by Blue Cube Operations LLC; 0.001% minority interest owned by Blue Cube IP LLC	99.998 0.001 0.001	Thailand
Blue Cube (Thailand) Company Limited Hong Kong Branch	Blue Cube (Thailand) Company Limited	100	Hong Kong

Blue Cube Turkey Kimyasal Ürünler Limited Şirketi	Nedastra Holding B.V.	100	Turkey
CANSO Chemicals Limited	Olin Canada ULC; Northern Pulp is the other 50% owner (Pioneer related)	50 50	Nova Scotia, Canada
Olin Germany AP LTP GmbH	Blue Cube Germany Assets GmbH & Co. KG	100	Germany
Olin Germany Upstream GmbH & Co. KG	Blue Cube Germany Assets GmbH & Co. KG	100	Germany
Olin Hunt Specialty Products S.r.l.	Olin Corporation; Hunt Trading Co.	99 01	Italy
Nedastra Holding B.V.	Olin International Holdings Limited	100	Netherlands
Niloco Cyprus Limited	Olin International Holdings Limited	100	Cyprus
Nutmeg Insurance Limited	Olin	100	Bermuda
Olin International Holdings Limited	Blue Cube Intermediate Holding 2 LLC; Blue Cube Intermediate Holding 1 LLC	99.496 0.504	United Kingdom
Olin Canada ULC	Olin North American Holdings, Inc.	100	Nova Scotia, Canada
Winchester Australia Limited	Olin	100	Australia

Footnotes:

- 1 Omitted from the following list are the names of certain subsidiaries which, if considered in the aggregate as a single subsidiary, would not constitute a significant subsidiary
- 2 In California only, this entity conducts business under the name of Kemwater KNA California, Inc.
- 3 Subordinates of Blue Cube Brasil Comércio de Produtos Químicos Ltda.:
 - São Paulo Branch of Blue Cube Brasil Comércio de Produtos Químicos Ltda.
 - Bahia Branch of Blue Cube Brasil Comércio de Produtos Químicos Ltda. (Caustic Soda)
 - Paraná Branch of Blue Cube Brasil Comércio de Produtos Químicos Ltda. (Caustic Soda)

Consent of Independent Registered Public Accounting Firm

The Board of Directors

Olin Corporation:

We consent to the incorporation by reference in the registration statements No. 333-216461 on Form S-3 and Nos. 333-18619, 333-39305, 333-35818, 333-97759, 333-110135, 333-110136, 333-124483, 333-133731, 333-148918, 333-158799, 333-166288, 333-176432, 333-195500, 333-209534, 333-211434, and 333-224569 on Form S-8 of Olin Corporation of our report dated February 24, 2020, with respect to the consolidated balance sheets of Olin Corporation as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income (loss), shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements), and the effectiveness of internal control over financial reporting as of December 31, 2019, which report appears in the December 31, 2019 annual report on Form 10-K of Olin Corporation.

Our report refers to a change in the accounting method for leases due to the adoption of Accounting Standards Update 2016-02 - *Leases* and amendments thereto as of January 1, 2019.

/s/ KPMG LLP

St. Louis, Missouri

February 24, 2020

CERTIFICATIONS

I, John E. Fischer, certify that:

1. I have reviewed this annual report on Form 10-K of Olin Corporation;

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

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

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

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

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

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

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

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

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

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

Date: February 24, 2020

/s/ John E. Fischer

John E. Fischer
Chairman, President and Chief Executive Officer

CERTIFICATIONS

I, Todd A. Slater, certify that:

1. I have reviewed this annual report on Form 10-K of Olin Corporation;

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

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

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

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

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

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

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

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

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

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

Date: February 24, 2020

/s/ Todd A. Slater

Todd A. Slater
Vice President and Chief Financial Officer

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 Olin Corporation (the “Company”) on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission (the “Report”), I, John E. Fischer, Chairman, President and Chief Executive Officer and I, Todd A. Slater, Vice President and Chief Financial 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, to our knowledge: (1) the Report fully complies with the requirements of Section 13(a) of the Securities Exchange Act of 1934; and (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its Staff upon request.

/s/ John E. Fischer

John E. Fischer

Chairman, President and Chief Executive Officer

Dated: February 24, 2020

/s/ Todd A. Slater

Todd A. Slater

Vice President and Chief Financial Officer

Dated: February 24, 2020