

MUELLER INDUSTRIES INC
Form 10-K
February 27, 2019
UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF
THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 29, 2018 Commission file number 1-6770
MUELLER INDUSTRIES, INC.

(Exact name of registrant as specified in its charter)

Delaware 25-0790410
(State or other jurisdiction of incorporation or organization) (I.R.S. Employer Identification No.)

150 Schilling Boulevard, Suite 100
Collierville, Tennessee 38017
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (901) 753-3200

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

Title of each class	Name of each exchange on which registered
Common Stock, \$0.01 Par Value	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark whether 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 a 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 (Section 229.405 of this chapter) 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, or a smaller reporting 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 Act). Yes No

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold, or the average bid and asked price of such common equity, as of the last business day of the Registrant's most recently completed second fiscal quarter was \$1,675,560,572.

The number of shares of the Registrant's common stock outstanding as of February 22, 2019 was 56,624,284 excluding 23,558,720 treasury shares.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the following document are incorporated by reference into this Report: Registrant's Definitive Proxy Statement for the 2019 Annual Meeting of Stockholders, scheduled to be mailed on or about March 28, 2019 (Part III).

MUELLER INDUSTRIES, INC.

As used in this report, the terms “we,” “us,” “our,” “Company,” “Mueller,” and “Registrant” mean Mueller Industries, Inc. and consolidated subsidiaries taken as a whole, unless the context indicates otherwise.

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PART I

ITEM 1. BUSINESS

Introduction

Mueller Industries, Inc. (the Company) is a leading manufacturer of copper, brass, aluminum, and plastic products. The range of products we manufacture is broad: copper tube and fittings; line sets; brass and copper alloy rod, bar, and shapes; aluminum and brass forgings; aluminum impact extrusions; PEX plastic tube and fittings; refrigeration valves and fittings; compressed gas valves; fabricated tubular products; pressure vessels; steel nipples; and insulated flexible duct systems. We also resell brass and plastic plumbing valves, plastic fittings, malleable iron fittings, faucets, and plumbing specialty products. Our operations are located throughout the United States and in Canada, Mexico, Great Britain, South Korea, the Middle East, and China. The Company was incorporated in Delaware on October 3, 1990.

Each of our reportable segments is composed of certain operating segments that are aggregated primarily by the nature of products offered. These are the Piping Systems, Industrial Metals, and Climate segments.

Certain administrative expenses and expenses related primarily to retiree benefits at inactive operations are combined into the Corporate and Eliminations classification.

Financial information concerning segments and geographic information appears under “Note 3 – Segment Information” in the Notes to Consolidated Financial Statements, which is incorporated herein by reference.

New housing starts and commercial construction are important determinants of our sales to the heating, ventilation, and air-conditioning (HVAC), refrigeration, and plumbing markets because the principal end use of a significant portion of our products is in the construction of single and multi-family housing and commercial buildings. Repairs and remodeling projects are also important drivers of underlying demand for these products. In addition, our products are used in various transportation, automotive, and industrial applications.

Piping Systems Segment

The Piping Systems segment is composed of Domestic Piping Systems Group, Great Lakes Copper (Great Lakes), Pexcor Manufacturing Company and Heatlink Group Inc. (collectively, Heatlink Group), Die-Mold Tool Limited (Die-Mold), European Operations, Trading Group, and Jungwoo Metal Ind. Co., LTD (Jungwoo-Mueller).

The Domestic Piping Systems Group manufactures copper tube, fittings, and line sets. These products are manufactured in the U.S., sold in the U.S., and exported to markets worldwide. Our copper tube ranges in size from 1/8 inch to 8 1/8 inch diameter and is sold in various straight lengths and coils. We are a market leader in the air-conditioning and refrigeration service tube markets and we also supply a variety of water tube in straight lengths and coils used for plumbing applications in virtually every type of construction project. Our copper fittings, line sets, and related components are produced for the plumbing and heating industry to be used in water distribution systems, heating systems, air-conditioning, and refrigeration applications, and drainage, waste, and vent systems.

Great Lakes manufactures copper tube and line sets in Canada and sells the products primarily in the U.S. and Canada. Heatlink Group manufactures a complete line of products for PEX plumbing and radiant systems in Canada and sells these products in Canada and the U.S. Die-Mold manufactures PEX and other plumbing-related fittings and plastic injection tooling in Canada and sells these products in Canada and the U.S. European Operations manufactures copper

tube in the United Kingdom, which is sold throughout Europe. The Trading Group manufactures steel pipe nipples and resells brass and plastic plumbing valves, malleable iron fittings, faucets, and plumbing specialty products to plumbing wholesalers, distributors to the manufactured housing and recreational vehicle industries, and building materials retailers in North America. Jungwoo-Mueller, our South Korean joint venture, manufactures copper-based joining products that are sold worldwide.

We acquired Howell Metal Company (Howell) on October 17, 2013, Yorkshire Copper Tube (Yorkshire) on February 28, 2014, Great Lakes on July 31, 2015, a 60 percent equity interest in Jungwoo-Mueller on April 26, 2016, Heatlink Group on May 31, 2017, and Die-Mold on March 31, 2018. Howell manufactures copper tube and line sets for U.S. distribution, while Yorkshire produces European standard copper distribution tubes. These acquisitions complement our existing copper tube, line sets, copper fittings, and plastics businesses in the Piping Systems segment.

We disposed of Mueller Primaflow Limited (Primaflow), our U.K. based plumbing and heating systems import distribution business, on November 21, 2014. This business was part of European Operations in the Piping Systems segment. We also disposed of Jiangsu Mueller-Xingrong Copper Industries Limited (Mueller-Xingrong), the Company's Chinese joint venture, on June 21, 2017. This business manufactured engineered copper tube primarily for air-conditioning applications in China.

The segment sells products to wholesalers in the plumbing and refrigeration markets, distributors to the manufactured housing and recreational vehicle industries, building material retailers, and air-conditioning original equipment manufacturers (OEMs). It markets primarily through its own sales and distribution organization, which maintains sales offices and distribution centers throughout the United States and in Canada, Mexico, Europe, China, and South Korea. Additionally, products are sold and marketed through a complement of agents, which, when combined with our sales organization, provide the Company broad geographic market representation.

The total amount of order backlog for the Piping Systems segment as of December 29, 2018 was not significant.

We compete with various companies, depending on the product line. In the U.S. copper tube business, domestic competition includes Cerro Flow Products LLC, Cambridge-Lee Industries LLC (a subsidiary of Industrias Unidas S.A. de C.V.), and Wieland Copper Products LLC, as well as many actual and potential foreign competitors. In the European copper tube business, we compete with several European-based manufacturers of copper tube as well as other foreign-based manufacturers. In the Canadian copper tube business, our competitors include foreign-based manufacturers. In the copper fittings market, our domestic competitors include Elkhart Products Company (a subsidiary of Aalberts Industries N.V.) and NIBCO, Inc. We also compete with several foreign manufacturers. Additionally, our copper tube and fittings businesses compete with a large number of manufacturers of substitute products made from other metals and plastic.

Industrial Metals Segment

The Industrial Metals segment is composed of Brass Rod & Copper Bar Products, Impacts & Micro Gauge, and Brass Value-Added Products.

Brass Rod & Copper Bar Products manufactures a broad range of brass rod, copper bar, and copper alloy shapes, as well as a wide variety of end products including plumbing brass, valves, and fittings sold primarily to OEMs in the industrial, HVAC, plumbing, and refrigeration industries. We extrude brass, bronze, and copper alloy rod in sizes ranging from 3/8 inches to 4 inches in diameter. These alloys are used in applications that require a high degree of machinability, wear and corrosion resistance, as well as electrical conductivity.

Impacts & Micro Gauge manufactures cold-form aluminum and copper products for automotive, industrial, and recreational components, as well as high-volume machining of aluminum, steel, brass, and cast iron impacts and castings for automotive applications. It sells its products primarily to OEMs in the U.S., serving the automotive, military ordnance, aerospace, and general manufacturing industries. Typical applications for impacts are high strength ordnance, high-conductivity electrical components, builders' hardware, hydraulic systems, automotive parts, and other uses where toughness must be combined with varying complexities of design and finish.

Brass Value-Added Products manufactures brass and aluminum forgings; brass, aluminum, and stainless steel valves; fluid control solutions; and gas train assemblies. Our forgings are used in a wide variety of products, including automotive components, brass fittings, industrial machinery, valve bodies, gear blanks, and computer hardware. Our valves, fluid control systems, and gas train assemblies are used in the compressed gas, pharmaceutical, construction, and gas appliance markets.

On June 18, 2015, we acquired Sherwood Valve Products, LLC (Sherwood), which manufactures valves and fluid control solutions for the HVAC, refrigeration, and compressed gas markets. The acquisition of Sherwood complements our existing brass businesses in the Industrial Metals segment.

The segment sells its products primarily to domestic OEMs in the industrial, construction, HVAC, plumbing, and refrigeration markets. The total amount of order backlog for the Industrial Metals segment as of December 29, 2018 was not significant.

Competitors, primarily in the brass rod market, include Chase Brass and Copper Company LLC, a subsidiary of Global Brass and Copper Holdings, Inc., and others, both domestic and foreign.

Climate Segment

The Climate segment is composed of Refrigeration Products, Fabricated Tube Products, Westermeyer Industries, Inc. (Westermeyer), Turbotec Products, Inc. (Turbotec), and ATCO Rubber Products, Inc. (ATCO).

Refrigeration Products designs and manufactures valves, protection devices, and brass fittings for various OEMs in the commercial HVAC and refrigeration markets. Fabricated Tube Products manufactures tubular assemblies and fabrications for OEMs in the HVAC and refrigeration markets. Westermeyer designs, manufactures, and distributes high-pressure components and accessories for the air-conditioning and refrigeration markets. Turbotec manufactures coaxial heat exchangers and twisted tubes for the HVAC, geothermal, refrigeration, swimming pool heat pump, marine, ice machine, commercial boiler, and heat reclamation markets. ATCO manufactures and distributes insulated HVAC flexible duct systems.

We acquired Turbotec on March 30, 2015 and ATCO on July 2, 2018. These acquisitions complement our existing businesses in the Climate segment.

The segment sells its products primarily to OEMs in the HVAC and refrigeration markets in the U.S. The total amount of order backlog for the Climate segment as of December 29, 2018 was not significant.

Labor Relations

At December 29, 2018, the Company employed approximately 5,134 employees, of which approximately 1,883 were represented by various unions. Those union contracts will expire as follows:

Location	Expiration Date
Port Huron, Michigan (Local 218 IAM)	May 5, 2019
Wynne, Arkansas (MCTP)	June 28, 2019
Port Huron, Michigan (Local 44 UAW)	July 21, 2019
Wynne, Arkansas (B&K LLC)	June 28, 2021
North Wales, Pennsylvania	July 31, 2021
Belding, Michigan	September 17, 2021
Fulton, Mississippi	October 2, 2021
Waynesboro, Tennessee	November 3, 2021

The union agreements at the Company's U.K. and Mexico operations are renewed annually. The Company expects to renew its union contracts without material disruption to its operations.

Raw Material and Energy Availability

A substantial portion of our base metal requirements (primarily copper) is normally obtained through short-term supply contracts with competitive pricing provisions (for cathode) and the open market (for scrap). Other raw materials used in the production of brass, including brass scrap, zinc, tin, and lead are obtained from zinc and lead producers, open-market dealers, and customers with brass process scrap. Raw materials used in the fabrication of aluminum and plastic products are purchased in the open market from major producers.

Adequate supplies of raw material have historically been available to us from primary producers, metal brokers, and scrap dealers. Sufficient energy in the form of natural gas, fuel oils, and electricity is available to operate our production facilities. While temporary shortages of raw material and fuels may occur occasionally, to date they have

not materially hampered our operations.

Our copper tube facilities can accommodate both refined copper and certain grades of copper scrap as the primary feedstock. The Company has commitments from refined copper producers for a portion of its metal requirements for 2019. Adequate quantities of copper are currently available. While we will continue to react to market developments, resulting pricing volatility or supply disruptions, if any, could nonetheless adversely affect the Company.

Environmental Proceedings

Compliance with environmental laws and regulations is a matter of high priority for the Company. Mueller's provision for environmental matters related to all properties was \$2.0 million for 2018, \$7.5 million for 2017, and \$0.9 million for 2016. The reserve for environmental matters was \$23.6 million at December 29, 2018 and \$28.0 million at December 30, 2017. Environmental expenses related to non-operating properties are presented below operating income in the Consolidated Statements of Income, and costs related to operating properties are included in cost of goods sold. We currently anticipate that we will need to make expenditures of approximately \$4.8 million for compliance activities related to existing environmental matters during the next three fiscal years.

For a description of material pending environmental proceedings, see "Note 12 – Commitments and Contingencies" in the Notes to Consolidated Financial Statements, which is incorporated herein by reference.

Other Business Factors

Our business is not materially dependent on patents, trademarks, licenses, franchises, or concessions held. In addition, expenditures for Company-sponsored research and development activities were not material during 2018, 2017, or 2016. No material portion of our business involves governmental contracts.

Seasonality

Our net sales typically moderate in the fourth quarter as a result of the seasonal construction markets and customer shutdowns for holidays, year-end plant maintenance, and physical inventory counts. Also, our working capital typically increases in the first quarter in preparation for the construction season.

SEC Filings

We make available through our internet website our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange Commission (SEC). To retrieve any of this information, you may access our internet home page at www.muellerindustries.com, select Investors, and then select SEC Filings.

ITEM 1A. RISK FACTORS

The Company is exposed to risk as it operates its businesses. To provide a framework to understand our operating environment, we are providing a brief explanation of the more significant risks associated with our businesses. Although we have tried to identify and discuss key risk factors, others could emerge in the future. These risk factors should be considered carefully when evaluating the Company and its businesses.

Increases in costs and the availability of energy and raw materials used in our products could impact our cost of goods sold and our distribution expenses, which could have a material adverse impact on our operating margins.

Both the costs of raw materials used in our manufactured products (copper, brass, zinc, aluminum, and plastic resins) and energy costs (electricity, natural gas and fuel) have been volatile during the last several years, which has resulted in changes in production and distribution costs. For example, recent and pending climate change regulation and initiatives on the state, regional, federal, and international levels that have focused on reducing greenhouse gas (GHG) emissions from the energy and utility sectors may affect energy availability and costs in the near future. While we

typically attempt to pass costs through to our customers or to modify or adapt our activities to mitigate the impact of increases, we may not be able to do so successfully. Failure to fully pass increases to our customers or to modify or adapt our activities to mitigate the impact could have a material adverse impact on our operating margins. Additionally, if we are for any reason unable to obtain raw materials or energy, our ability to manufacture our products would be impacted, which could have a material adverse impact on our operating margins.

The unplanned departure of key personnel could disrupt our business.

We depend on the continued efforts of our senior management. The unplanned loss of key personnel, or the inability to hire and retain qualified executives, could negatively impact our ability to manage our business.

Economic conditions in the housing and commercial construction industries, as well as changes in interest rates, could have a material adverse impact on our business, financial condition, and results of operations.

Our business is sensitive to changes in general economic conditions, particularly in the housing and commercial construction industries. Prices for our products are affected by overall supply and demand in the market for our products and for our competitors' products. In particular, market prices of building products historically have been volatile and cyclical, and we may be unable to control the timing and extent of pricing changes for our products. Prolonged periods of weak demand or excess supply in any of our businesses could negatively affect our revenues and margins and could result in a material adverse impact on our business, financial condition, and results of operations.

The markets that we serve, including, in particular, the housing and commercial construction industries, are significantly affected by movements in interest rates and the availability of credit. Significantly higher interest rates could have a material adverse effect on our business, financial condition, and results of operations. Our businesses are also affected by a variety of other factors beyond our control, including, but not limited to, employment levels, foreign currency exchange rates, unforeseen inflationary pressures, and consumer confidence. Since we operate in a variety of geographic areas, our businesses are subject to the economic conditions in each such area. General economic downturns or localized downturns in the regions where we have operations could have a material adverse effect on our business, financial condition, and results of operations.

The impact of economic conditions on the operations or liquidity of any party with which we conduct our business, including our suppliers and customers, may adversely impact our business.

Competitive conditions, including the impact of imports and substitute products and technologies, could have a material adverse effect on the demand for our products as well as our margins and profitability.

The markets we serve are competitive across all product lines. Some consolidation of customers has occurred and may continue, which could shift buying power to customers. In some cases, customers have moved production to low-cost countries such as China, or sourced components from there, which has reduced demand in North America for some of the products we manufacture. These conditions could have a material adverse impact on our ability to maintain margins and profitability. The potential threat of imports and substitute products is based upon many factors, including raw material prices, distribution costs, foreign exchange rates, production costs, and the development of emerging technologies and applications. The end use of alternative import and/or substitute products could have a material adverse effect on our business, financial condition, and results of operations. Likewise, the development of new technologies and applications could result in lower demand for our products and have a material adverse effect on our business.

Our exposure to exchange rate fluctuations on cross border transactions and the translation of local currency results into U.S. dollars could have an adverse impact on our results of operations or financial position.

We conduct our business through subsidiaries in several different countries and export our products to many countries. Fluctuations in currency exchange rates could have a significant impact on the competitiveness of our products as well as the reported results of our operations, which are presented in U.S. dollars. A portion of our products are manufactured in or acquired from suppliers located in lower cost regions. Cross border transactions, both with external parties and intercompany relationships, result in increased exposure to foreign exchange fluctuations. The strengthening of the U.S. dollar could expose our U.S. based businesses to competitive threats from lower cost producers in other countries such as China. Lastly, our sales are translated into U.S. dollars for reporting purposes. The strengthening of the U.S. dollar could result in unfavorable translation effects when the results of

foreign operations are translated into U.S. dollars. Accordingly, significant changes in exchange rates, particularly the British pound sterling, Mexican peso, Canadian dollar, and South Korean won, could have an adverse impact on our results of operations or financial position.

The vote by the United Kingdom (U.K.) to leave the European Union (EU) and implementation of Brexit could adversely affect us.

Through a June 2016 U.K. referendum on its membership in the EU, a majority of U.K. voters voted to exit the EU (Brexit). As a result, we face risks and uncertainty regarding the form and consequences of the implementation of Brexit, including the possibility that the U.K. and the EU could fail to come to an agreement on the terms of the U.K. exit. In particular, we may be negatively impacted by increased volatility in exchange rates and interest rates and disruptions affecting our relationships with our existing and future customers, suppliers and employees. Brexit and its implementation could adversely affect European or worldwide political, regulatory, economic or market conditions and could contribute to instability in global political institutions, regulatory agencies and financial markets. Any of these effects of Brexit, and others we cannot anticipate, could adversely affect our business, results of operations and financial condition.

We are subject to claims, litigation, and regulatory proceedings that could have a material adverse effect on us.

We are, from time-to-time, involved in various claims, litigation matters, and regulatory proceedings. These matters may include contract disputes, personal injury claims, environmental claims and administrative actions, Occupational Safety and Health Administration inspections or proceedings, other tort claims, employment and tax matters and other litigation including class actions that arise in the ordinary course of our business. Although we intend to defend these matters vigorously, we cannot predict with certainty the outcome or effect of any claim or other litigation matter, and there can be no assurance as to the ultimate outcome of any litigation or regulatory proceeding. Litigation and regulatory proceedings may have a material adverse effect on us because of potential adverse outcomes, defense costs, the diversion of our management's resources, availability of insurance coverage and other factors.

A strike, other work stoppage or business interruption, or our inability to renew collective bargaining agreements on favorable terms, could impact our cost structure and our ability to operate our facilities and produce our products, which could have an adverse effect on our results of operations.

We have a number of employees who are covered by collective bargaining or similar agreements. If we are unable to negotiate acceptable new agreements with the unions representing our employees upon expiration of existing contracts, we could experience strikes or other work stoppages. Strikes or other work stoppages could cause a significant disruption of operations at our facilities, which could have an adverse impact on us. New or renewal agreements with unions representing our employees could call for higher wages or benefits paid to union members, which would increase our operating costs and could adversely affect our profitability. Higher costs and/or limitations on our ability to operate our facilities and manufacture our products resulting from increased labor costs, strikes or other work stoppages could have a material adverse effect on our results of operations.

In addition, unexpected interruptions in our operations or those of our customers or suppliers due to such causes as weather-related events or acts of God, such as earthquakes, could have an adverse effect on our results of operations. For example, the Environmental Protection Agency has found that global climate change would be expected to increase the severity and possibly the frequency of severe weather patterns such as hurricanes. Although the financial impact of such future events is not reasonably estimable at this time, should they occur, our operations in certain coastal and flood-prone areas or operations of our customers and suppliers could be adversely affected.

We are subject to environmental, health, and safety laws and regulations and future compliance may have a material adverse effect on our results of operations, financial position, or cash flows.

The nature of our operations exposes us to the risk of liabilities and claims with respect to environmental, health, and safety matters. While we have established accruals intended to cover the cost of environmental remediation at contaminated sites, the actual cost is difficult to determine and may exceed our estimated reserves. Further, changes to, or more rigorous enforcement or stringent interpretation of environmental or health and safety laws could require significant incremental costs to maintain compliance. Recent and pending climate change regulation and initiatives on the state, regional, federal, and international levels may require certain of our facilities to reduce GHG emissions. While not reasonably estimable at this time, this could require capital expenditures for environmental control facilities and/or the purchase of GHG emissions credits in the coming years. In addition, with respect to environmental matters, future claims may be asserted against us for, among other things, past acts or omissions at locations operated by predecessor entities, or alleging damage or injury or seeking other relief in connection with environmental matters associated with our operations. Future liabilities, claims, and compliance costs may have a material adverse effect on us because of potential adverse outcomes, defense costs, diversion of our resources, availability of insurance coverage, and other factors. The overall impact of these requirements on our operations

could increase our costs and diminish our ability to compete with products that are produced in countries without such rigorous standards; the long run impact could negatively impact our results and have a material adverse effect on our business.

If we do not successfully execute or effectively operate, integrate, leverage and grow acquired businesses, our financial results may suffer.

Our strategy for long-term growth, productivity and profitability depends in part on our ability to make prudent strategic acquisitions and to realize the benefits we expect when we make those acquisitions. In furtherance of this strategy, over the past several years, we have acquired businesses in Europe, Canada, South Korea, the Middle East, and the United States.

While we currently anticipate that our past and future acquisitions will enhance our value proposition to customers and improve our long-term profitability, there can be no assurance that we will realize our expectations within the time frame we have established,

if at all, or that we can continue to support the value we allocate to these acquired businesses, including their goodwill or other intangible assets.

We may be subject to risks relating to our information technology systems.

We rely on information technology systems to process, transmit and store electronic information and manage and operate our business. The incidence of cyber attacks, computer hacking, computer viruses, worms, and other disruptive software, denial of service attacks, and other malicious cyber activities are on the rise worldwide. A breach of our information technology systems or those of our commercial partners could expose us, our customers, our suppliers, and our employees to risks of misuse or improper disclosure of data, business information (including intellectual property) and other confidential information. We operate globally, and the legal rules governing data storage and transfers are often complex, unclear, and changing. A breach could also result in manipulation and destruction of data, production downtimes and operations disruptions. Any such breaches or events could expose us to legal liability and adversely affect our reputation, competitive position, business or results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Information pertaining to our major operating facilities is included below. Except as noted, we own all of the principal properties. In addition, we own and/or lease other properties used as distribution centers and corporate offices. Our plants are in satisfactory condition and are suitable for the purpose for which they were designed and are now being used.

Location of Facility	Building Space (Sq. Ft.)	Primary Use	Owned or Leased
Piping Systems Segment			
Fulton, MS	778,065	Manufacturing, Packaging, & Distribution	Owned
New Market, VA	413,120	Manufacturing & Distribution	Owned
Cedar City, UT	260,000	Manufacturing & Distribution	Owned
North Wales, PA	174,000	Manufacturing	Owned
Covington, TN	159,500	Manufacturing	Owned
Ansonia, CT	89,396	Manufacturing & Distribution	Owned
Phoenix, AZ	61,000	Manufacturing	Leased
Lawrenceville, GA	42,000	Manufacturing	Leased
Bilston, England	402,500	Manufacturing	Owned
London, Ontario, Canada	200,400	Manufacturing	Owned
Georgetown, Ontario, Canada	20,000	Manufacturing	Leased
Calgary, Alberta, Canada	21,117	Manufacturing	Leased
Calgary, Alberta, Canada	20,000	Manufacturing	Leased
Calgary, Alberta, Canada	6,600	Manufacturing	Leased
Monterrey, Mexico	152,000	Manufacturing	Leased
Yangju City, Gyeonggi Province, South Korea	343,909	Manufacturing	Owned
Industrial Metals Segment			
Port Huron, MI	450,000	Manufacturing	Owned
Belding, MI	293,068	Manufacturing	Owned
Marysville, MI	81,500	Manufacturing	Owned
Brooklyn, OH	75,000	Manufacturing	Leased
Valley View, OH	65,400	Manufacturing & Distribution	Leased
Brighton, MI	65,000	Machining	Leased
Waynesboro, TN	57,000	Manufacturing	Leased
Middletown, OH	55,000	Manufacturing	Owned
Climate Segment			
Plainville, GA	313,835	Manufacturing & Distribution	Owned
Fort Worth, TX	266,485	Manufacturing	Owned
Cartersville, GA	260,924	Manufacturing	Owned
Phoenix, AZ	250,250	Manufacturing & Distribution	Owned
Tampa, FL	202,614	Manufacturing & Distribution	Owned
Crawsfordville, IN	153,600	Manufacturing & Distribution	Owned

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Fort Worth, TX	153,374	Manufacturing	Owned
Vineland, NJ	136,000	Manufacturing & Distribution	Owned
Sacramento, CA	121,240	Manufacturing & Distribution	Owned
Bluffs, IL	107,000	Manufacturing	Owned
Fort Worth, TX	103,125	Manufacturing & Distribution	Owned
Hickory, NC	100,000	Manufacturing	Owned

Location of Facility	Building Space (Sq. Ft.)	Primary Use	Owned or Leased
Hartsville, TN	78,000	Manufacturing	Owned
Houston, TX	72,000	Manufacturing & Distribution	Owned
Carthage, TN	67,520	Manufacturing	Owned
Baltimore, MD	62,500	Manufacturing & Distribution	Owned
Springdale, AR	57,600	Manufacturing & Distribution	Owned
Gordonsville, TN	54,000	Manufacturing	Leased
Carrollton, TX	9,230	Manufacturing	Leased
Guadalupe, Mexico	130,110	Manufacturing	Leased
Xinbei District, Changzhou, China	33,940	Manufacturing	Leased

ITEM 3. LEGAL
PROCEEDINGS

The Company is involved in certain litigation as a result of claims that arose in the ordinary course of business. Additionally, we may realize the benefit of certain legal claims and litigation in the future; these gain contingencies are not recognized in the Consolidated Financial Statements.

For a description of material pending legal proceedings, see “Note 12 – Commitments and Contingencies” in the Notes to Consolidated Financial Statements, which is incorporated herein by reference.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

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

Our common stock is listed on the New York Stock Exchange (NYSE) under the symbol "MLI." As of February 22, 2019, the number of holders of record of Mueller's common stock was 707. The following table sets forth, for the periods indicated, the high and low sales prices as reported by the NYSE and the cash dividends paid per share of common stock.

	Sales Prices		Dividend
	High	Low	
2018			
Fourth quarter	\$29.27	\$21.49	\$ 0.10
Third quarter	33.89	27.92	0.10
Second quarter	31.94	25.26	0.10
First quarter	37.57	25.50	0.10
2017			
Fourth quarter	\$37.53	\$32.88	\$0.10
Third quarter	35.02	28.49	0.10
Second quarter	35.82	27.72	0.10
First quarter	43.96	(1)30.93	3.10 (2)

(1) On March 9, 2017, the Company distributed a special dividend of \$3.00 in cash and \$5.00 in principal amount of the Company's 6% Subordinated Debentures per share of outstanding common stock, which resulted in a commensurate decrease in sales price per share.

(2) Does not include the \$5.00 in principal amount of the Company's 6% Subordinated Debentures per share of outstanding common stock issued as part of our special dividend.

Payment of dividends in the future is dependent upon the Company's financial condition, cash flows, capital requirements, earnings, and other factors.

Issuer Purchases of Equity Securities

The Company's Board of Directors has extended, until August 2019, the authorization to repurchase up to 20 million shares of the Company's common stock through open market transactions or through privately negotiated transactions. The Company may cancel, suspend, or extend the time period for the purchase of shares at any time. Any repurchases will be funded primarily through existing cash and cash from operations. The Company may hold any shares repurchased in treasury or use a portion of the repurchased shares for its stock-based compensation plans, as well as for other corporate purposes. From its initial authorization in 1999 through December 29, 2018, the Company has repurchased approximately 6.1 million shares under this authorization. Below is a summary of the Company's stock repurchases for the quarter ended December 29, 2018.

	(a) Total Number of Shares Purchased	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number of Shares That May Yet Be Purchased Under the Plans or Programs (1)
September 30, 2018 – October 27, 2018	300,166	\$ 25.35	300,166	14,736,894
October 28, 2018 – November 24, 2018	—	—	—	14,736,894
November 25, 2018 – December 29, 2018	836,890	23.15	836,890	13,900,004
Total	1,137,056		1,137,056	

(1) Shares available to be purchased under the Company's 20 million share repurchase authorization until August 2019. The extension of the authorization was announced on October 24, 2018.

Company Stock Performance

The following graph compares total stockholder return since December 28, 2013 to the Dow Jones U.S. Total Return Index (Total Return Index) and the Dow Jones U.S. Building Materials & Fixtures Index (Building Materials Index). Total return values for the Total Return Index, the Building Materials Index and the Company were calculated based on cumulative total return values assuming reinvestment of (i) regular quarterly dividends paid by the Company, (ii) the cash paid by the Company in conjunction with the special dividend and (iii) the proceeds of an assumed sale at par of the Debentures paid by the Company in connection with the special dividend.

	2013	2014	2015	2016	2017	2018
Mueller Industries, Inc.	100.00	110.03	90.95	131.30	128.47	86.12
Dow Jones U.S. Total Return Index	100.00	112.95	113.66	127.59	155.01	147.30
Dow Jones U.S. Building Materials & Fixtures Index	100.00	110.56	126.45	149.78	176.52	139.86

ITEM 6. SELECTED FINANCIAL DATA

(In thousands, except per share data)	2018	2017	2016	2015	2014
For the fiscal year: ⁽¹⁾					
Net sales	\$2,507,878	\$2,266,073	\$2,055,622	\$2,100,002	\$2,364,227
Operating income ⁽²⁾	172,969	150,807	154,401	138,704	150,143
Net income attributable to Mueller Industries, Inc.	104,459	(3)85,598	(4)99,727	(5)87,864	(6)101,560 (7)
Diluted earnings per share ⁽⁸⁾	1.82	1.49	1.74	1.54	1.79
Cash dividends per share ⁽⁸⁾	0.40	3.40	0.38	0.30	0.30
At year-end:					
Total assets	1,369,549	1,320,173	1,447,476	1,338,801	1,328,096
Long-term debt	489,597	448,592	213,709	204,250	205,250

Includes activity of acquired businesses from the following purchase dates: ATCO Rubber Products, Inc., July 2, 2018; Die-Mold Tool Limited, March 31, 2018; Pexcor Manufacturing Company Inc. and Heatlink Group Inc., ⁽¹⁾ May 31, 2017; Jungwoo Metal Ind. Co., LTD, April 26, 2016; Great Lakes Copper Ltd., July 31, 2015; Sherwood Valve Products, LLC, June 18, 2015; Turbotec Products, Inc., March 30, 2015; and Yorkshire Copper Tube, February 28, 2014.

Adjusted retroactively to reflect adoption of ASU 2017-07 that occurred during 2018. The components of net ⁽²⁾ periodic benefit cost (income) other than the service cost component are included in other income (expense), net in the Consolidated Statements of Income.

⁽³⁾ Includes a pre-tax insurance recovery gain of \$3.7 million related to the losses incurred due to the 2017 fire at the brass rod mill in Port Huron, Michigan.

⁽⁴⁾ Includes interest expense of \$13.8 million on the Company's Subordinated Debentures and pre-tax environmental expense for non-operating properties of \$7.3 million.

⁽⁵⁾ Includes pre-tax impairment charges of \$6.8 million on fixed assets.

⁽⁶⁾ Includes \$15.4 million pre-tax gain from the sale of certain assets, severance charges of \$3.4 million and a permanent adjustment to a deferred tax liability of \$4.2 million.

⁽⁷⁾ Includes \$6.3 million pre-tax gain on sale of assets, reversal of valuation allowance of \$5.7 million, and \$7.3 million of pre-tax charges related to severance.

⁽⁸⁾ Adjusted retroactively to reflect the two-for-one stock split that occurred on March 14, 2014.

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

Management's discussion and analysis of financial condition and results of operations is contained under the caption "Financial Review" submitted as a separate section of this Annual Report on Form 10-K commencing on page F-2.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Quantitative and qualitative disclosures about market risk are contained under the caption "Financial Review" submitted as a separate section of this Annual Report on Form 10-K commencing on page F-2.

ITEM 8. FINANCIAL STATEMENTS AND
SUPPLEMENTARY DATA

Financial Statements required by this item are contained in a separate section of this Annual Report on Form 10-K commencing on page F-17.

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

The Company maintains disclosure controls and procedures designed to ensure information required to be disclosed in Company reports filed under the Securities Exchange Act of 1934, as amended (the Exchange Act), is recorded, processed, summarized, and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed in Company reports filed under the Exchange Act is accumulated and communicated to management, including the Company's Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

The Company's management, with the participation of the Company's Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of the Company's disclosure controls and procedures pursuant to Rule 13a-15(e) of the Exchange Act as of December 29, 2018. Based on that evaluation, the Company's Chief Executive Officer and Chief Financial Officer have concluded that the Company's disclosure controls and procedures are effective as of December 29, 2018 to ensure that information required to be disclosed in Company reports filed under the Exchange Act is (i) recorded, processed, summarized and reported within the time periods specified in the SEC rules and forms and (ii) accumulated and communicated to management, including the Company's principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Pursuant to the rules and regulations of the SEC, internal control over financial reporting is a process designed by, or under the supervision of, the Company's principal executive and principal financial officers, and effected by the Company's Board of Directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States and includes those policies and procedures that (i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the Company's assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the issuer are being made only in accordance with authorizations of the Company's management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on the financial statements. Due to inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Further, because of changes in conditions, effectiveness

of internal control over financial reporting may vary over time.

The Company acquired ATCO Rubber Products, Inc. and Die-Mold Tool Limited during 2018 and has excluded these businesses from management's assessment of internal controls. The total value of assets for these businesses at year-end represents 14 percent of the Company's consolidated total assets at December 29, 2018. Net sales and operating income from the dates of acquisition represent four percent of the consolidated net sales and operating income of the Company for 2018. Accordingly, these acquired businesses are not included in the scope of this report.

As required by Rule 13a-15(c) under the Exchange Act, the Company's management, with the participation of the Company's Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of the Company's internal control over financial reporting as of December 29, 2018 based on the control criteria established in a report entitled Internal Control—Integrated

Framework, (2013 Framework) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on such evaluation, management has concluded that our internal control over financial reporting was effective as of December 29, 2018.

Ernst & Young LLP, the independent registered public accounting firm that audited the Company's financial statements included in this Annual Report on Form 10-K, has issued an attestation report on the Company's internal control over financial reporting, which is included herein.

Changes in Internal Control Over Financial Reporting

There were no changes in the Company's internal control over financial reporting during the Company's fiscal quarter ended December 29, 2018, that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Mueller Industries, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Mueller Industries, Inc.'s internal control over financial reporting as of December 29, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Mueller Industries, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 29, 2018, based on the COSO criteria.

As indicated in the accompanying Management's Report on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of ATCO Rubber Products, Inc. and Die-Mold Tool Limited, which are included in the 2018 consolidated financial statements of the Company and constituted 14% of total assets as of December 29, 2018 and 4% of both net sales and operating income for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of ATCO Rubber Products, Inc. and Die-Mold Tool Limited.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 29, 2018 and December 30, 2017, the related consolidated statements of income, comprehensive income, changes in equity and cash flows for each of the three years in the period ended December 29, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) and our report dated February 27, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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.

Memphis, Tennessee
February 27, 2019

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ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS, AND CORPORATE GOVERNANCE

The information required by Item 10 is contained under the captions “Ownership of Common Stock by Directors and Executive Officers and Information about Director Nominees,” “Corporate Governance,” “Report of the Audit Committee of the Board of Directors,” and “Section 16(a) Beneficial Ownership Compliance Reporting” in the Company’s Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed with the SEC on or about March 28, 2019, which is incorporated herein by reference.

The Company has adopted a Code of Business Conduct and Ethics that applies to its chief executive officer, chief financial officer, and other financial executives. We have also made the Code of Business Conduct and Ethics available on the Company’s website at www.muellerindustries.com.

ITEM 11. EXECUTIVE COMPENSATION

The information required by Item 11 is contained under the caption “Compensation Discussion and Analysis,” “Summary Compensation Table for 2018,” “2018 Grants of Plan Based Awards Table,” “Outstanding Equity Awards at Fiscal 2018 Year-End,” “2018 Option Exercises and Stock Vested,” “Potential Payments Upon Termination of Employment or Change in Control as of the End of 2018,” “2018 Director Compensation,” “Report of the Compensation Committee of the Board of Directors on Executive Compensation” and “Corporate Governance” in the Company’s Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed with the SEC on or about March 28, 2019, which is incorporated herein by reference.

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

Equity Compensation Plan Information

The following table discloses information regarding the securities to be issued and the securities remaining available for issuance under the Registrant’s stock-based incentive plans as of December 29, 2018 (shares in thousands):

Plan category	(a) Number of securities to be issued upon exercise of outstanding options, warrants, and rights	(b) Weighted average price of outstanding options, warrants, and rights	(c) Number of securities remaining available for future issuance under equity compensation plans (excluding

			securities reflected in column (a))
Equity compensation plans approved by security holders	1,014	\$ 23.90	344
Equity compensation plans not approved by security holders	—	—	—
Total	1,014	\$ 23.90	344

Other information required by Item 12 is contained under the captions “Principal Stockholders” and “Ownership of Common Stock by Directors and Executive Officers and Information about Director Nominees” in the Company’s Proxy Statement for its

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2019 Annual Meeting of Stockholders to be filed with the SEC on or about March 28, 2019, which is incorporated herein by reference.

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

The information required by Item 13 is contained under the caption “Corporate Governance” in the Company’s Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed with the SEC on or about March 28, 2019, which is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by Item 14 is contained under the caption “Appointment of Independent Registered Public Accounting Firm” in the Company’s Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed with the SEC on or about March 28, 2019, which is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) The following documents are filed as part of this report:

Financial Statements: the financial statements, notes, and report of independent registered public accounting firm 1. described in Item 8 of this Annual Report on Form 10-K are contained in a separate section of this Annual Report on Form 10-K commencing on page F-1.

2. Financial Statement Schedule: the financial statement schedule described in Item 8 of this report is contained in a separate section of this Annual Report on Form 10-K commencing on page F-1.

3. Exhibits:

Certificate of Incorporation and Bylaws

3.1 Restated Certificate of Incorporation of the Registrant dated February 8, 2007 (Incorporated herein by reference to Exhibit 3.1 of the Registrant's Annual Report on Form 10-K, dated February 28, 2007, for the fiscal year ended December 30, 2006).

3.2 Amended and Restated By-laws of the Registrant, effective as of January 15, 2016 (Incorporated herein by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K, dated January 19, 2016).

Long-Term Debt Instruments

4.1 Indenture, dated March 9, 2017, among the Registrant (as issuer) and Regions Bank (as trustee) (Incorporated herein by reference to Exhibit 4.1 of the Registrant's Current Report on Form 8-K, dated March 13, 2017).

4.2 Form of 6% Subordinated Debenture due 2027 (Incorporated herein by reference to Exhibit 4.1 of the Registrant's Current Report on Form 8-K, dated March 13, 2017).

4.3 Certain instruments with respect to long-term debt of the Registrant have not been filed as Exhibits to this Report since the total amount of securities authorized under any such instruments does not exceed 10 percent of the total assets of the Registrant and its subsidiaries on a consolidated basis. The Registrant agrees to furnish a copy of each such instrument upon request of the SEC.

Consulting, Employment, and Compensatory Plan Agreements

10.1 Mueller Industries, Inc. 2002 Stock Option Plan Amended and Restated as of February 16, 2006 (Incorporated herein by reference to Exhibit 10.20 of the Registrant's Annual Report on Form 10-K, dated February 28, 2007, for the fiscal year ended December 30, 2006).

10.2 Mueller Industries, Inc. 2009 Stock Incentive Plan (Incorporated by reference from Appendix I to the Company's 2009 Definitive Proxy Statement with respect to the Company's 2009 Annual Meeting of Stockholders, as filed with the Securities and Exchange Commission on March 26, 2009).

10.3 Mueller Industries, Inc. 2014 Stock Incentive Plan (Incorporated by reference from Appendix I to the Company's 2014 Definitive Proxy Statement with respect to the Company's 2014 Annual Meeting of Stockholders, as filed with the Securities and Exchange Commission on March 19, 2014).

10.4 Amendment to the Mueller Industries, Inc. 2002 Stock Option Plan, dated July 11, 2011 (Incorporated herein by reference to Exhibit 10.16 of the Registrant's Annual Report on Form 10-K, dated February 28, 2012, for the fiscal year ended December 31, 2011).

10.5 Amendment to the Mueller Industries, Inc. 2009 Stock Incentive Plan, dated July 11, 2011 (Incorporated herein by reference to Exhibit 10.17 of the Registrant's Annual Report on Form 10-K, dated February 28, 2012, for the fiscal year ended December 31, 2011).

10.6 Mueller Industries, Inc. 2011 Annual Bonus Plan (Incorporated herein by reference to Exhibit 10.18 of the Registrant's Annual Report on Form 10-K, dated February 28, 2012, for the fiscal year ended December 31, 2011).

- 10.7 Summary description of the Registrant's 2019 incentive plan for certain key employees.
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Brian K. Barksdale
- 10.8 (Incorporated herein by reference to Exhibit 10.3 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Daniel R. Corbin
- 10.9 (Incorporated herein by reference to Exhibit 10.4 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Jeffrey A. Martin
- 10.10 (Incorporated herein by reference to Exhibit 10.5 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Mark Millerchip
- 10.11 (Incorporated herein by reference to Exhibit 10.6 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Nicholas W. Moss
- 10.12 (Incorporated herein by reference to Exhibit 10.7 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Steffen Sigloch
- 10.13 (Incorporated herein by reference to Exhibit 10.8 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Change in Control Agreement, effective January 3, 2017 by and between the Registrant and Christopher J.
- 10.14 Miritello (Incorporated herein by reference to Exhibit 10.25 of the Registrant's Annual Report on Form 10-K, dated March 1, 2017, for the fiscal year ended December 31, 2016).
Employment Agreement, dated as of March 15, 2018, by and between Mueller Industries, Inc. and Gregory L.
- 10.15 Christopher (Incorporated herein by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, dated March 19, 2018).

Financing Agreements

- Amended Credit Agreement, dated as of March 7, 2011, among the Registrant (as borrower) and Bank of America, N.A. (as agent), and certain lenders named therein, following adoption of Amendment No. 2 dated
- 10.16 December 11, 2012 (Incorporated herein by reference to Exhibit 10.20 of the Registrant's Annual Report on Form 10-K, dated February 27, 2013, for the fiscal year ended December 29, 2012).
Amendment No. 1 to Credit Agreement among the Registrant (as borrower), Bank of America, N.A. (as agent),
- 10.17 and certain lenders named therein dated August 12, 2011 (Incorporated herein by reference to Exhibit 10.1 of the Registrant's Quarterly Report on Form 10-Q, for the Quarterly period ended October 1, 2011, dated October 27, 2011).
Amendment No. 2 to Credit Agreement among the Registrant (as borrower), Bank of America, N.A. (as agent),
- 10.18 and certain lenders named therein dated December 11, 2012 (Incorporated herein by reference to Exhibit 10.22 of the Registrant's Annual Report on Form 10-K, dated February 27, 2013, for the fiscal year ended December 29, 2012).
Amendment No. 3 to Credit Agreement among the Registrant (as borrower), Bank of America, N.A. (as agent),
- 10.19 and certain lenders named therein dated July 26, 2016 (Incorporated herein by reference to Exhibit 10.1 of the Registrant's Quarterly Report on Form 10-Q, for the period ended July 2, 2016, dated July 28, 2016).
Credit Agreement, dated as of December 6, 2016 among the Registrant (as borrower), Bank of America (as
- 10.20 agent), and certain lenders named therein (Incorporated herein by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, dated December 12, 2016).

Purchase Agreements

- Stock Purchase Agreement, dated as of July 2, 2018, by and among ATCO Rubber Products, Inc., the Sellers
- 10.21 named therein, the Company, and Ramesh Bhatia (Incorporated herein by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, dated July 6, 2018).

- 10.22 Amendment No. 1 to Stock Purchase Agreement, dated as of August 24, 2018, by and among ATCO Rubber Products, Inc., the Company, the Original Sellers named therein, the Representative named therein, and the Corrected Sellers named therein (Incorporated herein by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q, for the period ended September 29, 2018, dated October 24, 2018).

Other Exhibits

- 21.0 Subsidiaries of the Registrant.
- 23.0 Consent of Independent Registered Public Accounting Firm.
- 31.1 Certification of Chief Executive Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended.
- 31.2 Certification of Chief Financial Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended.
- 32.1 Certification of Chief Executive Officer pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
- 32.2 Certification of Chief Financial Officer pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
- 101.CALXBRL Taxonomy Extension Calculation Linkbase
- 101.DEF XBRL Taxonomy Extension Definition Linkbase
- 101.INS XBRL Instance Document
- 101.LAB XBRL Taxonomy Extension Label Linkbase
- 101.PRE XBRL Presentation Linkbase Document
- 101.SCH XBRL Taxonomy Extension Schema

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, on February 27, 2019.

MUELLER INDUSTRIES, INC.

/s/ Gregory L. Christopher
 Gregory L. Christopher, Chief Executive Officer
 (Principal Executive Officer) and Chairman of the Board

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.

Signature	Title	Date
/s/ Gregory L. Christopher Gregory L. Christopher	Chief Executive Officer (Principal Executive Officer) and Chairman of the Board	February 27, 2019
/s/ Terry Hermanson Terry Hermanson	Lead Independent Director	February 27, 2019
/s/ Elizabeth Donovan Elizabeth Donovan	Director	February 27, 2019
/s/ Gary S. Gladstein Gary S. Gladstein	Director	February 27, 2019
/s/ Paul J. Flaherty Paul J. Flaherty	Director	February 27, 2019
/s/ Gennaro J. Fulvio Gennaro J. Fulvio	Director	February 27, 2019
/s/ Scott J. Goldman Scott J. Goldman	Director	February 27, 2019
/s/ John B. Hansen John B. Hansen	Director	February 27, 2019

/s/ Charles P. Herzog, Jr. Director

February 27,
2019

Charles P. Herzog, Jr.

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.

Signature and Title

Date

/s/ Jeffrey A. Martin

February 27, 2019

Jeffrey A. Martin

Chief Financial Officer and Treasurer

(Principal Financial and Accounting Officer)

/s/ Anthony J. Steinriede

February 27, 2019

Anthony J. Steinriede

Vice President – Corporate Controller

MUELLER INDUSTRIES, INC.
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FINANCIAL REVIEW

The Financial Review section of our Annual Report on Form 10-K consists of the following: Management's Discussion and Analysis of Results of Operations and Financial Condition (MD&A), the Consolidated Financial Statements, and Other Financial Information, all of which include information about our significant accounting policies, practices, and the transactions that impact our financial results. The following MD&A describes the principal factors affecting the results of operations, liquidity and capital resources, contractual cash obligations, and the critical accounting estimates of the Company. The discussion in the Financial Review section should be read in conjunction with the other sections of this Annual Report, particularly "Item 1: Business" and our other detailed discussion of risk factors included in this MD&A.

OVERVIEW

We are a leading manufacturer of copper, brass, aluminum, and plastic products. The range of products we manufacture is broad: copper tube and fittings; line sets; brass and copper alloy rod, bar, and shapes; aluminum and brass forgings; aluminum impact extrusions; PEX plastic tube and fittings; refrigeration valves and fittings; compressed gas valves; fabricated tubular products; pressure vessels; steel nipples; and insulated flexible duct systems. We also resell brass and plastic plumbing valves, plastic fittings, malleable iron fittings, faucets and plumbing specialty products. Mueller's operations are located throughout the United States and in Canada, Mexico, Great Britain, South Korea, the Middle East, and China.

Each of the reportable segments is composed of certain operating segments that are aggregated primarily by the nature of products offered as follows:

Piping Systems: The Piping Systems segment is composed of Domestic Piping Systems Group, Great Lakes Copper, Heatlink Group, Die-Mold, European Operations, Trading Group, and Jungwoo-Mueller (our South Korean joint venture). The Domestic Piping Systems Group manufactures copper tube, fittings, and line sets. These products are manufactured in the U.S., sold in the U.S., and exported to markets worldwide. Great Lakes Copper manufactures copper tube and line sets in Canada and sells the products primarily in the U.S. and Canada. Heatlink Group manufactures a complete line of products for PEX plumbing and radiant systems in Canada and sells these products in Canada and the U.S. Die-Mold manufactures PEX and other plumbing-related fittings and plastic injection tooling in Canada and sells these products in Canada and the U.S. European Operations manufacture copper tube in the United Kingdom, which is sold throughout Europe. The Trading Group manufactures pipe nipples and sources products for import distribution in North America. Jungwoo-Mueller manufactures copper-based joining products that are sold worldwide. The Piping Systems segment sells products to wholesalers in the plumbing and refrigeration markets, distributors to the manufactured housing and recreational vehicle industries, building material retailers, and air-conditioning original equipment manufacturers (OEMs).

The Company disposed of Mueller-Xingrong (the Company's Chinese joint venture) on June 21, 2017. This business manufactured engineered copper tube primarily for air-conditioning applications in China.

Industrial Metals: The Industrial Metals segment is composed of Brass Rod & Copper Bar Products, Impacts & Micro Gauge, and Brass Value-Added Products. The segment manufactures and sells brass and copper alloy rod, bar, and shapes; aluminum and brass forgings; aluminum impact extrusions; and gas valves and assemblies. The segment manufactures and sells its products primarily to domestic OEMs in the industrial, transportation, construction, heating, ventilation, and air-conditioning, plumbing, refrigeration, and energy markets.

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Climate: The Climate segment is composed of Refrigeration Products, Fabricated Tube Products, Westermeyer, Turbotec, and ATCO. The segment manufactures and sells refrigeration valves and fittings, fabricated tubular products, high pressure components, coaxial heat exchangers, and insulated HVAC flexible duct systems. The segment sells its products primarily to the heating, ventilation, air-conditioning, and refrigeration markets in the U.S.

New housing starts and commercial construction are important determinants of our sales to the heating, ventilation, and air-conditioning, refrigeration, and plumbing markets because the principal end use of a significant portion of our products is in the construction of single and multi-family housing and commercial buildings. Repairs and remodeling projects are also important drivers of underlying demand for these products. In addition, our products are used in various transportation, automotive, and industrial applications.

Residential construction activity has shown improvement in recent years, but remains at levels below long-term historical averages. Per the U.S. Census Bureau, the November 2018 seasonally adjusted annual rate of new housing starts in the U.S. was 1.26 million in 2018, which compares to 1.20 million in 2017 and 1.17 million in 2016. Mortgage rates remain at historically low levels, as

the average 30-year fixed mortgage rate was approximately 4.54 percent in 2018 and 3.99 percent in 2017. The private nonresidential construction sector, which includes offices, industrial, health care, and retail projects, has also shown improvement in recent years. Per the U.S. Census Bureau, the seasonally adjusted value of private nonresidential construction put in place was \$450.8 billion in November 2018, \$439.4 billion in 2017, and \$452.9 billion in 2016.

Profitability of certain of our product lines depends upon the “spreads” between the cost of raw material and the selling prices of our products. The open market prices for copper cathode and copper and brass scrap, for example, influence the selling price of copper tube and brass rod, two principal products manufactured by the Company. We attempt to minimize the effects on profitability from fluctuations in material costs by passing through these costs to our customers. Our earnings and cash flow are dependent upon these spreads that fluctuate based upon market conditions.

Earnings and profitability are also impacted by unit volumes that are subject to market trends, such as substitute products, imports, technologies, and market share. In our core product lines, we intensively manage our pricing structure while attempting to maximize profitability. From time-to-time, this practice results in lost sales opportunities and lower volume. For plumbing systems, plastics are the primary substitute product; these products represent an increasing share of consumption. For certain air-conditioning and refrigeration applications, aluminum based systems are the primary substitution threat. We cannot predict the acceptance or the rate of switching that may occur. U.S. consumption of copper tube and brass rod is still predominantly supplied by U.S. manufacturers. In recent years, brass rod consumption in the U.S. has declined due to the outsourcing of many manufactured products from offshore regions.

RESULTS OF OPERATIONS

Consolidated Results

The following table compares summary operating results for 2018, 2017, and 2016:

(In thousands)	2018	2017	2016	Percent Change	
				2018 vs. 2017	2017 vs. 2016
Net sales	\$2,507,878	\$2,266,073	\$2,055,622	10.7 %	10.2 %
Operating income	172,969	150,807	154,401	14.7	(2.3)
Net income	104,459	85,598	99,727	22.0	(14.2)

The following are components of changes in net sales compared to the prior year:

	2018 vs. 2017	2017 vs. 2016
Net selling price in core product lines	4.4 %	13.0 %
Unit sales volume in core product lines	3.6	(1.3)
Acquisitions and new products	4.7	1.5
Dispositions	(3.0)	(2.6)
Other	1.0	(0.4)

10.7 % 10.2 %

The increase in net sales in 2018 was primarily due to (i) higher unit sales volume of \$126.2 million in our domestic core product lines, primarily copper tube and brass rod, (ii) higher net selling prices of \$99.8 million in our core product lines, (iii) sales of \$90.0 million recorded by ATCO, acquired in July 2018, (iv) an increase in sales in our non-core product lines of \$21.2 million, (v) incremental sales of \$9.6 million of recorded by Heatlink Group, acquired in May 2017, and (vi) sales of \$6.8 million recorded by Die-Mold, acquired in March 2018. These increases were partially offset by (i) the absence of sales of \$67.3 million recorded by Mueller-Xingrong, a business we sold during June 2017, and (ii) lower unit sales volume of \$44.5 million in our non-domestic core product lines.

The increase in net sales in 2017 was primarily due to (i) higher net selling prices of \$266.9 million in our core product lines, (ii) incremental sales of \$16.4 million recorded by Jungwoo-Mueller, acquired in April 2016, and (iii) sales of \$14.4 million recorded

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by Heatlink Group. These increases were partially offset by (i) the absence of sales of \$54.2 million recorded by Mueller-Xingrong and (ii) lower unit sales volume of \$27.3 million in our core product lines.

Net selling prices generally fluctuate with changes in raw material costs. Changes in raw material costs are generally passed through to customers by adjustments to selling prices. The following graph shows the Comex average copper price per pound by quarter for the most recent three-year period:

The following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for 2018, 2017, and 2016:

(In thousands)	2018	2017	2016
Cost of goods sold	\$2,150,400	\$1,940,617	\$1,723,499
Depreciation and amortization	39,555	33,944	35,133
Selling, general, and administrative expense	148,888	140,730	135,811
Gain on sale of assets	(253)	(1,491)	—
Impairment charges	—	1,466	6,778
Insurance recovery	(3,681)	—	—
Operating expenses	\$2,334,909	\$2,115,266	\$1,901,221

	2018	2017	2016
Cost of goods sold	85.7 %	85.6 %	83.8 %
Depreciation and amortization	1.6	1.5	1.7
Selling, general, and administrative expense	5.9	6.2	6.7
Gain on sale of assets	—	(0.1)	—
Impairment charges	—	0.1	0.3
Insurance recovery	(0.1)	—	—
Operating expenses	93.1 %	93.3 %	92.5 %

The increase in cost of goods sold in 2018 was primarily due to the increase in the average cost of copper, our principal raw material, and the increase in sales volume in our domestic core product lines and related to businesses acquired. This was partially

offset by the decrease in sales volume resulting from the sale of Mueller-Xingrong and lower sales volume in our non-domestic core product lines. The increase in cost of goods sold in 2017 was primarily due to the increase in the average cost of copper, partially offset by the decrease in sales volume resulting from the sale of Mueller-Xingrong.

Depreciation and amortization increased in 2018 as a result of long-lived assets of businesses acquired as well as several new long-lived assets being placed into service, partially offset by the impact of the sale of long-lived assets at Mueller-Xingrong. Depreciation and amortization decreased in 2017 primarily due to several long-lived assets becoming fully depreciated and amortized, as well as the sale of long-lived assets at Mueller-Xingrong.

Selling, general, and administrative expenses increased in 2018, primarily due to (i) incremental expenses of \$9.8 million associated with ATCO, Heatlink Group, and Die-Mold and (ii) an increase in employment costs, including incentive compensation, of \$4.7 million. These increases were partially offset by (i) fees of \$3.5 million received for services provided under certain third-party sales and distribution arrangements, (ii) a reduction in product liability costs of \$2.1 million, and (iii) the absence of expenses associated with Mueller-Xingrong of \$1.2 million. The increase in selling, general, and administrative expenses in 2017 was primarily due to (i) incremental expenses of \$5.5 million associated with Heatlink Group and Jungwoo-Mueller, (ii) higher environmental remediation and product liability costs of \$1.0 million, and (iii) an increase in foreign currency exchange rate losses of \$0.6 million. These increases were partially offset by a reduction in employment costs of \$1.8 million, including incentive compensation of \$1.1 million.

During 2018, we recognized a gain of \$2.7 million on the sale of real property and a gain of \$0.7 million on the sale of manufacturing equipment, which were offset by a loss of \$3.1 million on the sale of a corporate aircraft. We also recognized an insurance recovery gain of \$3.7 million related to the losses incurred due to the 2017 fire at our brass rod mill in Port Huron, Michigan.

During 2017, we recognized fixed asset impairment charges for certain copper fittings manufacturing equipment of \$1.5 million and a gain of \$1.5 million on the sale of our interest in Mueller-Xingrong.

During 2016, we recognized fixed asset impairment charges for certain manufacturing equipment of \$6.8 million.

Interest expense increased in 2018 primarily as a result of interest associated with the 6% Subordinated Debentures issued during the first quarter of 2017 as part of our special dividend, as well as increased borrowing costs associated with our unsecured \$350.0 million revolving credit facility. The increase in 2017 was primarily due to interest associated with the 6% Subordinated Debentures.

Environmental expense for our non-operating properties was significantly higher in 2017 than in 2018 or 2016 primarily as a result of ongoing remediation activities related to the Lead Refinery site.

Other income, net, was significantly higher in 2018 and 2017 primarily as a result of higher net periodic benefit income for our benefit plans.

Income tax expense was \$31.0 million in 2018, representing an effective tax rate of 20.6 percent. This rate was lower than what would be computed using the U.S. statutory federal rate primarily due to (i) a reduction of the calculation of federal tax on the Company's accumulated foreign earnings under the Tax Cuts and Jobs Act (the Act) of \$4.4 million and (ii) a reduction for the impact of investments in unconsolidated affiliates of \$3.9 million. These reductions were partially offset by (i) the provision for state and local income taxes, net of the federal benefit, of \$3.5 million, (ii) an increase in valuation allowances of \$1.1 million, and (iii) other adjustments of \$3.1 million.

Income tax expense was \$37.9 million in 2017, representing an effective tax rate of 29.8 percent. This rate was lower than what would be computed using the U.S. statutory federal rate primarily due to (i) reductions for the effect of lower foreign tax rates when compared to the U.S. statutory rate and other foreign adjustments of \$6.0 million, (ii) the U.S. production activities deduction of \$1.6 million, (iii) the benefit of stock-based compensation deductions of \$2.2 million, and (iv) the impact of the change in the federal tax rate under the Act on deferred taxes of \$12.1 million. These reductions were partially offset by (i) the accrual of federal tax on the Company's accumulated foreign earnings under the Act of \$12.9 million, (ii) the provision for state and local income taxes, net of the federal benefit, of \$1.1 million, and (iii) other adjustments of \$1.2 million.

Income tax expense was \$48.1 million in 2016, representing an effective tax rate of 33.0 percent. This rate was lower than what would be computed using the U.S. statutory federal rate primarily due to (i) reductions for the effect of lower foreign tax rates when compared to the U.S. statutory rate and other foreign adjustments of \$4.1 million and (ii) the U.S. production activities deduction of \$3.1 million. These reductions were partially offset by (i) the provision for state and local income taxes, net of the federal benefit, of \$2.0 million and (ii) \$2.2 million of other adjustments.

During 2018, we recognized losses of \$12.6 million on our investments in unconsolidated affiliates, net of foreign tax, compared to losses of \$2.1 million in 2017. The loss on these investments for 2018 included net losses of \$14.0 million and charges of \$3.0 million related to certain labor claim contingencies, offset by a gain of \$7.0 million related to a settlement with the Brazilian Federal Revenue Agency for Tecumseh. It also includes net losses of \$2.6 million for Mueller Middle East. During 2017, the loss on these investments included net losses of \$2.1 million for Tecumseh. During 2016, we recognized income of \$1.9 million on these investments, which included the gain that resulted from the allocation of the purchase price recorded by our equity method investees, but was offset by restructuring and impairment charges and net losses during the year for Tecumseh.

Piping Systems Segment

The following table compares summary operating results for 2018, 2017, and 2016 for the businesses comprising our Piping Systems segment:

(In thousands)	2018	2017	2016	Percent Change	
				2018 vs. 2017	2017 vs. 2016
Net sales	\$1,645,633	\$1,564,950	\$1,429,589	5.2 %	9.5 %
Operating income	122,829	99,596	104,926	23.3	(5.1)

The following are components of changes in net sales compared to the prior year:

	2018 vs. 2017	2017 vs. 2016
Net selling price in core product lines	4.5 %	13.1 %
Unit sales volume in core product lines	3.4	(2.3)
Acquisitions	1.1	2.2
Dispositions	(4.3)	(3.8)
Other	0.5	0.3
	5.2 %	9.5 %

The increase in net sales in 2018 was primarily attributable to (i) higher unit sales volume of \$96.6 million in the segment's domestic core product lines, primarily copper tube, (ii) higher net selling prices of \$69.7 million in the segment's core product lines, (iii) an increase in sales of \$13.3 million in the segment's non-core product lines, (iv) incremental sales of \$9.6 million recorded by Heatlink Group, and (v) sales of \$6.8 million recorded by Die-Mold. These increases were partially offset by (i) the absence of sales of \$67.3 million recorded by Mueller-Xingrong and (ii) lower unit sales volume of \$44.5 million in the segment's non-domestic core product lines.

The increase in net sales in 2017 was primarily attributable to (i) higher net selling prices of \$186.5 million in the segment's core product lines, (ii) incremental sales of \$16.4 million recorded by Jungwoo-Mueller and (iii) sales of \$14.4 million recorded by Heatlink Group. These increases were partially offset by (i) the absence of sales of \$54.2 million recorded by Mueller-Xingrong and (ii) lower unit sales volume of \$33.1 million in the segment's core product

lines.

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The following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for 2018, 2017, and 2016:

(In thousands)	2018	2017	2016
Cost of goods sold	\$1,426,729	\$1,369,161	\$1,228,949
Depreciation and amortization	23,304	21,777	22,421
Selling, general, and administrative expense	74,864	74,441	67,178
Gain on sale of assets	(2,093)	(1,491)	—
Impairment charges	—	1,466	6,115
Operating expenses	\$1,522,804	\$1,465,354	\$1,324,663
	2018	2017	2016
Cost of goods sold	86.7 %	87.5 %	86.0 %
Depreciation and amortization	1.4	1.4	1.6
Selling, general, and administrative expense	4.5	4.7	4.7
Gain on sale of assets	(0.1)	(0.1)	—
Impairment charges	—	0.1	0.4
Operating expenses	92.5 %	93.6 %	92.7 %

The increase in cost of goods sold in 2018 was primarily due to the increase in the average cost of copper and the increase in sales volume in the segment's domestic core product lines and related to the acquisitions of Heatlink Group and Die-Mold, partially offset by the decrease in sales volume resulting from the sale of Mueller-Xingrong. The increase in cost of goods sold in 2017 was primarily due to the increase in the average cost of copper and the increase in sales volume related to the acquisition of Jungwoo-Mueller and Heatlink Group, partially offset by the decrease in sales volume resulting from the sale of Mueller-Xingrong and in certain other businesses.

Depreciation and amortization increased in 2018 as a result of several new long-lived assets being placed into service as well as long-lived assets of Heatlink Group and Die-Mold, partially offset by the impact of the sale of long-lived assets at Mueller-Xingrong. The decrease in 2017 was a result of the sale of long-lived assets at Mueller-Xingrong as well as several long-lived assets becoming fully depreciated and amortized, partially offset by depreciation and amortization of long-lived assets for businesses acquired.

Selling, general, and administrative expenses increased slightly for 2018, primarily due to (i) incremental expenses associated with Die-Mold and Heatlink Group of \$2.5 million, (ii) an increase in legal and professional fees of \$1.6 million, (iii) an increase in foreign currency exchange rate losses of \$0.6 million, and (iv) an increase in agent commissions of \$0.5 million. These increases were partially offset by (i) fees of \$3.5 million received for services provided under certain third-party sales and distribution arrangements and (ii) the absence of expenses associated with Mueller-Xingrong of \$1.2 million. The increase in 2017 was primarily due to (i) incremental expenses associated with Jungwoo-Mueller and Heatlink Group of \$5.5 million, (ii) an increase in employment costs of \$0.6 million, (iii) an increase in agent commissions of \$0.4 million, and (iv) an increase in foreign currency exchange rate losses of \$0.3 million.

During 2018, we recognized a gain of \$1.4 million on the sale of real property and a gain of \$0.7 million on the sale of manufacturing equipment.

During 2017, we recognized fixed asset impairment charges for certain copper fittings manufacturing equipment of \$1.5 million and a gain of \$1.5 million on the sale of our interest in Mueller-Xingrong.

During 2016, we recognized fixed asset impairment charges for certain manufacturing equipment of \$6.1 million.

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Industrial Metals Segment

The following table compares summary operating results for 2018, 2017, and 2016 for the businesses comprising our Industrial Metals segment:

(In thousands)	2018	2017	2016	Percent Change	
				2018 vs. 2017	2017 vs. 2016
Net sales	\$651,061	\$602,131	\$521,060	8.1 %	15.6 %
Operating income	75,607	74,364	77,387	1.7	(3.9)

The following are components of changes in net sales compared to the prior year:

	2018 vs. 2017	2017 vs. 2016
Net selling price in core product lines	5.2 %	15.7 %
Unit sales volume in core product lines	5.1	1.1
Other	(2.2)	(1.2)
	8.1 %	15.6 %

The increase in net sales in 2018 was primarily due to (i) higher net selling prices of \$30.0 million in the segment's core product lines, primarily brass rod, and (ii) higher unit sales volume of \$29.6 million in the segment's core product lines.

The increase in net sales during 2017 was primarily due to higher net selling prices of \$80.1 million in the segment's core product lines.

The following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for 2018, 2017, and 2016:

(In thousands)	2018	2017	2016
Cost of goods sold	\$559,367	\$506,973	\$420,905
Depreciation and amortization	7,568	7,516	8,162
Selling, general, and administrative expense	13,501	13,278	13,943
Gain on sale of assets	(1,301)	—	—
Impairment charges	—	—	663
Insurance recovery	(3,681)	—	—
Operating expenses	\$575,454	\$527,767	\$443,673

	2018	2017	2016
Cost of goods sold	85.9 %	84.2 %	80.8 %
Depreciation and amortization	1.2	1.2	1.6
Selling, general, and administrative expense	2.1	2.2	2.6
Gain on sale of assets	(0.2)	—	—
Impairment charges	—	—	0.1
Insurance recovery	(0.6)	—	—
Operating expenses	88.4 %	87.6 %	85.1 %

The increase in cost of goods sold in 2018 was primarily due to the increase in the average cost of copper and the increase in sales volume in the segment's core product lines. The increase in cost of goods sold in 2017 was primarily related to the increase in the average cost of copper.

Depreciation and amortization in 2018 was consistent with 2017. Depreciation and amortization decreased slightly in 2017 as a result of several long-lived assets becoming fully depreciated.

Selling, general, and administrative expenses increased slightly in 2018 primarily due to an increase in legal fees of \$0.2 million. The decrease in 2017 was primarily a result of a reduction in employment costs, including incentive compensation, of \$0.5 million.

During 2018, we recognized a gain of \$1.3 million on the sale of real property and an insurance recovery gain of \$3.7 million related to the losses incurred due to the 2017 fire at our brass rod mill in Port Huron, Michigan. During 2016, we recognized fixed asset impairment charges of \$0.7 million on fixed assets related to the rationalization of Sherwood.

Climate Segment

The following table compares summary operating results for 2018, 2017, and 2016 for the businesses comprising our Climate segment:

(In thousands)	2018	2017	2016	Percent Change	
				2018 vs. 2017	2017 vs. 2016
Net sales	\$229,069	\$131,448	\$119,758	74.3 %	9.8 %
Operating income	24,118	20,325	17,733	18.7	14.6

Net sales for 2018 increased primarily as a result of sales of \$90.0 million recorded by ATCO, as well as an increase in volume and improved product mix. Net sales for 2017 increased due to an increase in volume and improved product mix.

The following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for 2018, 2017, and 2016:

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(In thousands)	2018	2017	2016
Cost of goods sold	\$182,456	\$98,851	\$89,927
Depreciation and amortization	5,569	2,513	2,437
Selling, general, and administrative expense	16,926	9,759	9,661
Operating expenses	\$204,951	\$111,123	\$102,025

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	2018	2017	2016
Cost of goods sold	79.7%	75.2%	75.1%
Depreciation and amortization	2.4	1.9	2.0
Selling, general, and administrative expense	7.4	7.4	8.1
Operating expenses	89.5%	84.5%	85.2%

Cost of goods sold increased in 2018 due to the increase in volume and change in product mix within the segment primarily resulting from the ATCO acquisition. In addition, it included additional expense of \$2.2 million to adjust ATCO's inventory to fair value as part of purchase price accounting during 2018. The increase in cost of goods sold in 2017 was related to factors consistent with those noted regarding changes in net sales. Depreciation and amortization increased in 2018 primarily as a result of depreciation and amortization of the long-lived assets acquired at ATCO. Depreciation and amortization was consistent in 2017 and 2016. Selling, general, and administrative expenses increased in 2018 as a result of incremental expenses associated with ATCO. Selling, general, and administrative expenses were consistent in 2017 and 2016.

LIQUIDITY AND CAPITAL RESOURCES

The following table presents selected financial information for 2018, 2017, and 2016:

(In thousands)	2018	2017	2016
Increase (decrease) in:			
Cash, cash equivalents, and restricted cash	\$(49,425)	\$(233,906)	\$81,805
Property, plant, and equipment, net	66,312	9,090	15,007
Total debt	31,626	237,708	11,354
Working capital, net of cash and current debt	11,228	55,405	9,781
Net cash provided by operating activities	167,892	43,995	157,778
Net cash used in investing activities	(187,096)	(36,280)	(47,726)
Net cash used in financing activities	(28,269)	(244,566)	(22,561)

Cash Provided by Operating Activities

During 2018, net cash provided by operating activities was primarily attributable to (i) consolidated net income of \$106.8 million, (ii) depreciation and amortization of \$39.9 million, (iii) a decrease in inventories of \$27.5 million, (iv) a decrease in other assets of \$14.4 million, (v) losses from unconsolidated affiliates of \$12.6 million, and (vi) stock-based compensation expense of \$8.0 million. These cash increases were offset by (i) a decrease in current liabilities of \$15.7 million, (ii) a decrease in other liabilities of \$14.8 million, and (iii) an increase in accounts receivable of \$11.3 million. The decrease in inventories was primarily driven by the use of excess inventory built at the end of 2017 due to a casting outage in our brass rod mill that impaired our ability to melt scrap returns. The fluctuations in accounts receivable and current liabilities were primarily due to increased selling prices and sales volume in certain businesses and additional working capital needs in 2018. The changes in other assets and liabilities are primarily attributable to the change in estimate of the one-time transition tax liability on accumulated foreign earnings under the the Act.

During 2017, net cash provided by operating activities was primarily attributable to (i) consolidated net income of \$87.0 million, (ii) depreciation and amortization of \$34.2 million, and (iii) an increase in current liabilities of \$10.7 million. These cash increases were offset by an increase in inventories of \$86.3 million, primarily driven by the increase in the price of copper and an excess inventory build of \$38.9 million at the end of 2017 due to a casting outage in our brass rod mill that impaired our ability to melt scrap returns.

During 2016, net cash provided by operating activities was primarily attributable to consolidated net income of \$99.8 million plus the addition of non-cash charges to income.

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Cash Used in Investing Activities

The major components of net cash used in investing activities in 2018 included (i) \$167.7 million for the purchases of ATCO and Die-Mold, net of cash acquired, and (ii) capital expenditures of \$38.5 million. These uses of cash were offset by proceeds on the sale of properties of \$18.7 million.

The major components of net cash used in investing activities in 2017 included (i) capital expenditures of \$46.1 million, (ii) \$18.4 million for the purchase of Heatlink Group, net of cash acquired, and (iii) investments in our joint venture in Bahrain of \$3.3 million. These uses of cash were offset by (i) \$17.5 million of proceeds from the sale of our 50.5 percent equity interest in Mueller-Xingrong, net of cash sold, (ii) proceeds from the sale of properties of \$12.3 million, and (iii) proceeds from the sale of securities of \$1.8 million.

The major components of net cash used in investing activities in 2016 included (i) capital expenditures of \$37.5 million and (ii) \$20.5 million for the purchase of a 60.0 percent equity interest in Jungwoo-Mueller, net of cash acquired. These uses of cash were offset by \$10.3 million in proceeds from the sale of properties.

Cash Used in Financing Activities

For 2018, net cash used in investing activities consisted primarily of (i) \$165.0 million used to reduce the debt outstanding under our Credit Agreement, (ii) \$33.6 million used to repurchase common stock, (iii) \$22.7 million used for the payment of regular quarterly dividends to stockholders of the Company, and (iv) \$2.9 million used for repayment of debt by Jungwoo-Mueller. These uses of cash were offset by the issuance of debt under our Credit Agreement of \$200.0 million.

For 2017, net cash used in investing activities consisted primarily of (i) \$196.9 million used for the payment of the special dividend and the regular quarterly dividends to stockholders of the Company, (ii) \$110.0 million used to reduce the debt outstanding under our Credit Agreement, (iii) \$3.4 million used for repayment of debt by Jungwoo-Mueller and Mueller-Xingrong, and (iv) \$2.9 million used for payment of dividends to noncontrolling interests. These uses of cash were partially offset by the issuance of debt of \$70.0 million under our Credit Agreement.

For 2016, net cash used in investing activities consisted primarily of (i) \$21.2 million used for payment of regular quarterly dividends to stockholders of the Company and (ii) \$3.8 million used for payment of dividends to noncontrolling interests. This was partially offset by the issuance of debt of \$3.5 million.

Liquidity and Outlook

We believe that cash provided by operations, funds available under the Credit Agreement, and cash on hand will be adequate to meet our liquidity needs, including working capital, capital expenditures, and debt payment obligations. Our current ratio was 3.0 to 1 as of December 29, 2018.

As of December 29, 2018, \$52.1 million of our cash and cash equivalents were held by foreign subsidiaries. The undistributed earnings of most of the foreign subsidiaries are considered to be permanently reinvested. Accordingly, no additional income tax liability has been accrued with respect to these earnings. If these undistributed earnings were remitted to the U.S., we would pay additional tax of approximately \$4.0 million. No additional income taxes have been provided for any additional outside basis differences that may exist with respect to these entities, as these amounts continue to be indefinitely reinvested in foreign operations and the calculation of such taxes is not practicable.

The Act imposed a one-time transition tax based on our total post-1986 earnings and profits for which the accrual of U.S. income taxes has previously been deferred. As of December 29, 2018, our remaining transition tax liability is \$2.5 million, which will be paid in various amounts over eight years beginning in 2019.

We expect the reduction in the U.S. federal tax rate from 35 percent to 21 percent under the Act to provide ongoing benefits to liquidity. For 2019, we expect our effective tax rate on consolidated earnings to be in the range of 22 to 26 percent. We believe that cash held domestically, funds available through the Credit Agreement, and cash generated from U.S. based operations will be adequate to meet the future needs of our U.S. based operations.

Fluctuations in the cost of copper and other raw materials affect the Company's liquidity. Changes in material costs directly impact components of working capital, primarily inventories, accounts receivable, and accounts payable. The price of copper has fluctuated significantly and averaged approximately \$2.93 in 2018, \$2.80 in 2017, and \$2.20 in 2016.

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We have significant environmental remediation obligations which we expect to pay over future years. Approximately \$6.4 million was spent during 2018 for environmental matters. As of December 29, 2018, we expect to spend \$3.6 million in 2019, \$0.6 million in 2020, \$0.6 million in 2021, \$0.6 million in 2022, \$0.7 million in 2023, and \$17.5 million thereafter for ongoing projects.

Cash used to fund pension and other postretirement benefit obligations was \$1.9 million in 2018 and \$3.2 million in 2017. We anticipate making contributions of approximately \$1.2 million to these plans in 2019.

Beginning in the second quarter of 2016, the Company declared and paid a quarterly cash dividend of 10.0 cents per common share during each quarter of 2016, 2017, and 2018, and 7.5 cents per common share for the first quarter of 2016. Additionally, during the first quarter of 2017 the Company distributed a special dividend composed of \$3.00 in cash and \$5.00 in principal amount of the Company's 6% Subordinated Debentures (Debentures) due 2027 for each share of common stock outstanding. Payment of dividends in the future is dependent upon our financial condition, cash flows, capital requirements, and other factors.

Capital Expenditures

During 2018 our capital expenditures were \$38.5 million. We anticipate investing approximately \$25.0 million to \$30.0 million for capital expenditures in 2019.

Long-Term Debt

The Company's Credit Agreement provides for an unsecured \$350.0 million revolving credit facility which matures on December 6, 2021. Funds borrowed under the Credit Agreement may be used for working capital purposes and other general corporate purposes. In addition, the Credit Agreement provides a sublimit of \$50.0 million for the issuance of letters of credit, a sublimit of \$25.0 million for loans and letters of credit made in certain foreign currencies, and a swing line loan sublimit of \$15.0 million. Outstanding letters of credit and foreign currency loans reduce borrowing availability under the Credit Agreement. Total borrowings under the Credit Agreement were \$195.0 million at December 29, 2018.

The Debentures distributed as part of our special dividend are subordinated to all other funded debt of the Company and are callable, in whole or in part, at any time at the option of the Company, subject to declining call premiums during the first five years. The Debentures also grant each holder the right to require the Company to repurchase such holder's Debentures in the event of a change in control at declining repurchase premiums during the first five years. Interest is payable semiannually on September 1 and March 1. Total Debentures outstanding as of December 29, 2018 were \$284.5 million.

Jungwoo-Mueller has several secured revolving credit arrangements with a total borrowing capacity of KRW 28.8 billion (or approximately \$25.3 million). Borrowings are secured by the real property and equipment of Jungwoo-Mueller and were bearing interest at an average rate of 3.16 percent as of December 29, 2018. Total borrowings at Jungwoo-Mueller were \$10.4 million as of December 29, 2018.

As of December 29, 2018, the Company's total debt was \$496.7 million or 46.9 percent of its total capitalization.

Covenants contained in the Company's financing obligations require, among other things, the maintenance of minimum levels of tangible net worth and the satisfaction of certain minimum financial ratios. As of December 29, 2018, we were in compliance with all of our debt covenants.

Share Repurchase Program

The Company's Board of Directors has extended, until August 2019, its authorization to repurchase up to 20 million shares of the Company's common stock through open market transactions or through privately negotiated transactions. We may cancel, suspend, or extend the time period for the repurchase of shares at any time. Any repurchases will be funded primarily through existing cash and cash from operations. The Company may hold any shares repurchased in treasury or use a portion of the repurchased shares for stock-based compensation plans, as well as for other corporate purposes. From its initial authorization in 1999 through December 29, 2018, the Company had repurchased approximately 6.1 million shares under this authorization.

Subsequent to year-end and as of February 22, 2019, the Company has repurchased an additional 77 thousand shares.

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CONTRACTUAL CASH OBLIGATIONS

The following table presents payments due by the Company under contractual obligations with minimum firm commitments as of December 29, 2018:

(In millions)	Total	Payments Due by Year			
		2019	2020-2021	2022-2023	Thereafter
Total debt	\$497.6	\$7.1	\$ 202.8	\$ 1.0	\$ 286.7
Operating and capital leases	38.3	6.6	10.0	6.3	15.4
Heavy machinery and equipment commitments	1.1	1.1	—	—	—
Purchase commitments ⁽¹⁾	662.2	660.7	0.8	0.7	—
Environmental remediation at Lead Refinery Site	2.5	2.5	—	—	—
Transition tax on accumulated foreign earnings	2.5	0.1	0.2	0.2	2.0
Interest payments ⁽²⁾	156.4	24.8	42.0	34.1	55.5
Total contractual cash obligations	\$1,360.6	\$702.9	\$ 255.8	\$ 42.3	\$ 359.6

This includes contractual supply commitments totaling \$614.0 million at year-end prices; these contracts contain (1) variable pricing based on Comex and the London Metals Exchange quoted prices. These commitments are for purchases of raw materials that are expected to be consumed in the ordinary course of business.

(2) These payments represent interest on long-term debt based on rates in effect at December 29, 2018.

The above obligations will be satisfied with existing cash, funds available under the Credit Agreement, and cash generated by operations. The Company has no off-balance sheet financing arrangements except for the operating leases identified above.

MARKET RISKS

The Company is exposed to market risks from changes in raw material and energy costs, interest rates, and foreign currency exchange rates. To reduce such risks, we may periodically use financial instruments. Hedging transactions are authorized and executed pursuant to policies and procedures. Further, we do not buy or sell financial instruments for trading purposes. A discussion of the Company's accounting for derivative instruments and hedging activities is included in "Note 1 - Summary of Significant Accounting Policies" in the Notes to Consolidated Financial Statements.

Cost and Availability of Raw Materials and Energy

Raw materials, primarily copper and brass, represent the largest component of the Company's variable costs of production. The cost of these materials is subject to global market fluctuations caused by factors beyond our control. Significant increases in the cost of metal, to the extent not reflected in prices for our finished products, or the lack of availability could materially and adversely affect our business, results of operations and financial condition.

The Company occasionally enters into forward fixed-price arrangements with certain customers. We may utilize futures contracts to hedge risks associated with these forward fixed-price arrangements. We may also utilize futures contracts to manage price risk associated with inventory. Depending on the nature of the hedge, changes in the fair value of the futures contracts will either be offset against the change in fair value of the inventory through earnings or recognized as a component of accumulated other comprehensive income (AOCI) in equity and reflected in earnings upon the sale of inventory. Periodic value fluctuations of the contracts generally offset the value fluctuations of the

underlying fixed-price transactions or inventory. At December 29, 2018, we held open futures contracts to purchase approximately \$59.4 million of copper over the next 12 months related to fixed-price sales orders and to sell approximately \$3.1 million of copper over the next five months related to copper inventory.

We may enter into futures contracts or forward fixed-price arrangements with certain vendors to manage price risk associated with natural gas purchases. The effective portion of gains and losses with respect to positions are deferred in equity as a component of AOCI and reflected in earnings upon consumption of natural gas. Periodic value fluctuations of the futures contracts generally offset the value fluctuations of the underlying natural gas prices. There were no open futures contracts to purchase natural gas at December 29, 2018.

Interest Rates

The Company had variable-rate debt outstanding of \$202.6 million at December 29, 2018 and \$169.9 million at December 30, 2017. At this borrowing level, a hypothetical 10 percent increase in interest rates would have had an insignificant unfavorable impact on our pre-tax earnings and cash flows. The primary interest rate exposure on variable-rate debt is based on LIBOR.

Foreign Currency Exchange Rates

Foreign currency exposures arising from transactions include firm commitments and anticipated transactions denominated in a currency other than an entity's functional currency. The Company and its subsidiaries generally enter into transactions denominated in their respective functional currencies. We may utilize certain futures or forward contracts with financial institutions to hedge foreign currency transactional exposures. Gains and losses with respect to these positions are deferred in equity as a component of AOCI and reflected in earnings upon collection of receivables or payment of commitments. At December 29, 2018, we had open forward contracts with a financial institution to sell approximately 4.1 million euros, 27.4 million Swedish kronor, and 7.7 million Norwegian kroner through April 2019.

The Company's primary foreign currency exposure arises from foreign-denominated revenues and profits and their translation into U.S. dollars. The primary currencies to which we are exposed include the Canadian dollar, the British pound sterling, the Mexican peso, and the South Korean won. The Company generally views its investments in foreign subsidiaries with a functional currency other than the U.S. dollar as long-term. As a result, we generally do not hedge these net investments. The net investment in foreign subsidiaries translated into U.S. dollars using the year-end exchange rates was \$376.6 million at December 29, 2018 and \$360.7 million at December 30, 2017. The potential loss in value of the Company's net investment in foreign subsidiaries resulting from a hypothetical 10 percent adverse change in quoted foreign currency exchange rates at December 29, 2018 and December 30, 2017 amounted to \$37.7 million and \$36.1 million, respectively. This change would be reflected in the foreign currency translation component of AOCI in the equity section of our Consolidated Balance Sheets until the foreign subsidiaries are sold or otherwise disposed.

We have significant investments in foreign operations whose functional currency is the British pound sterling, the Mexican peso, the Canadian dollar, and the South Korean won. During 2018, the value of the British pound decreased approximately six percent, the Mexican peso remained consistent with prior year, the Canadian dollar decreased approximately eight percent, and the South Korean won decreased approximately four percent, relative to the U.S. dollar. The resulting net foreign currency translation losses were included in calculating net other comprehensive loss for the year ended December 29, 2018 and were recorded as a component of AOCI.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The Company's accounting policies are more fully described in "Note 1 - Summary of Significant Accounting Policies" in the Notes to Consolidated Financial Statements. As disclosed in Note 1, the preparation of financial statements in conformity with general accepted accounting principles in the United States requires management to make estimates and assumptions about future events that affect amounts reported in the financial statements and accompanying notes. Actual results could differ significantly from those estimates. Management believes the following discussion addresses our most critical accounting policies, which are those that are most important to the portrayal of the Company's financial condition and results of operations and require management's most difficult, subjective, and complex judgments.

Inventory Valuation Reserves

Our inventories are valued at the lower-of-cost-or-market. The market price of copper cathode and scrap are subject to volatility. During periods when open market prices decline below net realizable value, the Company may need to provide an allowance to reduce the carrying value of its inventory. In addition, certain items in inventory may be considered excess or obsolete and, as such, we may establish an allowance to reduce the carrying value of those items to their net realizable value. Changes in these estimates related to the value of inventory, if any, may result in a materially adverse impact on our reported financial position or results of operations. The Company recognizes the impact of any changes in estimates, assumptions, and judgments in income in the period in which they are determined.

As of December 29, 2018 and December 30, 2017, our inventory valuation reserves were \$7.0 million and \$6.8 million, respectively. The expense recognized in each of these periods was immaterial to our Consolidated Financial Statements.

Impairment of Goodwill

As of December 29, 2018, we had \$150.3 million of recorded goodwill from our business acquisitions, representing the excess of the purchase price over the fair value of the net assets we have acquired. During 2018 we recorded \$20.0 million in additional goodwill associated with our ATCO and Die-Mold acquisitions.

Goodwill is subject to impairment testing, which is performed annually as of the first day of the fourth quarter unless circumstances indicate the need to accelerate the timing of the tests. These circumstances include a significant change in the business climate, operating performance indicators, competition, or sale or disposition of a significant portion of one of our businesses. In our evaluation of goodwill impairment, we perform a qualitative assessment at the reporting unit level that requires management judgment and the use of estimates to determine if it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If the qualitative assessment is not conclusive, management compares the fair value of a reporting unit with its carrying amount and will recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value, not to exceed the total amount of goodwill allocated to the reporting unit.

We identify reporting units by evaluating components of our operating segments and combining those components with similar economic characteristics. Reporting units with significant recorded goodwill include Domestic Piping Systems, B&K LLC, Great Lakes, Heatlink Group, Die-Mold, European Operations, Jungwoo-Mueller, Westermeyer, Turbotec, and ATCO.

The fair value of each reporting unit is estimated using a combination of the income and market approaches, incorporating market participant considerations and management's assumptions on revenue growth rates, operating margins, discount rates and expected capital expenditures. Estimates used by management can significantly affect the outcome of the impairment test. Changes in forecasted operating results and other assumptions could materially affect these estimates.

We evaluated each reporting unit during the fourth quarters of 2018 and 2017, as applicable. The estimated fair value of each of these reporting units exceeded its carrying values in 2018 and 2017, and we do not believe that any of these reporting units were at risk of impairment as of December 29, 2018.

Environmental Reserves

We recognize an environmental reserve when it is probable that a loss is likely to occur and the amount of the loss is reasonably estimable. We estimate the duration and extent of our remediation obligations based upon reports of outside consultants, internal and third party estimates and analyses of cleanup costs and ongoing monitoring costs, communications with regulatory agencies, and changes in environmental law. If we were to determine that our estimates of the duration or extent of our environmental obligations were no longer accurate, we would adjust our environmental reserve accordingly in the period that such determination is made. Estimated future expenditures for environmental remediation are not discounted to their present value.

Environmental expenses that relate to ongoing operations are included as a component of cost of goods sold. Environmental expenses related to non-operating properties are presented below operating income in the Consolidated Statements of Income.

Income Taxes

We estimate total income tax expense based on domestic and international statutory income tax rates in the tax jurisdictions where we operate, permanent differences between financial reporting and tax reporting, and available credits and incentives.

Deferred income tax assets and liabilities are recognized for the future tax effects of temporary differences between the treatment of certain items for financial statement and tax purposes using tax rates in effect for the years in which the differences are expected to reverse. Realization of certain components of deferred tax assets is dependent upon the occurrence of future events.

Valuation allowances are recorded when, in the opinion of management, it is more likely than not that all or a portion of the deferred tax assets will not be realized. These valuation allowances can be impacted by changes in tax laws, changes to statutory tax rates, and future taxable income levels, and are based on our judgment, estimates, and assumptions. In the event we were to determine that we would not be able to realize all or a portion of the net deferred tax assets in the future, we would increase the valuation allowance through a charge to income tax expense in the period that such determination is made. Conversely, if we were to determine that we would be able to realize our deferred tax assets in the future, in excess of the net carrying amounts, we would decrease the recorded valuation allowance through a decrease to income tax expense in the period that such determination is made.

We record liabilities for known or anticipated tax issues based on our analysis of whether, and the extent to which, additional taxes will be due. These unrecognized tax benefits are retained until the associated uncertainty is resolved. Tax benefits for uncertain tax positions that are recognized in the Consolidated Financial Statements are measured as the largest amount of benefit, determined

on a cumulative probability basis, that is more likely than not to be realized upon ultimate settlement. To the extent we prevail in matters for which a liability for an uncertain tax position is established or are required to pay amounts in excess of the liability, our effective tax rate in a given period may be materially affected.

New Accounting Pronouncements

See “Note 1 – Summary of Significant Accounting Policies” in our Consolidated Financial Statements.

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING INFORMATION

This Annual Report contains various forward-looking statements and includes assumptions concerning the Company’s operations, future results, and prospects. These forward-looking statements are based on current expectations and are subject to risk and uncertainties, and may be influenced by factors that could cause actual outcomes and results to be materially different from those predicted. The forward-looking statements reflect knowledge and information available as of the date of preparation of the Annual Report, and the Company undertakes no obligation to update these forward-looking statements. We identify the forward-looking statements by using the words “anticipates,” “believes,” “expects,” “intends” or similar expressions in such statements.

In connection with the “safe harbor” provisions of the Private Securities Litigation Reform Act of 1995, the Company provides the following cautionary statement identifying important economic, political, and technological factors, among others, which could cause actual results or events to differ materially from those set forth in or implied by the forward-looking statements and related assumptions. In addition to those factors discussed under “Risk Factors” in this Annual Report on Form 10-K, such factors include: (i) the current and projected future business environment, including interest rates and capital and consumer spending; (ii) the domestic housing and commercial construction industry environment; (iii) availability and price fluctuations in commodities (including copper, natural gas, and other raw materials, including crude oil that indirectly affects plastic resins); (iv) competitive factors and competitor responses to the Company’s initiatives; (v) stability of government laws and regulations, including taxes; (vi) availability of financing; and (vii) continuation of the environment to make acquisitions, domestic and foreign, including regulatory requirements and market values of candidates.

MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF INCOME
Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands, except per share data)	2018	2017 ⁽¹⁾	2016 ⁽¹⁾
Net sales	\$2,507,878	\$2,266,073	\$2,055,622
Cost of goods sold	2,150,400	1,940,617	1,723,499
Depreciation and amortization	39,555	33,944	35,133
Selling, general, and administrative expense	148,888	140,730	135,811
Gain on sale of assets, net	(253)	(1,491)	—
Impairment charges	—	1,466	6,778
Insurance recovery	(3,681)	—	—
Operating income	172,969	150,807	154,401
Interest expense	(25,199)	(19,502)	(7,387)
Environmental expense	(1,320)	(7,284)	(1,279)
Other income, net	3,967	2,951	295
Income before income taxes	150,417	126,972	146,030
Income tax expense	(30,952)	(37,884)	(48,137)
(Loss) income from unconsolidated affiliates, net of foreign tax	(12,645)	(2,077)	1,861
Consolidated net income	106,820	87,011	99,754
Net income attributable to noncontrolling interests	(2,361)	(1,413)	(27)
Net income attributable to Mueller Industries, Inc.	\$104,459	\$85,598	\$99,727
Weighted average shares for basic earnings per share	56,782	56,925	56,572
Effect of dilutive stock-based awards	487	559	597
Adjusted weighted average shares for diluted earnings per share	57,269	57,484	57,169
Basic earnings per share	\$1.84	\$1.50	\$1.76
Diluted earnings per share	\$1.82	\$1.49	\$1.74
Dividends per share	\$0.400	\$8.400	\$0.375

See accompanying notes to consolidated financial statements.

⁽¹⁾ The Consolidated Statements of Income for prior periods have been adjusted to reflect the adoption of ASU 2017-07, Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. The components of net periodic benefit cost (income) other than the

service cost component are included in other income, net in the Consolidated Statements of Income. Refer to Note 1 for further discussion.

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MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands)	2018	2017	2016
Consolidated net income	\$ 106,820	\$ 87,011	\$ 99,754
Other comprehensive (loss) income, net of tax:			
Foreign currency translation	(16,876)	13,174	(27,767)
Net change with respect to derivative instruments and hedging activities, net of tax of \$318, \$(541), and \$(917)	(1,173)	1,147	1,709
Net change in pension and postretirement obligation adjustments, net of tax of \$670, \$(1,071), and \$(2,606)	(3,339)	2,436	5,383
Attributable to unconsolidated affiliates, net of tax of \$2,522, \$(505), and \$(3,375)	(8,686)	895	5,975
Other, net	—	(380)	159
Total other comprehensive (loss) income, net	(30,074)	17,272	(14,541)
Consolidated comprehensive income	76,746	104,283	85,213
Comprehensive (income) loss attributable to noncontrolling interests	(1,579)	(2,785)	2,548
Comprehensive income attributable to Mueller Industries, Inc. See accompanying notes to consolidated financial statements.	\$ 75,167	\$ 101,498	\$ 87,761

MUELLER INDUSTRIES, INC.

CONSOLIDATED BALANCE SHEETS

As of December 29, 2018 and December 30, 2017

(In thousands, except share data)

	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	\$72,616	\$120,269
Accounts receivable, less allowance for doubtful accounts of \$836 in 2018 and \$980 in 2017	273,417	244,795
Inventories	329,795	327,901
Other current assets	26,790	46,150
Total current assets	702,618	739,115
Property, plant, and equipment, net	370,633	304,321
Goodwill, net	150,335	130,293
Intangible assets, net	61,971	42,008
Investment in unconsolidated affiliates	58,042	76,434
Other noncurrent assets	25,950	28,002
Total Assets	\$1,369,549	\$1,320,173
Liabilities		
Current liabilities:		
Current portion of debt	\$7,101	\$16,480
Accounts payable	103,754	102,503
Accrued wages and other employee costs	38,549	33,546
Other current liabilities	83,397	89,723
Total current liabilities	232,801	242,252
Long-term debt, less current portion	489,597	448,592
Pension liabilities	14,237	11,606
Postretirement benefits other than pensions	14,818	17,107
Environmental reserves	20,009	23,699
Deferred income taxes	16,615	19,403
Other noncurrent liabilities	18,212	21,486
Total liabilities	806,289	784,145
Equity		
Mueller Industries, Inc. stockholders' equity:		
Preferred stock - \$1.00 par value; shares authorized 5,000,000; none outstanding	—	—
Common stock - \$.01 par value; shares authorized 100,000,000; issued 80,183,004; outstanding 56,702,997 in 2018 and 57,809,509 in 2017	802	802
Additional paid-in capital	276,849	274,585
Retained earnings	824,737	743,503
Accumulated other comprehensive loss	(79,792)	(51,056)

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Treasury common stock, at cost	(474,240)	(445,723)
Total Mueller Industries, Inc. stockholders' equity	548,356	522,111
Noncontrolling interests	14,904	13,917
Total equity	563,260	536,028
Commitments and contingencies	—	—
Total Liabilities and Equity	\$1,369,549	\$1,320,173
See accompanying notes to consolidated financial statements.		

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MUELLER INDUSTRIES, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands)

	2018	2017 ⁽¹⁾	2016 ⁽¹⁾
Operating activities:			
Consolidated net income	\$ 106,820	\$ 87,011	\$ 99,754
Reconciliation of consolidated net income to net cash provided by operating activities:			
Depreciation	35,118	30,800	30,827
Amortization of intangibles	4,437	3,144	4,306
Amortization of debt issuance costs	318	303	569
Loss (income) from unconsolidated affiliates	12,645	2,077	(1,861)
Insurance proceeds - noncapital related	2,306	500	—
Insurance recovery	(3,681)	—	—
Stock-based compensation expense	8,035	7,450	6,387
Gain on sale of business	—	(1,491)	—
Gain on disposals of assets	(253)	(624)	(651)
Impairment charges	—	1,466	6,778
Deferred income tax expense (benefit)	170	(3,160)	6,998
Recovery of doubtful accounts receivable	—	—	(50)
Changes in assets and liabilities, net of effects of businesses acquired and sold:			
Receivables	(11,342)	(1,779)	(16,502)
Inventories	27,512	(86,286)	6,662
Other assets	14,353	(5,325)	5,808
Current liabilities	(15,680)	10,678	5,646
Other liabilities	(14,769)	64	1,518
Other, net	1,903	(833)	1,589
Net cash provided by operating activities	167,892	43,995	157,778
Investing activities:			
Proceeds from sale of assets, net of cash transferred	18,703	31,564	10,304
Acquisition of businesses, net of cash acquired	(167,677)	(18,396)	(20,533)
Capital expenditures	(38,481)	(46,131)	(37,497)
Insurance proceeds - capital related	1,968	—	—
Investment in unconsolidated affiliates	(1,609)	(3,317)	—
Net cash used in investing activities	(187,096)	(36,280)	(47,726)
Financing activities:			
Dividends paid to stockholders of Mueller Industries, Inc.	(22,705)	(196,944)	(21,224)
Dividends paid to noncontrolling interests	(592)	(2,909)	(3,765)
Issuance of long-term debt	204,233	71,475	3,500
Repayments of long-term debt	(172,002)	(111,224)	(1,074)
(Repayment) issuance of debt by consolidated joint ventures, net	(2,915)	(3,369)	2,265
Repurchase of common stock	(33,562)	—	—
Net cash used to settle stock-based awards	(726)	(1,595)	(1,306)

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Debt issuance costs	—	—	(957)
Net cash used in financing activities	(28,269)	(244,566)	(22,561)
Effect of exchange rate changes on cash	(1,952)	2,945	(5,686)
(Decrease) increase in cash, cash equivalents, and restricted cash	(49,425)	(233,906)	81,805
Cash, cash equivalents, and restricted cash at the beginning of the year	126,563	360,469	278,664
Cash, cash equivalents, and restricted cash at the end of the year	\$77,138	\$126,563	\$360,469

See accompanying notes to consolidated financial statements. Refer to Note 10 for discussion of significant noncash financing activities.

⁽¹⁾ The Consolidated Statements of Cash Flows for prior periods have been adjusted to reflect the adoption of ASU 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash. The Consolidated Statements of Cash Flows reflect the changes during the periods in the total of cash, cash equivalents, and restricted cash. Therefore, restricted cash activity is included with cash when reconciling the beginning-of-period and end-of-period total amounts shown. Refer to Note 1 for further discussion.

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MUELLER INDUSTRIES, INC.

CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY

Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands)	2018		2017		2016	
	Shares	Amount	Shares	Amount	Shares	Amount
Common stock:						
Balance at beginning of year	80,183	\$802	80,183	\$802	80,183	\$802
Balance at end of year	80,183	\$802	80,183	\$802	80,183	\$802
Additional paid-in capital:						
Balance at beginning of year		\$274,585		\$273,345		\$271,158
Issuance of shares under incentive stock option plans	(278)	(2,118)	(419)
Stock-based compensation expense	8,035		7,450		6,387	
Issuance of restricted stock	(5,493)	(4,092)	(3,781)
Balance at end of year		\$276,849		\$274,585		\$273,345
Retained earnings:						
Balance at beginning of year		\$743,503		\$1,141,831		\$1,063,543
Net income attributable to Mueller Industries, Inc.		104,459		85,598		99,727
Dividends paid or payable to stockholders of Mueller Industries, Inc.	(23,009)	(483,926)	(21,439)
Reclassification of stranded effects of the Act	(556)	—		—	
Other adjustments	340		—		—	
Balance at end of year		\$824,737		\$743,503		\$1,141,831
Accumulated other comprehensive loss:						
Balance at beginning of year		\$(51,056)		\$(66,956)		\$(54,990)
Total other comprehensive (loss) income attributable to Mueller Industries, Inc.		(29,292)		15,900		(11,966)
Reclassification of stranded effects of the Act		556		—		—
Balance at end of year		\$(79,792)		\$(51,056)		\$(66,956)

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MUELLER INDUSTRIES, INC.
 CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY
 (continued)

Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands)	2018		2017		2016	
	Shares	Amount	Shares	Amount	Shares	Amount
Treasury stock:						
Balance at beginning of year	22,373	\$(445,723)	22,788	\$(450,338)	23,024	\$(453,228)
Issuance of shares under incentive stock option plans	(57)	1,136	(395)	7,828	(178)	3,499
Repurchase of common stock	1,437	(35,146)	188	(7,305)	133	(4,389)
Issuance of restricted stock	(273)	5,493	(208)	4,092	(191)	3,780
Balance at end of year	23,480	\$(474,240)	22,373	\$(445,723)	22,788	\$(450,338)
Noncontrolling interests:						
Balance at beginning of year		\$13,917		\$37,753		\$32,417
Sale of Mueller-Xingrong		—		(23,712)		—
Purchase of Jungwoo-Mueller		—		—		11,649
Dividends paid to noncontrolling interests		(592)		(2,909)		(3,765)
Net income attributable to noncontrolling interests		2,361		1,413		27
Foreign currency translation		(782)		1,372		(2,575)
Balance at end of year		\$14,904		\$13,917		\$37,753

See accompanying notes to consolidated financial statements.

Notes to Consolidated Financial Statements

Note 1 – Summary of Significant Accounting Policies

Nature of Operations

The principal business of Mueller Industries, Inc. is the manufacture and sale of copper tube and fittings; line sets; brass and copper alloy rod, bar, and shapes; aluminum and brass forgings; aluminum impact extrusions; PEX plastic tube and fittings; refrigeration valves and fittings; compressed gas valves; fabricated tubular products; pressure vessels; steel nipples; and insulated flexible duct systems. The Company also resells brass and plastic plumbing valves, plastic fittings, malleable iron fittings, faucets, and plumbing specialty products. The Company markets its products to the HVAC, plumbing, refrigeration, hardware, and other industries. Mueller's operations are located throughout the United States and in Canada, Mexico, Great Britain, South Korea, the Middle East, and China.

Fiscal Years

The Company's fiscal year ends on the last Saturday of December, and consisted of 52 weeks in 2018 and 2017, compared to 53 weeks in 2016. These dates were December 29, 2018, December 30, 2017, and December 31, 2016.

Basis of Presentation

The Consolidated Financial Statements include the accounts of Mueller Industries, Inc. and its majority-owned subsidiaries. The noncontrolling interests represent separate private ownership interests of 40 percent of Jungwoo Metal Ind. Co., LTD (Jungwoo-Mueller) and 49.5 percent of Jiangsu Mueller-Xingrong Copper Industries Limited (Mueller-Xingrong), which the Company sold during 2017. See "Note 2 – Acquisitions and Dispositions" for additional information.

Revenue Recognition

Given the nature of the Company's business and product offerings, sales transactions with customers are generally comprised of a single performance obligation that involves delivery of the products identified in the contracts with customers. Performance obligations are generally satisfied at the point in time of shipment and payment is generally due within sixty days. Variable consideration is estimated for future rebates on certain product lines and product returns. The Company records variable consideration as an adjustment to the transaction price in the period it is incurred. Since variable consideration is settled within a short period of time, the time value of money is not significant. The cost of shipping product to customers is expensed as incurred as a component of cost of goods sold.

Acquisitions

Accounting for acquisitions requires the Company to recognize separately from goodwill the assets acquired and liabilities assumed at their acquisition date fair values. Goodwill is measured as the excess of the purchase price over the net amount allocated to the identifiable assets acquired and liabilities assumed. While management uses its best estimates and assumptions to accurately value assets acquired and liabilities assumed at the acquisition date, the estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, the Company may record adjustments to the assets acquired and liabilities assumed with the corresponding offset to goodwill. The operating results generated by the acquired businesses are included in the Consolidated Statements of Income from their respective dates of acquisition. Acquisition related costs are expensed as incurred. See "Note 2 – Acquisitions and Dispositions" for additional information.

Cash Equivalents and Restricted Cash

Temporary investments with original maturities of three months or less are considered to be cash equivalents. These investments are stated at cost. At December 29, 2018 and December 30, 2017, temporary investments consisted of money market mutual funds, commercial paper, bank repurchase agreements, and U.S. and foreign government securities totaling approximately \$0.6 million each year. Included in other current assets was restricted cash of \$4.4 million and \$6.2 million at December 29, 2018 and December 30, 2017, respectively. These amounts represent required deposits into brokerage accounts that facilitate the Company's hedging activities as well as imprest funds for the Company's self-insured workers' compensation program.

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Allowance for Doubtful Accounts

The Company provides an allowance for receivables that may not be fully collected. In circumstances where the Company is aware of a customer's inability to meet their financial obligations (e.g., bankruptcy filings or substantial credit rating downgrades), it records an allowance for doubtful accounts against amounts due to reduce the net recognized receivable to the amount it believes most likely will be collected. For all other customers, the Company recognizes an allowance for doubtful accounts based on its historical collection experience. If circumstances change (e.g., greater than expected defaults or an unexpected material change in a major customer's ability to meet their financial obligations), the Company could change its estimate of the recoverability of amounts due by a material amount.

Inventories

The Company's inventories are valued at the lower-of-cost-or-market. The material component of its U.S. copper tube and copper fittings inventories is valued on a LIFO basis and the non-material components of U.S. copper tube and copper fittings inventories are valued on a FIFO basis. The material component of its U.K. and Canadian copper tube inventories are valued on a FIFO basis. The material component of its brass rod and forgings inventories are valued on a FIFO basis. Certain inventories purchased for resale are valued on an average cost basis. Elements of cost in finished goods inventory in addition to the cost of material include depreciation, amortization, utilities, maintenance, production wages, and transportation costs.

The market price of copper cathode and scrap is subject to volatility. During periods when open market prices decline below net book value, the Company may need to provide an allowance to reduce the carrying value of its inventory. In addition, certain items in inventory may be considered obsolete and, as such, the Company may establish an allowance to reduce the carrying value of those items to their net realizable value. Changes in these estimates related to the value of inventory, if any, may result in a materially adverse impact on the Company's reported financial position or results of operations. The Company recognizes the impact of any changes in estimates, assumptions, and judgments in income in the period in which it is determined. See "Note 4 – Inventories" for additional information.

Property, Plant, and Equipment

Property, plant, and equipment is stated at cost less accumulated depreciation. Expenditures for major additions and improvements are capitalized, while minor replacements, maintenance, and repairs are charged to expense as incurred. Depreciation of buildings, machinery, and equipment is provided on the straight-line method over the estimated useful lives ranging from 20 to 40 years for buildings and five to 20 years for machinery and equipment. Leasehold improvements are amortized over the lesser of their useful life or the remaining lease term.

The Company continually evaluates these assets to determine whether events or changes in circumstances have occurred that may warrant revision of the estimated useful life or whether the remaining balance should be evaluated for possible impairment. See "Note 7 – Property, Plant, and Equipment, Net" for additional information.

Goodwill

Goodwill is recognized for the excess of the purchase price over the fair value of tangible and identifiable intangible net assets of businesses acquired. Several factors give rise to goodwill in business acquisitions, such as the expected benefit from synergies of the combination and the existing workforce of the acquired business. Goodwill is evaluated annually for possible impairment as of the first day of the fourth quarter unless circumstances indicate the need to

accelerate the timing of the evaluation. In the evaluation of goodwill impairment, management performs a qualitative assessment to determine if it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If the qualitative assessment is not conclusive, management compares the fair value of a reporting unit with its carrying amount and will recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value, not to exceed the total amount of goodwill allocated to the reporting unit.

Fair value for the Company's reporting units is determined using a combination of the income and market approaches (level 3 within the fair value hierarchy), incorporating market participant considerations and management's assumptions on revenue growth rates, operating margins, discount rates and expected capital expenditures. The market approach measures the fair value of a business through the analysis of publicly traded companies or recent sales of similar businesses. The income approach uses a discounted cash flow model to estimate the fair value of reporting units based on expected cash flows (adjusted for capital investment required to support operations) and a terminal value. This cash flow stream is discounted to its present value to arrive at a fair value for each reporting unit. Future earnings are estimated using the Company's most recent annual projections, applying a growth rate to future periods. Those projections are directly impacted by the condition of the markets in which the Company's

businesses participate. The discount rate selected for the reporting units is generally based on rates of return available for comparable companies at the date of valuation. Fair value determinations may include both internal and third-party valuations. See “Note 8 – Goodwill and Other Intangible Assets” for additional information.

Investments in Unconsolidated Affiliates

The Company owns a 50 percent interest in an unconsolidated affiliate that acquired Tecumseh Products Company (Tecumseh). The Company also owns a 50 percent interest in a second unconsolidated affiliate that provides financing to Tecumseh. These investments are recorded using the equity method of accounting, as the Company can exercise significant influence but does not own a majority equity interest or otherwise control the respective entities. Under the equity method of accounting, these investments are stated at initial cost and are adjusted for subsequent additional investments and the Company’s proportionate share of earnings or losses and distributions.

The Company records its proportionate share of the investees’ net income or loss, net of foreign taxes, one quarter in arrears as income (loss) from unconsolidated affiliates, net of foreign tax, in the Consolidated Statements of Income. The Company’s proportionate share of the investees’ other comprehensive income (loss), net of income taxes, is recorded in the Consolidated Statements of Comprehensive Income and Consolidated Statements of Changes in Equity. The U.S. tax effect of the Company’s proportionate share of Tecumseh’s income or loss is recorded in income tax expense in the Consolidated Statements of Income. In general, the equity investment in unconsolidated affiliates is equal to the current equity investment plus the investees’ net accumulated losses.

The Company also owns a 40 percent interest in Mueller Middle East BSC.

The investments in unconsolidated affiliates are assessed periodically for impairment and written down when the carrying amount is not considered fully recoverable. See “Note 9 – Investments in Unconsolidated Affiliates” for additional information.

Self-Insurance Accruals

The Company is primarily self-insured for workers’ compensation claims and benefits paid under certain employee health care programs. Accruals are primarily based on estimated undiscounted cost of claims, which includes incurred but not reported claims, and are classified as accrued wages and other employee costs.

Pension and Other Postretirement Benefit Plans

The Company sponsors several qualified and nonqualified pension and other postretirement benefit plans in the U.S. and certain foreign locations. The Company recognizes the overfunded or underfunded status of the plans as an asset or liability in the Consolidated Balance Sheets with changes in the funded status recorded through comprehensive income in the year in which those changes occur. The obligations for these plans are actuarially determined and affected by assumptions, including discount rates, expected long-term return on plan assets for defined benefit pension plans, and certain employee-related factors, such as retirement age and mortality. The Company evaluates its assumptions periodically and makes adjustments as necessary.

The expected return on plan assets is determined using the market value of plan assets. Differences between assumed and actual returns are amortized to the market value of assets on a straight-line basis over the average remaining service period of the plan participants using the corridor approach. The corridor approach defers all actuarial gains and losses resulting from variances between actual results and actuarial assumptions. These unrecognized gains and losses are amortized when the net gains and losses exceed 10 percent of the greater of the market value of the plan

assets or the projected benefit obligation. The amount in excess of the corridor is amortized over the average remaining service period of the plan participants. For 2018, the average remaining service period for the pension plans was nine years. See “Note 11 – Benefit Plans” for additional information.

Environmental Reserves and Environmental Expenses

The Company recognizes an environmental liability when it is probable the liability exists and the amount is reasonably estimable. The Company estimates the duration and extent of its remediation obligations based upon reports of outside consultants, internal and third party estimates and analyses of cleanup costs and ongoing monitoring costs, communications with regulatory agencies, and changes in environmental law. If the Company were to determine that its estimates of the duration or extent of its environmental obligations were no longer accurate, it would adjust environmental liabilities accordingly in the period that such determination is made. Estimated future expenditures for environmental remediation are not discounted to their present value.

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Environmental expenses that relate to ongoing operations are included as a component of cost of goods sold. Environmental expenses related to non-operating properties are presented below operating income in the Consolidated Statements of Income. See [“Note 12 – Commitments and Contingencies”](#) for additional information.

Earnings Per Share

Basic earnings per share is computed based on the weighted average number of common shares outstanding. Diluted earnings per share reflects the increase in weighted average common shares outstanding that would result from the assumed exercise of outstanding stock options and vesting of restricted stock awards calculated using the treasury stock method. Approximately 54 thousand and 20 thousand stock-based awards were excluded from the computation of diluted earnings per share for the years ended December 29, 2018 and December 30, 2017, respectively, because they were antidilutive.

Income Taxes

Deferred income tax assets and liabilities are recognized when differences arise between the treatment of certain items for financial statement and tax purposes. Realization of certain components of deferred tax assets is dependent upon the occurrence of future events. The Company records valuation allowances to reduce its deferred tax assets to the amount it believes is more likely than not to be realized. These valuation allowances can be impacted by changes in tax laws, changes to statutory tax rates, and future taxable income levels and are based on the Company’s judgment, estimates, and assumptions regarding those future events. In the event the Company was to determine that it would not be able to realize all or a portion of the net deferred tax assets in the future, it would increase the valuation allowance through a charge to income tax expense in the period that such determination is made. Conversely, if it was to determine that it would be able to realize its deferred tax assets in the future, in excess of the net carrying amounts, the Company would decrease the recorded valuation allowance through a decrease to income tax expense in the period that such determination is made.

The Company provides for uncertain tax positions and the related interest and penalties, if any, based upon management’s assessment of whether a tax benefit is more likely than not to be sustained upon examination by tax authorities. Tax benefits for uncertain tax positions that are recognized in the financial statements are measured as the largest amount of benefit, determined on a cumulative probability basis, that is more likely than not to be realized upon ultimate settlement. To the extent the Company prevails in matters for which a liability for an uncertain tax position is established or is required to pay amounts in excess of the liability, the Company’s effective tax rate in a given financial statement period may be affected.

These estimates are highly subjective and could be affected by changes in business conditions and other factors. Changes in any of these factors could have a material impact on future income tax expense. See [“Note 13 – Income Taxes”](#) for additional information.

Taxes Collected from Customers and Remitted to Governmental Authorities

Taxes assessed by a governmental authority that are directly imposed on a revenue producing transaction between the Company and its customers, primarily value added taxes in foreign jurisdictions, are accounted for on a net (excluded from revenues and costs) basis.

Stock-Based Compensation

The Company has in effect stock incentive plans under which stock-based awards have been granted to certain employees and members of its Board of Directors. Stock-based compensation expense is recognized in the Consolidated Statements of Income as a component of selling, general, and administrative expense based on the grant date fair value of the awards. See “Note 15 – Stock-Based Compensation” for additional information.

Concentrations of Credit and Market Risk

Concentrations of credit risk with respect to accounts receivable are limited due to the large number of customers comprising the Company’s customer base, and their dispersion across different geographic areas and different industries, including HVAC, plumbing, refrigeration, hardware, automotive, OEMs, and others.

The Company minimizes its exposure to base metal price fluctuations through various strategies. Generally, it prices an equivalent amount of copper raw material, under flexible pricing arrangements it maintains with its suppliers, at the time it determines the selling price of finished products to its customers.

Derivative Instruments and Hedging Activities

The Company's earnings and cash flows are subject to fluctuations due to changes in commodity prices, foreign currency exchange rates, and interest rates. The Company uses derivative instruments such as commodity futures contracts, foreign currency forward contracts, and interest rate swaps to manage these exposures.

All derivatives are recognized in the Consolidated Balance Sheets at their fair value. On the date the derivative contract is entered into, it is either a) designated as a hedge of (i) a forecasted transaction or the variability of cash flow to be paid (cash flow hedge) or (ii) the fair value of a recognized asset or liability (fair value hedge), or b) not designated in a hedge accounting relationship, even though the derivative contract was executed to mitigate an economic exposure (economic hedge), as the Company does not enter into derivative contracts for trading purposes. Changes in the fair value of a derivative that is qualified, designated, and highly effective as a cash flow hedge are recorded in stockholders' equity within accumulated other comprehensive income (AOCI), to the extent effective, until they are reclassified to earnings in the same period or periods during which the hedged transaction affects earnings. Changes in the fair value of a derivative that is qualified, designated, and highly effective as a fair value hedge, along with the gain or loss on the hedged recognized asset or liability that is attributable to the hedged risk, are recorded in current earnings. Changes in the fair value of undesignated derivative instruments executed as economic hedges and the ineffective portion of designated derivatives are reported in current earnings.

The Company documents all relationships between derivative instruments and hedged items, as well as the risk-management objective and strategy for undertaking various hedge transactions. This process includes linking all derivative instruments that are designated as fair value hedges to specific assets and liabilities in the Consolidated Balance Sheets and linking cash flow hedges to specific forecasted transactions or variability of cash flow.

The Company also assesses, both at the hedge's inception and on an ongoing basis, whether the designated derivative instruments that are used in hedging transactions are highly effective in offsetting changes in cash flow or fair values of hedged items. When a derivative instrument is determined not to be highly effective as a hedge or the underlying hedged transaction is no longer probable of occurring, hedge accounting is discontinued prospectively in accordance with the derecognition criteria for hedge accounting.

The Company primarily executes derivative contracts with major financial institutions. These counterparties expose the Company to credit risk in the event of non-performance. The amount of such exposure is limited to the fair value of the contract plus the unpaid portion of amounts due to the Company pursuant to terms of the derivative instruments, if any. If a downgrade in the credit rating of these counterparties occurs, management believes that this exposure is mitigated by provisions in the derivative arrangements which allow for the legal right of offset of any amounts due to the Company from the counterparties with any amounts payable to the counterparties by the Company. As a result, management considers the risk of loss from counterparty default to be minimal. See "Note 6 – Derivative Instruments and Hedging Activities" for additional information.

Fair Value of Financial Instruments

The carrying amounts for cash and cash equivalents, accounts receivable, and accounts payable approximate fair value due to the short-term maturity of these instruments.

The fair value of long-term debt at December 29, 2018 approximates the carrying value on that date. The estimated fair values were determined based on quoted market prices and the current rates offered for debt with similar terms and maturities. The fair value of long-term debt is classified as level 2 within the fair value hierarchy. This classification is defined as a fair value determined using market-based inputs other than quoted prices that are

observable for the liability, either directly or indirectly.

Foreign Currency Translation

For foreign subsidiaries for which the functional currency is not the U.S. dollar, balance sheet accounts are translated at exchange rates in effect at the end of the year and income statement accounts are translated at average exchange rates for the year. Translation gains and losses are included in equity as a component of AOCI. Transaction gains and losses that arise from exchange rate fluctuations on transactions denominated in a currency other than the functional currency are recognized in selling, general, and administrative expense in the Consolidated Statements of Income. Included in the Consolidated Statements of Income were net transaction losses of \$1.0 million in 2018, losses of \$0.4 million in 2017, and gains of \$0.4 million in 2016.

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Use of and Changes in Estimates

The preparation of financial statements in conformity with generally accepted accounting principles in the United States (U.S. GAAP) requires management to make estimates, assumptions, and judgments that affect the amounts reported in the financial statements and accompanying notes. Management makes its best estimate of the ultimate outcome for these items based on historical trends and other information available when the financial statements are prepared. Changes in estimates are recognized in accordance with the accounting rules for the estimate, which is typically in the period when new information becomes available to management. Areas where the nature of the estimate makes it reasonably possible that actual results could materially differ from amounts estimated include but are not limited to: pension and other postretirement benefit plan obligations, tax liabilities, loss contingencies, litigation claims, environmental reserves, and impairment assessments of long-lived assets (including goodwill).

Recently Adopted Accounting Standard

In February 2018, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) No. 2018-02, Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income. The ASU permits entities to reclassify tax effects stranded in AOCI as a result of tax reform to retained earnings. The guidance is effective for the Company in interim and annual periods beginning in 2019. Early adoption is permitted and can be applied retrospectively or in the period of adoption. The Company early adopted the ASU during the first quarter of 2018, which resulted in a net reclassification of \$556 thousand from AOCI to retained earnings during the quarter.

In March 2017, the FASB issued ASU No. 2017-07, Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. The ASU requires employers that sponsor defined benefit pension and/or other postretirement benefit plans to present the service cost component of net periodic benefit cost in the same income statement line item(s) as other employee compensation costs arising from services rendered during the period and other components of net periodic benefits cost separately from the line item(s) that includes the service cost and outside of any subtotal of operating income. The Company adopted the ASU during the first quarter of 2018 using a retrospective approach for each period presented, and elected to use the practical expedient that allows the Company to use the amounts previously presented in its Benefit Plans disclosure as the estimation basis for applying the retrospective presentation requirements. Prior to the adoption of the ASU, net periodic benefit cost (income) was reported within selling, general, and administrative expense in the Consolidated Statements of Income. The prior periods have been revised to conform to the current period presentation, resulting in the reclassification net periodic benefit income of \$1.2 million and net periodic benefit cost of \$1.7 million from operating income to other income, net for the years ended 2017 and 2016, respectively.

In January 2017, the FASB issued ASU No. 2017-01, Business Combinations (Topic 805): Clarifying the Definition of a Business. The ASU provides guidance to assist entities in evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The updated guidance requires prospective adoption. Early adoption is permitted. The Company early adopted the ASU during the first quarter of 2018 and the adoption had no impact on its Consolidated Financial Statements.

In December 2016, the FASB issued ASU No. 2016-20, Technical Corrections and Improvements to Topic 606, Revenue from Contracts with Customers. The ASU provides correction or improvement to the guidance previously issued in Accounting Standards Codification (ASC) 606, Revenue from Contracts with Customers. Under the ASU, an entity will recognize revenue to depict the transfer of promised goods or services to customers at an amount that reflects the consideration that it expects to receive in exchange for the goods or services. It also requires more detailed disclosures to enable users of financial statements to understand the nature, amount, timing and uncertainty of revenue

and cash flows arising from contracts with customers. The ASU requires revenue to be recognized over time (i.e., throughout the production process) rather than at a point in time (generally upon shipment to the customer) if performance does not create an asset with an alternative use to the entity and the entity has an enforceable right to payment for performance completed to date.

The Company adopted the ASU during the first quarter of 2018 using the modified retrospective method for all contracts with customers. The adoption did not result in a significant impact on opening retained earnings. Revenues for prior periods have not been adjusted and continue to be reported under Revenue Recognition (Topic 605). No significant judgments were made in the application of the guidance in ASC 606 and there were no material contract assets, contract liabilities, or deferred contract costs as of December 29, 2018.

The Company also evaluated specific contract terms, primarily within the Industrial Metals and Climate segments, related to the production of customized products and payment rights and determined that there are no significant changes to the timing or nature of revenue recognition under the ASU. As part of the overall evaluation of the standard, the Company has assessed and implemented necessary changes to its accounting policies, practices, and internal controls over financial reporting to support the standard.

In November 2016, the FASB issued ASU No. 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash. The ASU requires entities to report the changes in the total of cash, cash equivalents, restricted cash, and restricted cash equivalents in the statement of cash flows. As a result, entities will no longer present transfers between cash and cash equivalents and restricted cash and restricted cash equivalents in the statement of cash flows. The Company adopted the ASU during the first quarter of 2018 using a retrospective approach for each period presented. Prior to the adoption of the ASU, the Company presented the change in restricted cash balances separately as a cash flow from investing activity. Upon adoption, the Company included restricted cash in each of the balances of the cash, cash equivalents, and restricted cash at the beginning and end of periods in the Consolidated Statements of Cash Flows. The prior periods have been revised to conform to the current period presentation, and as a result, net cash flows for the years ended 2017 and 2016 increased by \$6.3 million and \$9.2 million, respectively. A reconciliation of cash, cash equivalents, and restricted cash for the periods presented is as follows:

(In thousands)	December 29, 2018	December 30, 2017
Cash & cash equivalents	\$ 72,616	\$ 120,269
Restricted cash included within other current assets	4,414	6,189
Restricted cash included within other assets	108	105
Total cash, cash equivalents, and restricted cash	\$ 77,138	\$ 126,563

In October 2016, the FASB issued ASU No. 2016-16, Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory. The ASU requires companies to account for the income tax effects of intercompany transfers of assets other than inventory when the transfer occurs. Companies will still be required to defer the income tax effects of intercompany inventory transactions in an exception to the income tax accounting guidance. The Company adopted the ASU during the first quarter of 2018 and the adoption had no impact on its Consolidated Financial Statements.

Recently Issued Accounting Standards

In August 2018, the FASB issued ASU No. 2018-14, Compensation - Retirement Benefits - Defined Benefit Plans - General (Subtopic 715-20): Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans. For employers that sponsor defined benefit pension and/or other postretirement benefit plans, the ASU eliminates requirements for certain disclosures that are no longer considered cost beneficial, requires new disclosures related to the weighted-average interest crediting rate for cash balance plans and explanations for significant gains and losses related to changes in benefit obligations, and clarifies the requirements for entities that provide aggregate disclosures for two or more plans. The ASU will be effective for the annual period beginning in 2020. The updated guidance requires retrospective adoption, and early adoption is permitted. The Company does not expect the adoption of the ASU to have a material impact on its Consolidated Financial Statements.

In August 2018, the FASB issued ASU No. 2018-13, Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement. The ASU eliminates requirements to disclose the amount and reasons for transfers between level 1 and level 2 of the fair value hierarchy, but requires public companies to disclose changes in unrealized gains and losses for the period included in other comprehensive income (OCI) for recurring level 3 fair value measurements or instruments held at the end of the reporting period and the range and weighted average used to develop significant unobservable inputs for level 3 fair value measurements. The ASU will be effective for interim and annual periods beginning in 2020. An entity is permitted to early adopt either the entire standard or only the provisions that eliminate or modify requirements, and can elect to early adopt in interim periods. The guidance on changes in unrealized gains and losses for the period included in OCI for recurring level 3

measurements, the range and weighted average of significant unobservable inputs used to develop level 3 fair value measurements, and the narrative description of measurement uncertainty is applied prospectively. All other amendments should be applied retrospectively. The Company does not expect the adoption of the ASU to have a material impact on its Consolidated Financial Statements.

In July 2018, the FASB issued ASU No. 2018-11, Leases (Topic 842): Targeted Improvements and ASU No. 2018-10, Codification Improvements to Topic 842, Leases. The ASUs provide entities with relief from the costs of implementation and clarify how to apply certain aspects of the new leasing standard, ASC 842. ASC 842 requires an entity to recognize a right-of-use asset and lease liability for all leases with terms of more than 12 months. Recognition, measurement and presentation of expenses will depend on classification as a financing or operating lease. The guidance also requires certain quantitative and qualitative disclosures about leasing arrangements. The ASU will be effective for interim and annual periods beginning in 2019. Early adoption is permitted. ASC 842 requires a modified retrospective adoption, but ASU 2018-11 amends ASC 842 so that entities may elect not to recast

their comparative periods in transition and allows entities to change their date of initial application to the beginning of the period of adoption. The future minimum lease payments under noncancelable leases were approximately \$38.3 million and \$40.5 million as of December 29, 2018 and December 30, 2017, respectively. The Company has implemented a system to identify its entire population of leases and tested the population for completeness. The Company is still evaluating all of the effects that the provisions of the ASUs and the ASC will have on its Consolidated Financial Statements, but estimates that the right-of-use asset and lease liability will be approximately \$25.0 million to \$35.0 million.

Note 2 – Acquisitions and Dispositions

2018 Acquisitions

ATCO

On July 2, 2018, the Company entered into a stock purchase agreement pursuant to which the Company acquired all of the outstanding capital stock of ATCO Rubber Products, Inc. (ATCO) for approximately \$156.7 million, net of the estimated working capital adjustment. The total purchase price consisted of \$151.4 million in cash at closing and a contingent consideration arrangement which requires the Company to pay the former owner up to \$12.0 million based on EBITDA growth of the acquired business. ATCO is an industry leader in the manufacturing and distribution of insulated HVAC flexible duct systems and will support the Company's strategy to grow its Climate Products businesses to become a more valuable resource to its HVAC customers. The acquired business is reported in the Company's Climate segment.

For the year ended December 29, 2018, the Company's total net sales included \$90.0 million of revenue recognized by ATCO from the date of acquisition. ATCO had revenues of approximately \$166.0 million in its fiscal year ending December 31, 2017 (unaudited).

The following table presents condensed pro forma consolidated results of operations as if the ATCO acquisition has occurred at the beginning of 2017. The pro forma information does not purport to be indicative of the results that would have been obtained if the operations had actually been combined during the periods presented, and is not necessarily indicative of operating results to be expected in future periods. The most significant pro forma adjustments to the historical results of operations relate to the application of purchase accounting and the financing structure.

(In thousands, except per share data)	For the Year Ended	
	2018	2017
Net sales	\$2,595,454	\$2,431,972
Net income	111,482	90,270
Basic earnings per share	\$1.96	\$1.59
Diluted earnings per share	1.95	1.57

Die-Mold

On March 31, 2018, the Company entered into a share purchase agreement pursuant to which the Company acquired all of the outstanding shares of Die-Mold Tool Limited (Die-Mold) for approximately \$13.6 million, net of working capital adjustments. The total purchase price consisted of \$12.4 million in cash at closing and a contingent consideration arrangement which requires the Company to pay the former owner up to \$2.3 million based on EBITDA

growth of the acquired business. Die-Mold, based out of Ontario, Canada, is a manufacturer of plastic PEX and other plumbing-related fittings and an integrated designer and manufacturer of plastic injection tooling. The business complements the Company's existing businesses within the Piping Systems segment.

2017 Acquisition

Heatlink Group

On May 31, 2017, the Company entered into a share purchase agreement pursuant to which the Company acquired all of the outstanding shares of Pexcor Manufacturing Company Inc. and Heatlink Group Inc. (collectively, Heatlink Group) for

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approximately \$17.2 million, net of working capital adjustments. The total purchase price consisted of \$16.3 million in cash at closing and a contingent consideration arrangement which requires the Company to pay the former owners up to \$2.2 million based on EBITDA growth of the acquired business. Heatlink Group, based out of Calgary, Alberta, Canada, produces and sells a complete line of products for PEX plumbing and radiant systems. The business complements the Company's existing businesses within the Piping Systems segment.

2016 Acquisition

Jungwoo-Mueller

On April 26, 2016, the Company entered into an agreement providing for the purchase of a 60 percent equity interest in Jungwoo-Mueller for approximately \$20.5 million in cash. Jungwoo-Mueller, which manufactures copper-based pipe joining products, is headquartered in Seoul, South Korea and serves markets worldwide. This business complements the Company's existing copper fittings businesses in the Piping Systems segment and is reported in the Company's Consolidated Financial Statements one month in arrears.

Purchase Price Allocations

These acquisitions were accounted for using the acquisition method of accounting whereby the total purchase price was allocated to tangible and intangible assets acquired and liabilities assumed based on respective fair values.

The following table summarizes the allocation of the purchase price to acquire these businesses, which were financed by available cash balances, as well as the assets acquired and liabilities assumed at the respective acquisition dates. The purchase price allocation for ATCO is provisional as of December 29, 2018 and subject to change upon completion of the final valuation of the long-lived assets, contingent consideration, and final working capital adjustment during the measurement period. During 2018, the valuation of the Heatlink Group acquisition was finalized. Changes to the purchase price allocation from the amounts presented in the Company's 2017 Annual Report on Form 10-K included the valuation of the contingent consideration of \$0.9 million and the recognition of a deferred tax liability of \$1.9 million that resulted from a basis difference in the long-lived assets acquired. These changes resulted in an increase to goodwill.

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(in thousands)	ATCO	Die-Mold	Heatlink Group	Jungwoo-Mueller
Total consideration	\$156,704	\$ 13,629	\$17,164	\$ 20,533
Allocated to:				
Accounts receivable	21,829	1,684	2,809	5,551
Inventories	31,666	1,833	4,648	17,616
Other current assets	1,051	267	508	1,437
Property, plant, and equipment	83,080	3,278	2,024	24,191
Goodwill	17,770	(1) 2,241	6,879	223
Intangible assets	21,430	5,209	6,413	756
Other assets	224	—	—	277
Total assets acquired	177,050	14,512	23,281	50,051
Accounts payable	8,093	710	3,633	7,252
Other current liabilities	10,187	173	593	577
Long-term debt	2,066	—	—	8,659
Pension and other postretirement liabilities	—	—	—	799
Other noncurrent liabilities	—	—	1,891	582
Total liabilities assumed	20,346	883	6,117	17,869
Noncontrolling interest	—	—	—	11,649
Net assets acquired	\$156,704	\$ 13,629	\$17,164	\$ 20,533
(1) Tax-deductible goodwill				

The fair value of the noncontrolling interest at Jungwoo-Mueller was determined based on the proportionate share of consideration transferred and adjusted for lack of control and marketability based on the average of the classic put option model and the Finnerty Formula.

The following details the total intangible assets identified in the allocation of the purchase price at the respective acquisition dates:

(in thousands)	Estimated Useful Life	ATCO	Die-Mold	Heatlink Group	Jungwoo-Mueller
Intangible asset type:					
Customer relationships	20 years	\$6,200	\$ 3,077	\$ 4,265	\$ —
Non-compete agreements	3-5 years	—	70	74	—
Patents and technology	10-15 years	8,950	1,512	1,466	756
Trade names, licenses, and other	5-10 years	3,960	550	608	—
Supply contracts	5 years	2,320	—	—	—
Total intangible assets		\$21,430	\$ 5,209	\$ 6,413	\$ 756

2017 Disposition

Mueller-Xingrong

On June 21, 2017, the Company entered into a definitive equity transfer agreement with Jiangsu Xingrong Hi-Tech Co. Ltd. and Jiangsu Baiyang Industries Co. Ltd. (Baiyang), together, the minority partners in Mueller-Xingrong (the Company's Chinese joint venture), pursuant to which the Company sold its 50.5 percent equity interest in Mueller-Xingrong to Baiyang for approximately

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\$18.3 million. Mueller-Xingrong manufactured engineered copper tube primarily for air-conditioning applications in China and was included in the Piping Systems segment. Mueller-Xingrong reported net sales of \$67.3 million and net losses of \$9 thousand in 2017, compared to net sales of \$121.5 million and net income of \$62 thousand in 2016. The carrying value of the assets disposed totaled \$56.8 million, consisting primarily of accounts receivable, inventories, and long-lived assets. The carrying value of the liabilities disposed (consisting primarily of current debt and accounts payable), noncontrolling interest, and amounts recognized in AOCI totaled \$36.2 million. Since the disposal constituted a complete liquidation of the Company's investment in a foreign entity, the Company removed from AOCI and recognized a cumulative translation gain of \$3.8 million. As a result of the disposal, the Company recognized a net gain on the sale of this business of \$1.5 million in the Consolidated Financial Statements.

Note 3 –Segment Information

The Company's reportable segments are Piping Systems, Industrial Metals, and Climate. Each of the reportable segments is composed of certain operating segments that are aggregated primarily by the nature of products offered as follows:

Piping Systems

Piping Systems is composed of the following operating segments: Domestic Piping Systems Group, Great Lakes Copper, Heatlink Group, Die-Mold, European Operations, Trading Group, and Jungwoo-Mueller (the Company's South Korean joint venture). The Domestic Piping Systems Group manufactures copper tube, fittings, and line sets. These products are manufactured in the U.S., sold in the U.S., and exported to markets worldwide. Outside the U.S., Great Lakes Copper manufactures copper tube and line sets in Canada and sells the products primarily in the U.S. and Canada. Heatlink Group produces a complete line of products for PEX plumbing and radiant systems in Canada and sells these products in Canada and the U.S. Die-Mold manufactures PEX and other plumbing-related fittings and plastic injection tooling in Canada and sells these products in Canada and the U.S. European Operations manufacture copper tube in the U.K. which is sold primarily in Europe. The Trading Group manufactures pipe nipples and resells brass and plastic plumbing valves, malleable iron fittings, faucets, and plumbing specialty products in the U.S. and Mexico. Jungwoo-Mueller manufactures copper-based joining products that are sold worldwide. The Piping Systems segment's products are sold primarily to plumbing, refrigeration, and air-conditioning wholesalers, hardware wholesalers and co-ops, building product retailers, and air-conditioning OEMs.

During 2018, the segment recognized a gain of \$1.4 million on the sale of real property and a gain of \$0.7 million on the sale of manufacturing equipment.

During 2017, the segment recognized a gain of \$1.5 million on the sale of the Company's interest in Mueller-Xingrong and impairment charges of \$1.5 million on certain copper fittings manufacturing equipment.

During 2016, the segment recognized impairment charges of \$6.1 million on fixed assets used for product development.

Industrial Metals

Industrial Metals is composed of the following operating segments: Brass Rod & Copper Bar Products, Impacts & Micro Gauge, and Brass Value-Added Products. These businesses manufacture brass rod, impact extrusions, and forgings, as well as a wide variety of end products including plumbing brass, automotive components, valves, fittings, and gas assemblies. These products are manufactured in the U.S. and sold primarily to OEMs in the U.S., many of which are in the industrial, transportation, construction, heating, ventilation, and air-conditioning, plumbing,

refrigeration, and energy markets.

During 2018, the segment recognized an insurance recovery gain of \$3.7 million related to the losses incurred due to the 2017 fire at the brass rod mill in Port Huron, Michigan and a gain of \$1.3 million on the sale of real property.

During 2016, the segment recognized impairment charges of \$0.7 million on fixed assets related to the rationalization of Sherwood.

Climate

Climate is composed of the following operating segments: Refrigeration Products, Fabricated Tube Products, Westermeyer, Turbotec, and ATCO. These domestic businesses manufacture and fabricate valves, assemblies, high pressure components, coaxial heat exchangers, and insulated HVAC flexible duct systems primarily for the heating, ventilation, air-conditioning, and refrigeration markets in the U.S.

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Performance of segments is generally evaluated by their operating income. Summarized product line, geographic, and segment information is shown in the following tables. Geographic sales data indicates the location from which products are shipped. Unallocated expenses include general corporate expenses, plus certain charges or credits not included in segment activity.

During 2018, 2017, and 2016, no single customer exceeded 10 percent of worldwide sales.

The following tables represent a disaggregation of revenue from contracts with customers, along with the reportable segment for each category:

(In thousands)	For the Year Ended December 29, 2018			
	Piping Systems	Industrial Metals	Climate	Total
Tube and fittings	\$1,352,875	\$—	\$—	\$1,352,875
Brass rod and forgings	—	501,472	—	501,472
OEM components, tube & assemblies	29,578	53,581	139,113	222,272
Valves and plumbing specialties	263,180	—	—	263,180
Other	—	96,008	89,956	185,964
	\$1,645,633	\$651,061	\$229,069	\$2,525,763
Intersegment sales				(17,885)
Net sales				\$2,507,878

(In thousands)	For the Year Ended December 30, 2017			
	Piping Systems	Industrial Metals	Climate	Total
Tube and fittings	\$1,238,258	\$—	\$—	\$1,238,258
Brass rod and forgings	—	461,603	—	461,603
OEM components, tube & assemblies	94,383	51,707	131,448	277,538
Valves and plumbing specialties	232,309	—	—	232,309
Other	—	88,821	—	88,821
	\$1,564,950	\$602,131	\$131,448	\$2,298,529
Intersegment sales				(32,456)
Net sales				\$2,266,073

Disaggregation of revenue from contracts with customers (continued):

(In thousands)	For the Year Ended December 31, 2016			
	Piping Systems	Industrial Metals	Climate	Total
Tube and fittings	\$1,045,031	\$—	\$—	\$1,045,031
Brass rod and forgings	—	369,363	—	369,363
OEM components, tube & assemblies	145,017	69,578	119,758	334,353
Valves and plumbing specialties	239,541	—	—	239,541
Other	—	82,119	—	82,119
	\$1,429,589	\$521,060	\$119,758	\$2,070,407
Intersegment sales				(14,785)
Net sales				\$2,055,622

Summarized geographic information is as follows:

(In thousands)	2018	2017	2016
Net sales:			
United States	\$1,820,857	\$1,556,825	\$1,400,893
United Kingdom	245,458	231,039	197,039
Canada	292,798	280,140	237,162
Asia	59,730	121,295	149,875
Mexico	89,035	76,774	70,653
	\$2,507,878	\$2,266,073	\$2,055,622

(In thousands)	2018	2017	2016
Long-lived assets:			
United States	\$295,735	\$238,752	\$223,099
United Kingdom	16,313	17,661	15,978
Canada	33,144	21,327	18,928
Asia	24,930	25,973	36,722
Mexico	511	608	504
	\$370,633	\$304,321	\$295,231

Summarized segment information is as follows:

(In thousands)	For the Year Ended December 29, 2018				
	Piping Systems	Industrial Metals	Climate	Corporate and Eliminations	Total
Net sales	\$1,645,633	\$651,061	\$229,069	\$ (17,885)	\$2,507,878
Cost of goods sold	1,426,729	559,367	182,456	(18,152)	2,150,400
Depreciation and amortization	23,304	7,568	5,569	3,114	39,555
Selling, general, and administrative expense	74,864	13,501	16,926	43,597	148,888
(Gain) loss on sale of assets	(2,093)	(1,301)	—	3,141	(253)
Insurance recovery	—	(3,681)	—	—	(3,681)
Operating income	122,829	75,607	24,118	(49,585)	172,969
Interest expense					(25,199)
Environmental expense					(1,320)
Other income, net					3,967
Income before income taxes					\$150,417
	For the Year Ended December 30, 2017				
(In thousands)	Piping Systems	Industrial Metals	Climate	Corporate and Eliminations	Total
Net sales	\$1,564,950	\$602,131	\$131,448	\$ (32,456)	\$2,266,073
Cost of goods sold	1,369,161	506,973	98,851	(34,368)	1,940,617
Depreciation and amortization	21,777	7,516	2,513	2,138	33,944
Selling, general, and administrative expense	74,441	13,278	9,759	43,252	140,730
Gain on sale of assets	(1,491)	—	—	—	(1,491)
Impairment charges	1,466	—	—	—	1,466
Operating income	99,596	74,364	20,325	(43,478)	150,807
Interest expense					(19,502)
Environmental expense					(7,284)
Other income, net					2,951
Income before income taxes					\$126,972

Segment information (continued):

(In thousands)	For the Year Ended December 31, 2016				Total		
	Piping Systems	Industrial Metals	Climate	Corporate and Eliminations			
Net sales	\$1,429,589	\$521,060	\$119,758	\$ (14,785)	\$2,055,622		
Cost of goods sold	1,228,949	420,905	89,927	(16,282)	1,723,499		
Depreciation and amortization	22,421	8,162	2,437	2,113	35,133		
Selling, general, and administrative expense	67,178	13,943	9,661	45,029	135,811		
Impairment charges	6,115	663	—	—	6,778		
Operating income	104,926	77,387	17,733	(45,645)	154,401		
Interest expense					(7,387)		
Environmental expense					(1,279)		
Other income, net					295		
Income before income taxes					\$146,030		
(In thousands)					2018	2017	2016
Expenditures for long-lived assets (including those resulting from business acquisitions):							
Piping Systems					\$31,362	\$18,124	\$56,286
Industrial Metals					8,066	5,322	3,302
Climate					85,471	2,191	2,045
General Corporate					37	22,518	55
					\$124,936	\$48,155	\$61,688
Segment assets:							
Piping Systems	\$818,303	\$801,468	\$826,663				
Industrial Metals	173,725	212,638	160,478				
Climate	246,851	73,458	66,968				
General Corporate	130,670	232,609	393,367				
	\$1,369,549	\$1,320,173	\$1,447,476				

Note 4 – Inventories

(In thousands)	2018	2017
Raw materials and supplies	\$89,641	\$108,397
Work-in-process	58,643	46,158
Finished goods	188,506	180,143
Valuation reserves	(6,995)	(6,797)
Inventories	\$329,795	\$327,901

Inventories valued using the LIFO method totaled \$18.8 million at December 29, 2018 and \$26.5 million at December 30, 2017. At December 29, 2018 and December 30, 2017, the approximate FIFO cost of such inventories was \$91.8 million and \$111.0 million, respectively. Additionally, the Company values certain inventories purchased for resale on an average cost basis. The value of those inventories was \$53.6 million at December 29, 2018 and \$43.9 million at December 30, 2017.

At the end of 2018 and 2017, the FIFO value of inventory consigned to others was \$5.1 million and \$4.4 million, respectively.

Note 5 – Consolidated Financial Statement Details

Other Current Liabilities

Included in other current liabilities as of December 29, 2018 and December 30, 2017 were the following: (i) accrued discounts, allowances, and customer rebates of \$48.6 million and \$39.5 million, respectively, (ii) current taxes payable of \$5.0 million and \$9.2 million, respectively, (iii) accrued interest of \$5.8 million and \$5.9 million, respectively, and (iv) current environmental liabilities of \$3.6 million and \$4.3 million, respectively.

Other Income, Net

(In thousands)	2018	2017	2016
Net periodic benefit income (cost)	\$2,914	\$1,150	\$(1,687)
Interest income	624	684	1,185
Other	429	1,117	797
Other income, net	\$3,967	\$2,951	\$295

Note 6 – Derivative Instruments and Hedging Activities

The Company's earnings and cash flows are subject to fluctuations due to changes in commodity prices, foreign currency exchange rates, and interest rates. The Company uses derivative instruments such as commodity futures contracts, foreign currency forward contracts, and interest rate swaps to manage these exposures.

Commodity Futures Contracts

Copper and brass represent the largest component of the Company's variable costs of production. The cost of these materials is subject to global market fluctuations caused by factors beyond the Company's control. The Company occasionally enters into forward fixed-price arrangements with certain customers; the risk of these arrangements is generally managed with commodity futures contracts. These futures contracts have been designated as cash flow hedges.

At December 29, 2018, the Company held open futures contracts to purchase approximately \$59.4 million of copper over the next 12 months related to fixed price sales orders. The fair value of those futures contracts was a \$1.3 million net loss position, which was determined by obtaining quoted market prices (level 1 within the fair value hierarchy). In the next 12 months, the Company

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will reclassify into earnings realized gains or losses relating to cash flow hedges. At December 29, 2018, this amount was approximately \$0.4 million of deferred net losses, net of tax.

The Company may also enter into futures contracts to protect the value of inventory against market fluctuations. At December 29, 2018, the Company held open futures contracts to sell approximately \$3.1 million of copper over the next five months related to copper inventory. The fair value of those futures contracts was a \$0.1 million net gain position, which was determined by obtaining quoted market prices (level 1 within the fair value hierarchy).

The Company presents its derivative assets and liabilities in the Consolidated Balance Sheets on a net basis by counterparty. The following table summarizes the location and fair value of the derivative instruments and disaggregates the net derivative assets and liabilities into gross components on a contract-by-contract basis:

(In thousands)	Asset Derivatives		Liability Derivatives	
	Balance Sheet Location	Fair Value 2018 2017	Balance Sheet Location	Fair Value 2018 2017
Commodity contracts - gains	Other current assets	\$88 \$1,014	Other current liabilities	\$103 \$55
Commodity contracts - losses	Other current assets	(1) (5)	Other current liabilities	(1,382) (3,210)
Total derivatives ⁽¹⁾		\$87 \$1,009		\$(1,279) \$(3,155)

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

The following table summarizes the effects of derivative instruments on the Consolidated Statements of Income:

(In thousands)	Location	2018	2017
Fair value hedges:			
Gain (loss) on commodity contracts (qualifying)	Cost of goods sold	\$391	\$(724)
(Loss) gain on hedged item - inventory	Cost of goods sold	(385)	625

Undesignated derivatives:

Gain (loss) on commodity contracts (nonqualifying)	Cost of goods sold	\$4,227	\$(6,078)
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The following tables summarize amounts recognized in and reclassified from AOCI during the period:

(In thousands)	Year Ended December 29, 2018	
	Loss Recognized in AOCI (Effective Portion), Net of Tax	Gain Reclassified from AOCI (Effective Portion), Net of Tax
Cash flow hedges:		
Commodity contracts	\$(793) Cost of goods sold	\$ (371)
Other	(9) Other	—
Total	\$(802) Total	\$ (371)

(In thousands)	Year Ended December 30, 2017		Loss Reclassified from AOCI (Effective Portion), Net of Tax
	Gain Recognized in AOCI Classification (Effective Portion), Net of Tax	Gains (Losses)	
Cash flow hedges:			
Commodity contracts	\$ (574)	Cost of goods sold	\$ 990
Interest rate swap	—	Interest expense	546
Other	185	Other	—
Total	\$ (389)	Total	\$ 1,536

The Company enters into futures and forward contracts that closely match the terms of the underlying transactions. As a result, the ineffective portion of the qualifying open hedge contracts through December 29, 2018 was not material to the Consolidated Statements of Income.

The Company primarily enters into International Swaps and Derivatives Association master netting agreements with major financial institutions that permit the net settlement of amounts owed under their respective derivative contracts. Under these master netting agreements, net settlement generally permits the Company or the counterparty to determine the net amount payable for contracts due on the same date and in the same currency for similar types of derivative transactions. The master netting agreements generally also provide for net settlement of all outstanding contracts with the counterparty in the case of an event of default or a termination event. The Company does not offset fair value amounts for derivative instruments and fair value amounts recognized for the right to reclaim cash collateral. At December 29, 2018 and December 30, 2017, the Company had recorded restricted cash in other current assets of \$3.6 million and \$5.3 million, respectively, as collateral related to open derivative contracts under the master netting arrangements.

Note 7 – Property, Plant, and Equipment, Net

(In thousands)	2018	2017
Land and land improvements	\$32,132	\$18,740
Buildings	201,176	144,527
Machinery and equipment	635,173	649,667
Construction in progress	22,618	9,274
	891,099	822,208
Less accumulated depreciation	(520,466)	(517,887)
Property, plant, and equipment, net	\$370,633	\$304,321

Depreciation expense for property, plant, and equipment was \$35.1 million in 2018, \$30.8 million in 2017, and \$30.8 million in 2016.

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Note 8 – Goodwill and Other Intangible Assets

Goodwill

The changes in the carrying amount of goodwill by segment were as follows:

(In thousands)	Piping Systems	Industrial Metals	Climate	Total
Goodwill	\$160,128	\$8,854	\$4,416	\$173,398
Accumulated impairment charges	(40,552)	(8,853)	—	(49,405)
Balance at December 31, 2016:	119,576	1	4,416	123,993
Additions ⁽¹⁾	3,852	—	—	3,852
Currency translation	2,448	—	—	2,448
Balance at December 30, 2017:	125,876	1	4,416	130,293
Additions ⁽²⁾	5,049	—	17,770	22,819
Currency translation	(2,777)	—	—	(2,777)
Balance at December 29, 2018:				
Goodwill	168,700	8,854	22,186	199,740
Accumulated impairment charges	(40,552)	(8,853)	—	(49,405)
Goodwill, net	\$128,148	\$1	\$22,186	\$150,335

⁽¹⁾ Includes finalization of the purchase price allocation adjustment for Jungwoo-Mueller of \$0.2 million.

⁽²⁾ Includes finalization of the purchase price allocation adjustment for Heatlink Group of \$2.8 million.

Reporting units with recorded goodwill include Domestic Piping Systems Group, B&K LLC, Great Lakes, Heatlink Group, Die-Mold, European Operations, Jungwoo-Mueller, Westermeyer, Turbotec, and ATCO. Several factors give rise to goodwill in the Company's acquisitions, such as the expected benefit from synergies of the combination and the existing workforce of the acquired businesses. There were no impairment charges resulting from the 2018, 2017, or 2016 annual impairment tests as the estimated fair value of each of the reporting units exceeded its carrying value.

Other Intangible Assets

The carrying amount of intangible assets at December 29, 2018 was as follows:

(In thousands)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer relationships	\$43,104	\$(6,309)	\$36,795
Non-compete agreements	2,400	(1,582)	818
Patents and technology	17,879	(2,595)	15,284
Trade names and licenses	9,173	(2,188)	6,985
Other	2,526	(437)	2,089

Other intangible assets \$ 75,082 \$ (13,111) \$ 61,971

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The carrying amount of intangible assets at December 30, 2017 was as follows:

(In thousands)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer relationships	\$ 36,518	\$ (4,644)	\$ 31,874
Non-compete agreements	2,834	(1,497)	1,337
Patents and technology	7,673	(1,868)	5,805
Trade names and licenses	4,977	(1,575)	3,402
Other	213	(623)	(410)
Other intangible assets	\$ 52,215	\$ (10,207)	\$ 42,008

Amortization expense for intangible assets was \$4.4 million in 2018, \$3.1 million in 2017, and \$4.3 million in 2016. Future amortization expense is estimated as follows:

(In thousands)	Amount
2019	\$5,242
2020	5,047
2021	4,773
2022	4,693
2023	4,297
Thereafter	37,919

Expected amortization expense \$61,971

Note 9 – Investments in Unconsolidated Affiliates

Tecumseh

The Company owns a 50 percent interest in an unconsolidated affiliate that acquired Tecumseh. The Company also owns a 50 percent interest in a second unconsolidated affiliate that provides financing to Tecumseh. Tecumseh is a global manufacturer of hermetically sealed compressors for residential and specialty air conditioning, household refrigerators and freezers, and commercial refrigeration applications, including air conditioning and refrigeration compressors, as well as condensing units, heat pumps, and complete refrigeration systems.

The following tables present summarized financial information derived from the Company's equity method investees' combined consolidated financial statements, which are prepared in accordance with U.S. GAAP.

(In thousands)	2018	2017
Current assets	\$228,214	\$246,127
Noncurrent assets	114,257	139,200
Current liabilities	175,371	174,710
Noncurrent liabilities	57,216	58,334

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Net sales	\$509,517	\$556,600
Gross profit	59,385	75,600
Net loss	(20,049)	(4,153)

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The Company's loss from unconsolidated affiliates, net of foreign tax, for 2018 included net losses of \$14.0 million and charges of \$3.0 million related to certain labor claim contingencies, offset by a gain of \$7.0 million related to a settlement with the Brazilian Federal Revenue Agency for Tecumseh.

Mueller Middle East

On December 30, 2015, the Company entered into a joint venture agreement with Cayan Ventures and Bahrain Mumtalakat Holding Company to build a copper tube mill in Bahrain. The business operates and brands its products under the Mueller Industries family of brands. The Company has invested approximately \$4.5 million of cash to date and is the technical and marketing lead with a 40 percent ownership in the joint venture.

The Company's loss from unconsolidated affiliates, net of foreign tax, for 2018 included net losses of \$2.6 million for Mueller Middle East.

Note 10 – Debt

(In thousands)	2018	2017
Subordinated Debentures with interest at 6.00%, due 2027	\$284,479	\$284,536
Revolving Credit Facility with interest at 3.97%, due 2021	195,000	160,000
Jungwoo-Mueller credit facility with interest at 2.86%, due 2019	5,264	5,119
Jungwoo-Mueller credit facility with interest at 3.45%, due 2020	5,104	8,648
2001 Series IRB's with interest at 3.22%, due 2021	2,250	3,250
Other	5,458	4,694
	497,555	466,247
Less debt issuance costs	(857)	(1,175)
Less current portion of debt	(7,101)	(16,480)
Long-term debt	\$489,597	\$448,592

Subordinated Debentures

On March 9, 2017, the Company distributed a special dividend of \$3.00 in cash and \$5.00 in principal amount of the Company's 6% Subordinated Debentures (Debentures) due March 1, 2027 for each share of common stock outstanding. Interest on the Debentures is payable semiannually on September 1 and March 1.

The Debentures are subordinated to all other funded debt of the Company and are callable, in whole or in part, at any time at the option of the Company, subject to declining call premiums during the first five years. The Debentures also grant each holder the right to require the Company to repurchase such holder's Debentures in the event of a change in control at declining repurchase premiums during the first five years. The Debentures may be redeemed, subject to the conditions set forth above, at the following redemption price (expressed as a percentage of principal amount) plus any accrued but unpaid interest to, but excluding, the redemption date:

If redeemed during the 12-month period beginning March 9:

Year	Redemption Price
------	------------------

2018	105%
2019	104
2020	103
2021	102
2022 and thereafter	100

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Revolving Credit Facility

The Company's Credit Agreement provides for an unsecured \$350.0 million revolving credit facility (Revolving Credit Facility) that matures on December 6, 2021. Borrowings under the Revolving Credit Facility bear interest, at the Company's option, at LIBOR or Base Rate as defined by the Credit Agreement, plus a variable premium. LIBOR advances may be based upon the one, three, or six-month LIBOR. The variable premium is based upon the Company's debt to total capitalization ratio, and can range from 112.5 to 162.5 basis points for LIBOR based loans and 12.5 to 62.5 basis points for Base Rate loans. At December 29, 2018, the premium was 162.5 basis points for LIBOR loans and 62.5 basis points for Base Rate loans. Additionally, a commitment fee is payable quarterly on the total commitment less any outstanding loans or issued letters of credit, and varies from 15.0 to 30.0 basis points based upon the Company's debt to total capitalization ratio. Availability of funds under the Revolving Credit Facility is reduced by the amount of certain outstanding letters of credit, which are used to secure the Company's payment of insurance deductibles and certain retiree health benefits, totaling approximately \$8.5 million at December 29, 2018. Terms of the letters of credit are generally renewable annually.

Jungwoo-Mueller

Jungwoo-Mueller has several secured revolving credit arrangements with a total borrowing capacity of KRW 28.8 billion (or approximately \$25.3 million). Borrowings are secured by the real property and equipment of Jungwoo-Mueller.

Covenants contained in the Company's financing obligations require, among other things, the maintenance of minimum levels of tangible net worth and the satisfaction of certain minimum financial ratios. At December 29, 2018, the Company was in compliance with all debt covenants.

Aggregate annual maturities of the Company's debt are as follows:

(In thousands)	Amount
2019	\$7,101
2020	6,831
2021	195,955
2022	618
2023	402
Thereafter	286,648

Long-term debt \$497,555

Net interest expense consisted of the following:

(In thousands)	2018	2017	2016
Interest expense	\$25,349	\$19,716	\$7,749
Capitalized interest	(150)	(214)	(362)
	\$25,199	\$19,502	\$7,387

Interest paid in 2018, 2017, and 2016 was \$25.2 million, \$13.8 million, and \$7.1 million, respectively.

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Note 11 – Benefit Plans

Pension and Other Postretirement Plans

The Company sponsors several qualified and nonqualified pension plans and other postretirement benefit plans for certain employees. The following tables provide a reconciliation of the changes in the plans' benefit obligations and the fair value of the plans' assets for 2018 and 2017, and a statement of the plans' aggregate funded status:

(In thousands)	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Change in benefit obligation:				
Obligation at beginning of year	\$186,766	\$178,736	\$16,407	\$15,274
Service cost	88	128	235	235
Interest cost	5,745	6,344	447	599
Actuarial (gain) loss	(10,637)	4,688	(1,185)	923
Benefit payments	(10,368)	(10,171)	(892)	(883)
Settlement charge	—	—	(171)	(209)
Foreign currency translation adjustment	(4,855)	7,041	(459)	468
Obligation at end of year	166,739	186,766	14,382	16,407
Change in fair value of plan assets:				
Fair value of plan assets at beginning of year	186,336	169,140	—	—
Actual return on plan assets	(8,282)	19,175	—	—
Employer contributions	999	2,271	892	883
Benefit payments	(10,368)	(10,171)	(892)	(883)
Foreign currency translation adjustment	(4,082)	5,921	—	—
Fair value of plan assets at end of year	164,603	186,336	—	—
Underfunded status at end of year	\$(2,136)	\$(430)	\$(14,382)	\$(16,407)

The following represents amounts recognized in AOCI (before the effect of income taxes):

(In thousands)	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Unrecognized net actuarial loss	\$39,101	\$34,627	\$170	\$1,540
Unrecognized prior service credit	—	—	(6,387)	(7,289)

The Company sponsors one pension plan in the U.K. which comprised 45 and 44 percent of the above benefit obligation at December 29, 2018 and December 30, 2017, respectively, and 37 and 39 percent of the above plan assets at December 29, 2018 and December 30, 2017, respectively.

As of December 29, 2018, \$1.8 million of the actuarial net loss and \$0.9 million of the prior service credit will, through amortization, be recognized as components of net periodic benefit cost in 2019.

The aggregate status of all overfunded plans is recognized as an asset and the aggregate status of all underfunded plans is recognized as a liability in the Consolidated Balance Sheets. The amounts recognized as a liability are classified as current or long-term on a plan-by-plan basis. Liabilities are classified as current to the extent the actuarial present value of benefits payable within the next 12 months exceeds the fair value of plan assets, with all remaining amounts classified as long-term.

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As of December 29, 2018 and December 30, 2017, the total funded status of the plans recognized in the Consolidated Balance Sheets was as follows:

(In thousands)	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Long-term asset	\$10,580	\$9,894	\$—	\$—
Current liability	—	—	(1,080)	(1,070)
Long-term liability	(12,716)	(10,324)	(13,302)	(15,337)
Total underfunded status	\$(2,136)	\$(430)	\$(14,382)	\$(16,407)

The components of net periodic benefit cost (income) are as follows:

(In thousands)	2018	2017	2016
Pension benefits:			
Service cost	\$88	\$128	\$532
Interest cost	5,745	6,344	7,553
Expected return on plan assets	(9,522)	(9,374)	(9,615)
Amortization of net loss	1,151	2,206	2,898
Settlement charge	—	—	1,214
Net periodic benefit (income) cost	\$(2,538)	\$(696)	\$2,582
Other benefits:			
Service cost	\$235	\$235	\$232
Interest cost	447	599	594
Amortization of prior service credit	(902)	(901)	(896)
Amortization of net loss (gain)	92	(42)	(60)
Settlement charge	38	17	—
Net periodic benefit income	\$(90)	\$(92)	\$(130)

The components of net periodic benefit cost (income) other than the service cost component are included in other income, net in the Consolidated Statements of Income.

The weighted average assumptions used in the measurement of the Company's benefit obligations are as follows:

	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Discount rate	3.72%	3.22%	4.56%	3.89%
Expected long-term return on plan assets	5.05%	5.27%	N/A	N/A
Rate of compensation increases	N/A	N/A	5.00%	5.00%
Rate of inflation	3.40%	3.30%	N/A	N/A

The weighted average assumptions used in the measurement of the Company's net periodic benefit cost are as follows:

	Pension Benefits			Other Benefits		
	2018	2017	2016	2018	2017	2016
Discount rate	3.22%	3.61%	4.02%	3.89%	4.21%	4.25%
Expected long-term return on plan assets	5.27%	5.56%	5.59%	N/A	N/A	N/A
Rate of compensation increases	N/A	N/A	N/A	5.00%	5.00%	5.00%
Rate of inflation	3.30%	3.30%	3.20%	N/A	N/A	N/A

The Company's Mexican postretirement plans use the rate of compensation increase in the benefit formulas. Past service in the U.K. pension plan will be adjusted for the effects of inflation. All other pension and postretirement plans use benefit formulas based on length of service.

The annual assumed rate of increase in the per capita cost of covered benefits (i.e., health care cost trend rate) is assumed to range from 6.4 to 8.4 percent for 2019, gradually decrease to 3.0 percent through 2036, and remain at that level thereafter. The health care cost trend rate assumption does not have a significant effect on the amounts reported.

Pension Assets

The weighted average asset allocation of the Company's pension fund assets are as follows:

Asset category	Pension Plan Assets	
	2018	2017
Fixed income securities (includes fixed income mutual funds)	54 %	48 %
Equity securities (includes equity mutual funds)	35	46
Cash and equivalents (includes money market funds)	8	3
Alternative investments	3	3
Total	100%	100%

At December 29, 2018, the long-term target allocation, by asset category, of assets of the Company's defined benefit pension plans was: (i) fixed income securities – at least 60 percent; (ii) equity securities, including equity index funds – not more than 30 percent; and (iii) alternative investments – not more than 5 percent.

The pension plan obligations are long-term and, accordingly, the plan assets are invested for the long-term. Plan assets are monitored periodically. Based upon results, investment managers and/or asset classes are redeployed when considered necessary. None of the plans' assets are expected to be returned to the Company during the next fiscal year. The assets of the plans do not include investments in securities issued by the Company.

The estimated rates of return on plan assets are the expected future long-term rates of earnings on plan assets and are forward-looking assumptions that materially affect pension cost. Establishing the expected future rates of return on pension assets is a judgmental matter. The Company reviews the expected long-term rates of return on an annual basis and revises as appropriate. The expected long-term rate of return on plan assets was 5.05 percent for 2018 and 5.27 percent in 2017.

The Company's investments for its pension plans are reported at fair value. The following methods and assumptions were used to estimate the fair value of the Company's plan asset investments:

Cash and money market funds – Valued at cost, which approximates fair value.

Common stock – Valued at the closing price reported on the active market on which the individual securities are traded.

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Mutual funds – Valued at the net asset value of shares held by the plans at December 29, 2018 and December 30, 2017, respectively, based upon quoted market prices.

Limited partnerships – Limited partnerships include investments in various Cayman Island multi-strategy hedge funds. The plans' investments in limited partnerships are valued at the estimated fair value of the class shares owned by the plans based upon the equity in the estimated fair value of those shares. The estimated fair values of the limited partnerships are determined by the investment managers. In determining fair value, the investment managers of the limited partnerships utilize the estimated net asset valuations of the underlying investment entities. The underlying investment entities value securities and other financial instruments on a mark-to-market or estimated fair value basis. The estimated fair value is determined by the investment managers based upon, among other things, the type of investments, purchase price, marketability, current financial condition, operating results, and other information. The estimated fair values of substantially all of the investments of the underlying investment entities, which may include securities for which prices are not readily available, are determined by the investment managers or management of the respective underlying investment entities and may not reflect amounts that could be realized upon immediate sale. Accordingly, the estimated fair values may differ significantly from the values that would have been used had a ready market existed for these investments.

The following table sets forth by level, within the fair value hierarchy, the assets of the plans at fair value:

(In thousands)	Fair Value Measurements at December 29, 2018			
	Level 1	Level 2	Level 3	Total
Cash and money market funds	\$12,984	\$—	\$—	\$12,984
Mutual funds ⁽¹⁾	—	146,591	—	146,591
Limited partnerships	—	—	5,028	5,028
Total	\$12,984	\$146,591	\$5,028	\$164,603

(In thousands)	Fair Value Measurements at December 30, 2017			
	Level 1	Level 2	Level 3	Total
Cash and money market funds	\$5,364	\$—	\$—	\$5,364
Common stock ⁽²⁾	11,113	—	—	11,113
Mutual funds ⁽³⁾	8,412	156,442	—	164,854
Limited partnerships	—	—	5,005	5,005
Total	\$24,889	\$156,442	\$5,005	\$186,336

Approximately 61 percent of mutual funds are actively managed funds and approximately 39 percent of mutual funds are index funds. Additionally, five percent of the mutual funds' assets are invested in U.S. equities, 35 percent in non-U.S. equities, 59 percent in U.S. fixed income securities, and one percent in non-U.S. fixed income securities.

(2) Approximately 91 percent of common stock represents investments in U.S. companies primarily in the health care, utilities, financials, consumer staples, industrials, and information technology sectors. All investments in common stock are listed on U.S. stock exchanges.

(3) Approximately 66 percent of mutual funds are actively managed funds and approximately 34 percent of mutual funds are index funds. Additionally, five percent of the mutual funds' assets are invested in U.S. equities, 41 percent in non-U.S. equities, 52 percent in U.S. fixed income securities, and two percent in non-U.S. fixed income securities.

The table below reflects the changes in the assets of the plan measured at fair value on a recurring basis using significant unobservable inputs (level 3 of fair value hierarchy) during the year ended December 29, 2018:

(In thousands)	Limited Partnerships
Balance, December 30, 2017	\$ 5,005
Redemptions	(108)
Subscriptions	108
Net appreciation in fair value	23
Balance, December 29, 2018	\$ 5,028

Contributions and Benefit Payments

The Company expects to contribute approximately \$0.1 million to its pension plans and \$1.1 million to its other postretirement benefit plans in 2019. The Company expects future benefits to be paid from the plans as follows:

(In thousands)	Pension Benefits	Other Benefits
2019	\$ 10,416	\$ 1,102
2020	10,342	1,244
2021	10,283	1,061
2022	10,241	1,112
2023	10,196	1,226
2024-2028	49,820	5,821
Total	\$ 101,298	\$ 11,566

Multiemployer Plan

The Company contributes to the IAM National Pension Fund, National Pension Plan (IAM Plan), a multiemployer defined benefit plan. Participation in the IAM Plan was negotiated under the terms of two collective bargaining agreements in Port Huron, Michigan, the Local 218 IAM and Local 44 UAW that expire on May 5, 2019 and July 21, 2019, respectively. The Employer Identification Number for this plan is 51-6031295.

The risks of participating in multiemployer plans are different from single-employer plans in the following aspects: (i) assets contributed to the multiemployer plan by one employer may be used to provide benefits to employees of other participating employers; (ii) if a participating employer stops contributing to the plan, the underfunded obligations of the plan may be borne by the remaining participating employers; (iii) if the Company chooses to stop participating in the plan, the Company may be required to pay the plan an amount based on the underfunded status of the plan, referred to as a withdrawal liability.

The Company makes contributions to the IAM Plan trusts that cover certain union employees; contributions by employees are not permitted. Contributions to the IAM Plan were approximately \$1.3 million in 2018, \$1.1 million in 2017, and \$1.1 million in 2016. The Company's contributions are less than five percent of total employer contributions made to the IAM Plan indicated in the most recently filed Form 5500.

Under the Pension Protection Act of 2006, the IAM Plan's actuary must certify the plan's zone status annually. Plans in the red zone are generally less than 65 percent funded, plans in the yellow zone are less than 80 percent funded, and plans in the green zone are at least 80 percent funded. If a plan is determined to be in endangered status, red zone or yellow zone, the plan's trustees must develop a formal plan of corrective action, a Financial Improvement Plan and/or a Rehabilitation Plan. For 2018 and 2017 the IAM Plan was determined to have green zone status; therefore, no formal plan of corrective action is either pending or has been implemented.

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401(k) Plans

The Company sponsors voluntary employee savings plans that qualify under Section 401(k) of the Internal Revenue Code of 1986. Compensation expense for the Company's matching contribution to the 401(k) plans was \$5.1 million in 2018, \$5.1 million in 2017, and \$5.2 million in 2016. The Company match is a cash contribution. Participants direct the investment of their account balances by allocating among a range of asset classes including mutual funds (equity, fixed income, and balanced funds) and money market funds. The plans do not allow direct investment in securities issued by the Company.

UMWA Benefit Plans

In October 1992, the Coal Industry Retiree Health Benefit Act of 1992 (1992 Act) was enacted. The 1992 Act mandates a method of providing for postretirement benefits to the United Mine Workers of America (UMWA) current and retired employees, including some retirees who were never employed by the Company. In October 1993, beneficiaries were assigned to the Company and the Company began its mandated contributions to the UMWA Combined Benefit Fund, a multiemployer trust. Beginning in 1994, the Company was required to make contributions for assigned beneficiaries under an additional multiemployer trust created by the 1992 Act, the UMWA 1992 Benefit Plan. The ultimate amount of the Company's liability under the 1992 Act will vary due to factors which include, among other things, the validity, interpretation, and regulation of the 1992 Act, its joint and several obligation, the number of valid beneficiaries assigned, and the extent to which funding for this obligation will be satisfied by transfers of excess assets from the 1950 UMWA pension plan and transfers from the Abandoned Mine Reclamation Fund. Contributions to the plan were \$153 thousand, \$182 thousand, and \$197 thousand for the years ended 2018, 2017, and 2016, respectively.

Note 12 – Commitments and Contingencies

Environmental

The Company is subject to federal, state, local, and foreign environmental laws and regulations. For all properties, the Company has provided and charged to expense \$2.0 million in 2018, \$7.5 million in 2017, and \$0.9 million in 2016 for pending environmental matters. Environmental reserves totaled \$23.6 million at December 29, 2018 and \$28.0 million at December 30, 2017. As of December 29, 2018, the Company expects to spend \$3.6 million in 2019, \$0.6 million in 2020, \$0.6 million in 2021, \$0.6 million in 2022, \$0.7 million in 2023, and \$17.5 million thereafter for ongoing projects.

Non-operating Properties

Southeast Kansas Sites

The Kansas Department of Health and Environment (KDHE) has contacted the Company regarding environmental contamination at three former smelter sites in Kansas (Altoona, East La Harpe, and Lanyon). The Company is not a successor to the companies that operated these smelter sites, but is exploring possible settlement with KDHE and other potentially responsible parties (PRP) in order to avoid litigation.

Altoona. Another PRP conducted a site investigation of the Altoona site under a consent decree with KDHE and submitted a removal site evaluation report recommending a remedy. The remedial design plan, which covers both on-site and certain off-site cleanup costs, was approved by the KDHE in 2016.

East La Harpe. At the East La Harpe site, the Company and two other PRPs conducted a site study evaluation under KDHE supervision and prepared a site cleanup plan approved by KDHE. In 2016, the corporate parent (Peabody Energy) of a third party that the Company understands may owe indemnification obligations to one of the other PRPs (Blue Tee) in connection with the East La Harpe site filed for protection under Chapter 11 of the U.S. Bankruptcy Code. KDHE has extended the deadline for the PRPs to develop a repository design plan to allow for wetlands permitting to take place. In December 2018, KDHE provided a draft agreement which contemplates the use of funds KDHE obtained from two other parties (Peabody Energy and Blue Tee) to fund part of the remediation, and removes Blue Tee from the PRPs' agreement with KDHE. The Company is currently negotiating the terms of the draft agreement.

Lanyon. With respect to the Lanyon Site, in 2016, the Company received a general notice letter from the United States Environmental Protection Agency (EPA) asserting that the Company is a PRP, which the Company has denied.

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The Company's reserve for its proportionate share of the remediation costs associated with these three Southeast Kansas sites is \$5.6 million.

Shasta Area Mine Sites

Mining Remedial Recovery Company (MRRC), a wholly owned subsidiary, owns certain inactive mines in Shasta County, California. MRRC has continued a program, begun in the late 1980s, of implementing various remedial measures, including sealing mine portals with concrete plugs in portals that were discharging water. The sealing program achieved significant reductions in the metal load in discharges from these adits; however, additional reductions are required pursuant to an order issued by the California Regional Water Quality Control Board (QCB). In response to a 1996 QCB Order, MRRC completed a feasibility study in 1997 describing measures designed to mitigate the effects of acid rock drainage. In December 1998, the QCB modified the 1996 order extending MRRC's time to comply with water quality standards. In September 2002, the QCB adopted a new order requiring MRRC to adopt Best Management Practices (BMP) to control discharges of acid mine drainage, and again extended the time to comply with water quality standards until September 2007. During that time, implementation of BMP further reduced impacts of acid rock drainage; however, full compliance has not been achieved. The QCB is presently renewing MRRC's discharge permit and will concurrently issue a new order. It is expected that the new 10-year permit will include an order requiring continued implementation of BMP through 2029 to address residual discharges of acid rock drainage. At this site, MRRC spent approximately \$1.4 million from 2016 through 2018 for remediation, and currently estimates that it will spend between approximately \$12.8 million and \$17.5 million over the next 30 years.

Lead Refinery Site

U.S.S. Lead Refinery, Inc. (Lead Refinery), a non-operating wholly owned subsidiary of MRRC, has conducted corrective action and interim remedial activities (collectively, Site Activities) at Lead Refinery's East Chicago, Indiana site pursuant to the Resource Conservation and Recovery Act since December 1996. Although the Site Activities have been substantially concluded, Lead Refinery is required to perform monitoring and maintenance-related activities pursuant to a post-closure permit issued by the Indiana Department of Environmental Management effective as of March 2, 2013. Lead Refinery spent approximately \$0.7 million from 2016 through 2018 with respect to this site. Approximate costs to comply with the post-closure permit, including associated general and administrative costs, are estimated at between \$1.7 million and \$2.1 million over the next 18 years.

On April 9, 2009, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the U.S. Environmental Protection Agency (EPA) added the Lead Refinery site and surrounding properties to the National Priorities List (NPL). On July 17, 2009, Lead Refinery received a written notice from the EPA indicating that it may be a PRP under CERCLA due to the release or threat of release of hazardous substances including lead into properties surrounding the Lead Refinery NPL site. The EPA identified two other PRPs in connection with that matter. In November 2012, the EPA adopted a remedy for the surrounding properties and in September 2014, the EPA announced that it had entered into a settlement with the two other PRPs whereby they will pay approximately \$26.0 million to fund the cleanup of approximately 300 properties surrounding the Lead Refinery NPL site (zones 1 and 3 of operable unit 1) and perform certain remedial action tasks.

On November 8, 2016, the Company, its subsidiary Arava Natural Resources Company, Inc. (Arava), and Arava's subsidiary MRRC each received general notice letters from the EPA asserting that they may be PRPs in connection with the Lead Refinery NPL site. The Company, Arava, and MRRC have denied liability for any remedial action and response costs associated with the Lead Refinery NPL site. In June 2017, the EPA requested that Lead Refinery conduct, and the Company fund, a remedial investigation and feasibility study of operable unit 2 of the Lead Refinery NPL site pursuant to a proposed administrative settlement agreement and order on consent. The Company and Lead

Refinery entered into that agreement in September 2017. The Company has made a capital contribution to Lead Refinery to conduct the remedial investigation and feasibility study with respect to operable unit 2 and has provided a financial guarantee in the amount of \$1.0 million. The EPA has also asserted its position that Mueller is a responsible party for the Lead Refinery NPL site, and accordingly is responsible for a share of remedial action and response costs at the site and in the adjacent residential area.

In January 2018, the EPA issued two unilateral administrative orders (UAOs) directing the Company, Lead Refinery, and four other PRPs to conduct soil and interior remediation of certain residences at the Lead Refinery NPL site (zones 2 and 3 of operable unit 1). The Company and Lead Refinery have reached agreement with the four other PRPs to implement these two UAOs, with the Company agreeing to pay, on an interim basis, (i) an estimated \$4.5 million (subject to potential change through a future reallocation process) of the approximately \$25.0 million the PRPs currently estimate it will cost to implement the UAOs, which estimate is subject to change, and (ii) \$2.0 million relating to past costs incurred by other PRPs for work conducted at the site. As of year-end, the Company has made payments of \$4.5 million related to the aforementioned agreement with the other PRPs and has included \$2.5 million in the reserve for environmental liabilities as of December 29, 2018. The Company disputes that it was properly named in the UAOs, and has reserved its rights to petition the EPA for reimbursement of any costs incurred to comply

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with the UAOs upon the completion of the work required therein. In October 2017, a group of private plaintiffs sued the Company, Arava, MRRC, and Lead Refinery, along with other defendants, in a private tort action relating to the site; the Company, Arava, and MRRC were voluntarily dismissed from that litigation without prejudice in March 2018. A second civil action asserting similar claims was filed against the Company, Arava, MRRC, and Lead Refinery in September 2018. At this juncture, the Company is unable to determine the likelihood of a material adverse outcome or the amount or range of a potential loss in excess of the current reserve with respect to any remedial action or litigation relating to the Lead Refinery NPL site, either at Lead Refinery's former operating site (operable unit 2) or the adjacent residential area (operable unit 1).

Bonita Peak Mining District

Following an August 2015 spill from the Gold King Mine into the Animas River near Silverton, Colorado, the EPA listed the Bonita Peak Mining District on the NPL. Said listing was finalized in September 2016. The Bonita Peak Mining District encompasses 48 mining sites within the Animas River watershed, including the Sunnyside Mine, the American Tunnel, and the Sunbank Group. On or about July 25, 2017, Washington Mining Company (Washington Mining) (a wholly-owned subsidiary of the Company's wholly-owned subsidiary, Arava), received a general notice letter from the EPA stating that Washington Mining may be a PRP under CERCLA in connection with the Bonita Peak Mining District site and therefore responsible for the remediation of certain portions of the site, along with related costs incurred by the EPA. Shortly thereafter, the Company received a substantively identical letter asserting that it may be a PRP at the Site and similarly responsible for the cleanup of certain portions of the site. The general notice letters identify one other PRP at the site, and do not require specific action by Washington Mining or the Company at this time. At this juncture, the Company is unable to determine the likelihood of a materially adverse outcome or the amount or range of a potential loss with respect to any remedial action related to the Bonita Peak Mining District NPL site.

Operating Properties

Mueller Copper Tube Products, Inc.

In 1999, Mueller Copper Tube Products, Inc. (MCTP), a wholly owned subsidiary, commenced a cleanup and remediation of soil and groundwater at its Wynne, Arkansas plant to remove trichloroethylene, a cleaning solvent formerly used by MCTP. On August 30, 2000, MCTP received approval of its Final Comprehensive Investigation Report and Storm Water Drainage Investigation Report addressing the treatment of soils and groundwater from the Arkansas Department of Environmental Quality (ADEQ). The Company established a reserve for this project in connection with the acquisition of MCTP in 1998. Effective November 17, 2008, MCTP entered into a Settlement Agreement and Administrative Order by Consent to submit a Supplemental Investigation Work Plan (SIWP) and subsequent Final Remediation Work Plan (RWP) for the site. By letter dated January 20, 2010, ADEQ approved the SIWP as submitted, with changes acceptable to the Company. On December 16, 2011, MCTP entered into an amended Administrative Order by Consent to prepare and implement a revised RWP regarding final remediation for the Site. The remediation system was activated in February 2014. Costs to implement the work plans, including associated general and administrative costs, are estimated to approximate \$0.7 million to \$1.1 million over the next seven years.

United States Department of Commerce Antidumping Review

On December 24, 2008, the Department of Commerce (DOC) initiated an antidumping administrative review of the antidumping duty order covering circular welded non-alloy steel pipe and tube from Mexico for the November 1, 2007 through October 31, 2008 period of review. The DOC selected Mueller Comercial as a respondent in the

review. On April 19, 2010, the DOC published the final results of the review and assigned Mueller Comercial an antidumping duty rate of 48.33 percent. On May 25, 2010, the Company appealed the final results to the U.S. Court of International Trade (CIT). On December 16, 2011, the CIT issued a decision remanding the Department's final results. While the matter was still pending, the Company and the United States reached an agreement to settle the appeal. Subject to the conditions of the agreement, the Company anticipated that certain of its subsidiaries would incur antidumping duties on subject imports made during the period of review and, as such, established a reserve for this matter. After the lapse of the statutory period of time during which U.S. Customs and Border Protection (CBP) was required, but failed, to liquidate the entries at the settled rate, the Company released the reserve. Between October 30, 2015 and November 27, 2015, CBP sent a series of invoices to Southland Pipe Nipples Co., Inc. (Southland), requesting payment of approximately \$3.0 million in duties and interest in connection with 795 import entries made during the November 1, 2007 through October 31, 2008 period. On January 26, 2016 and January 27, 2016, Southland filed protests with CBP in connection with these invoices, noting that CBP's asserted claims were not made in accordance with applicable law, including statutory provisions governing deemed liquidation. The Company believes in the merits of the legal objections raised in Southland's protests, and CBP's response to Southland's protests is currently pending. Given the procedural posture and issues raised by this legal dispute, the Company cannot estimate the amount of potential duty liability, if any, that may result from CBP's asserted claims.

Equal Employment Opportunity Commission Matter

On October 5, 2016, the Company received a demand letter from the Los Angeles District Office of the United States Equal Employment Opportunity Commission (EEOC). The EEOC alleges that between May 2011 and April 2015, various Company employees were terminated in violation of the Americans with Disabilities Act (ADA), and that certain of the Company's employee leave and attendance policies were discriminatory in nature. Thereafter, the Company, in consultation with its liability insurers, entered into conciliation and mediation efforts with the EEOC for purposes of resolving the claims. At the conclusion of those efforts, the Company and the EEOC reached agreement on a consensual resolution of the EEOC's claims, which includes both monetary and equitable relief.

On June 28, 2018, the EEOC filed a complaint against the Company on behalf of a group of unidentified claimants in the United States District Court for the Central District of California alleging that the Company engaged in unlawful employment practices in violation of the ADA. On July 13, 2018, the District Court approved a Consent Decree between the Company and the EEOC to resolve the EEOC's claims. The Consent Decree, the term of which shall be two and a half years, provides that the Company shall pay up to \$1.0 million in monetary relief to fund individual claims for discrimination under the ADA as approved by the EEOC. That amount is fully within the limits of the Company's applicable insurance coverage. Pursuant to the Consent Decree, the Company shall also take a series of proactive measures to cultivate a work environment free from unlawful discrimination. Those measures include, among others, assistance with the identification of potential claimants, employee, supervisory and managerial training regarding employee rights under the ADA, revised practices and procedures concerning reasonable workplace accommodations as required by the ADA, and related reporting and recordkeeping.

Deepwater Horizon Economic and Property Damage Claim

In November 2018, an Appeal Panel of the Deepwater Horizon Economic and Property Damage Settlement Program approved an award to Mueller Copper Tube Company, Inc., a wholly owned subsidiary of the Company, of \$27.4 million. In January 2019, the United States District Court for the Eastern District of Louisiana denied discretionary review of the award, and an appeal of the award is currently pending before the United States Court of Appeals for the Fifth Circuit. The award, if upheld, is subject to the Company's payment of contingency-based legal and advisory fees of approximately 20 percent of the total award amount. Any recovery following the payment of such fees and any applicable taxes will be recognized as income when settled. There can be no assurance that the Company will receive such award, and it is possible such award will be materially reduced or reversed in its entirety upon appeal.

Leases

The Company leases certain facilities, vehicles, and equipment which expire on various dates through 2033. The lease payments under these agreements aggregate to approximately \$6.6 million in 2019, \$5.6 million in 2020, \$4.4 million in 2021, \$3.7 million in 2022, \$2.6 million in 2023, and \$15.4 million thereafter. Total lease expense amounted to \$11.5 million in 2018, \$11.9 million in 2017, and \$11.6 million in 2016.

Other

The Company is involved in certain litigation as a result of claims that arose in the ordinary course of business, which management believes will not have a material adverse effect on the Company's financial position, results of operations, or cash flows. It may also realize the benefit of certain legal claims and litigation in the future; these gain contingencies are not recognized in the Consolidated Financial Statements.

Note 13 – Income Taxes

The components of income before income taxes were taxed under the following jurisdictions:

(In thousands)	2018	2017	2016
Domestic	\$ 105,455	\$ 76,876	\$ 103,576
Foreign	44,962	50,096	42,454
Income before income taxes	\$ 150,417	\$ 126,972	\$ 146,030

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Income tax expense consists of the following:

(In thousands)	2018	2017	2016
Current tax expense:			
Federal	\$17,974	\$28,584	\$32,262
Foreign	9,650	10,219	5,667
State and local	3,158	2,241	3,210
Current tax expense	30,782	41,044	41,139
Deferred tax expense (benefit):			
Federal	(1,381)	(1,764)	2,004
Foreign	551	1,118	5,099
State and local	1,000	(2,514)	(105)
Deferred tax expense (benefit)	170	(3,160)	6,998
Income tax expense	\$30,952	\$37,884	\$48,137

The difference between the reported income tax expense and a tax determined by applying the applicable U.S. federal statutory income tax rate to income before income taxes is reconciled as follows:

(In thousands)	2018	2017	2016
Expected income tax expense	\$31,588	\$44,440	\$51,110
State and local income tax, net of federal benefit	3,495	1,135	1,982
Effect of foreign statutory rates different from U.S. and other foreign adjustments	759	(6,026)	(4,092)
Changes in valuation allowances	1,133	—	—
U.S. production activities deduction	—	(1,575)	(3,063)
Investment in unconsolidated affiliates	(3,909)	216	1,030
Benefit of stock-based compensation deductions	(41)	(2,160)	(656)
Effect of tax on accumulated foreign earnings	(4,415)	12,893	—
Effect of tax rate change on net deferred tax liability balance	—	(12,067)	—
Other, net	2,342	1,028	1,826
Income tax expense	\$30,952	\$37,884	\$48,137

The Tax Cuts and Jobs Act (the Act) was enacted on December 22, 2017. The Act reduced the U.S. federal corporate income tax rate from 35 percent to 21 percent, required companies to pay a one-time transition tax on the accumulated earnings of certain foreign subsidiaries, and created new taxes on certain foreign-sourced earnings. The Company applied the guidance in Staff Accounting Bulletin No. 118 in accounting for the enactment date effects of the Act. At December 30, 2017, the Company made a reasonable estimate of the one-time transition tax on accumulated foreign earnings as well as the impact of the Act on its existing deferred tax balances. During the fourth quarter of 2018, the Company completed its accounting for all of the enactment-date income tax effects of the Act.

The one-time transition tax is based on the Company's total post-1986 earnings and profits (E&P) for which the accrual of U.S. income taxes had previously been deferred. The Company recorded a provisional amount for its

one-time transition tax liability, resulting in an increase in income tax expense of \$12.9 million, or 22 cents per diluted share, at December 30, 2017. During 2018, the Company finalized its calculation of the post-1986 E&P as well as the cash balances of the foreign subsidiaries whose earnings were subject to the transition tax. Following the completion of this analysis, the Company recorded a reduction to income tax

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expense of \$4.4 million, or eight cents per diluted share, to reduce this liability. Subsequent to the Company's year-end, the Treasury Department finalized regulations related to the calculation of the transition tax, and the Company is analyzing the impact of these regulations on its calculation of the transition tax.

The Company continues to assert that the undistributed earnings of most of its foreign subsidiaries are permanently reinvested. No additional tax liability has been accrued with respect to the earnings of any of these foreign subsidiaries. If these undistributed earnings were remitted from these foreign subsidiaries to the U.S., the Company would pay additional tax of approximately \$4.0 million. No additional income taxes have been provided for any additional outside bases differences inherent in these entities, as these amounts continue to be indefinitely reinvested in foreign operations. Determining the amount of unrecognized deferred tax liability related to any additional outside basis differences in these entities is not practicable.

On December 30, 2017, the Company remeasured certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21 percent, resulting in an income tax benefit of \$12.1 million, or 21 cents per diluted share. The Company has concluded that no further adjustment is needed related to this remeasurement.

The global intangible low-taxed income (GILTI) provisions of the Act impose a tax on the GILTI earned by certain foreign subsidiaries. The FASB Staff Q&A, Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income, states that an entity can make an accounting policy election to either recognize deferred taxes for temporary basis differences expected to reverse as GILTI in future years or provide for the tax expense related to GILTI in the year the tax is incurred. The Company has elected to provide for the tax expense related to GILTI in the year the tax is incurred. In 2018, this amount was not material to the Consolidated Financial Statements.

The Company includes interest and penalties related to income tax matters as a component of income tax expense. The income tax expense related to penalties and interest was immaterial in 2018, 2017, and 2016.

The Internal Revenue Service completed its audit of the Company's 2013 tax return during 2016, the results of which were immaterial to the Consolidated Financial Statements.

The statute of limitations is open for the Company's federal tax return and most state income tax returns for 2015 and all subsequent years. The statutes of limitations for certain state and foreign returns are also open for some earlier tax years due to differing statute periods. While the Company believes that it is adequately reserved for possible audit adjustments, the final resolution of these examinations cannot be determined with certainty and could result in final settlements that differ from current estimates.

The tax effects of temporary differences that give rise to significant portions of the deferred tax assets and deferred tax liabilities are presented below:

(In thousands)	2018	2017
Deferred tax assets:		
Inventories	\$ 12,297	\$ 10,598
Other postretirement benefits and accrued items	9,213	9,239
Other reserves	7,847	9,029
Federal and foreign tax attributes	6,252	11,936
State tax attributes, net of federal benefit	27,651	29,720
Stock-based compensation	2,949	2,102
Basis difference in unconsolidated affiliates	1,067	—
Total deferred tax assets	67,276	72,624
Less valuation allowance	(25,311)	(30,316)
Deferred tax assets, net of valuation allowance	41,965	42,308
Deferred tax liabilities:		
Property, plant, and equipment	44,910	43,972
Pension	250	3,841
Basis difference in unconsolidated affiliates	—	203
Total deferred tax liabilities	45,160	48,016
Net deferred tax liabilities	\$(3,195)	\$(5,708)

As of December 29, 2018, after consideration of the federal impact, the Company had state income tax credit carryforwards of \$4.3 million, all of which expire by 2021, and other state income tax credit carryforwards of \$11.7 million with unlimited lives. The Company had state net operating loss (NOL) carryforwards with potential tax benefits of \$11.6 million, after consideration of the federal impact, expiring between 2019 and 2033. The state tax credit and NOL carryforwards are offset by valuation allowances totaling \$16.0 million.

As of December 29, 2018, the Company had other foreign tax attributes with potential tax benefits of \$5.8 million that have an unlimited life. These attributes were fully offset by a valuation allowance.

Income taxes paid were approximately \$38.1 million in 2018, \$42.5 million in 2017, and \$40.1 million in 2016.

Note 14 – Equity

The Company's Board of Directors has extended, until August 2019, its authorization to repurchase up to 20 million shares of the Company's common stock through open market transactions or through privately negotiated transactions. The Company has no obligation to purchase any shares and may cancel, suspend, or extend the time period for the purchase of shares at any time. Any purchases will be funded primarily through existing cash and cash from operations. The Company may hold any shares purchased in treasury or use a portion of the repurchased shares for its stock-based compensation plans, as well as for other corporate purposes. From its initial authorization in 1999 through December 29, 2018, the Company has repurchased approximately 6.1 million shares under this authorization.

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Note 15 – Stock-Based Compensation

The Company has in effect stock incentive plans under which stock-based awards have been granted to certain employees and members of its Board of Directors. Under these existing plans, the Company may grant options to purchase shares of common stock at prices not less than the fair market value of the stock on the grant date, as well as restricted stock awards. Generally, the awards vest within five years from the grant date. Any unexercised options expire after not more than ten years.

During the years ended December 29, 2018, December 30, 2017, and December 31, 2016, the Company recognized stock-based compensation, as a component of selling, general, and administrative expense, in its Consolidated Statements of Income of \$8.0 million, \$7.5 million, and \$6.4 million, respectively.

Stock Options

The fair value of each option is estimated as a single award and amortized into compensation expense on a straight-line or accrual basis over its vesting period based on its vesting schedule. The weighted average grant-date fair value of options granted during 2018, 2017, and 2016 was \$9.64, \$9.38, and \$7.87, respectively.

The Company estimates the fair value of all stock option awards as of the grant date by applying the Black-Scholes-Merton option pricing model. The use of this valuation model in the determination of compensation expense involves certain assumptions that are judgmental and/or highly sensitive including the expected life of the option, stock price volatility, risk-free interest rate, and dividend yield. Additionally, forfeitures are not estimated at the time of valuation; they are recognized as they occur. The weighted average of key assumptions used in determining the fair value of options granted and a discussion of the methodology used to develop each assumption are as follows:

	2018	2017	2016	
Expected term	7.6 years	7.7 years	6.7 years	
Expected price volatility	27.2	% 28.9	% 25.6	%
Risk-free interest rate	2.9	% 2.1	% 1.6	%
Dividend yield	1.3	% 1.3	% 1.0	%

Expected term – This is the period of time estimated based on historical experience over which the options granted are expected to remain outstanding. An increase in the expected term will increase compensation expense.

Expected price volatility – This is a measure of the amount by which a price has fluctuated or is expected to fluctuate. The Company uses actual historical changes in the market value of its stock to calculate the volatility assumption. Daily market value changes from the grant date over a past period representative of the expected term of the options are used. An increase in the expected price volatility rate will increase compensation expense.

Risk-free interest rate – This is the U.S. Treasury rate for the week of the grant, having a term representative of the expected term of the options. An increase in the risk-free rate will increase compensation expense.

Dividend yield – This rate is the annual dividends per share as a percentage of the Company's stock price. An increase in the dividend yield will decrease compensation expense.

The total intrinsic value of options exercised was \$0.9 million, \$10.2 million, and \$2.5 million in 2018, 2017, and 2016, respectively. The total fair value of options that vested was \$1.0 million, \$1.0 million, and \$0.3 million in 2018,

2017, and 2016, respectively.

At December 29, 2018, the aggregate intrinsic value of all outstanding options was \$2.7 million with a weighted average remaining contractual term of 6.0 years. Of the outstanding options, 562 thousand are currently exercisable with an aggregate intrinsic value of \$2.7 million, a weighted average exercise price of \$19.87, and a weighted average remaining contractual term of 4.5 years.

The total compensation expense not yet recognized related to unvested options at December 29, 2018 was \$2.2 million, with an average expense recognition period of 3.8 years.

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Restricted Stock Awards

The fair value of each restricted stock award equals the fair value of the Company's stock on the grant date and is amortized into compensation expense on a straight-line or accrual basis over its vesting period based on its vesting schedule. The weighted average grant-date fair value of awards granted during 2018, 2017, and 2016 was \$32.04, \$30.97, and \$34.04, respectively.

The aggregate intrinsic value of outstanding and unvested awards was \$21.8 million at December 29, 2018. Total compensation expense for restricted stock awards not yet recognized was \$17.5 million with an average expense recognition period of 3.2 years. The total fair value of awards that vested was \$3.7 million, \$3.5 million, and \$4.7 million in 2018, 2017, and 2016, respectively.

The Company generally issues treasury shares when options are exercised or restricted stock awards are granted. A summary of the activity and related information follows:

(Shares in thousands)	Stock Options		Restricted Stock Awards	
	Shares	Weighted Average Exercise Price	Shares	Weighted Average Grant Date Fair Value
Outstanding at December 30, 2017	947	\$ 22.31	781	\$ 31.83
Granted	142	31.33	276	32.04
Exercised/Released	(57)	15.10	(124)	29.95
Forfeited	(18)	26.78	(3)	32.60
Outstanding at December 29, 2018	1,014	23.90	930	32.14

Approximately 344 thousand shares were available for future stock incentive awards at December 29, 2018.

Note 16 – Accumulated Other Comprehensive Income (Loss)

AOCI includes certain foreign currency translation adjustments from those subsidiaries not using the U.S. dollar as their functional currency, net deferred gains and losses on certain derivative instruments accounted for as cash flow hedges, adjustments to pension and OPEB liabilities, unrealized gains and losses on marketable securities classified as available-for-sale, and other comprehensive income attributable to unconsolidated affiliates.

The following table provides changes in AOCI by component, net of taxes and noncontrolling interest (amounts in parentheses indicate debits to AOCI):

(In thousands)	Cumulative Translation Adjustment	Unrealized (Loss) Gain on Derivatives	Pension/ OPEB Liability Adjustment	Unrealized Gain (Loss) on Equity Securities	Attributable to Unconsol. Affiliates	Total
Balance at December 31, 2016	\$ (49,965)	\$ (300)	\$ (23,046)	\$ 380	\$ 5,975	\$ (66,956)
Other comprehensive income (loss) before reclassifications	15,579	(389)	1,394	(1)	895	17,478
Amounts reclassified from AOCI	(3,777)	1,536	1,042	(379)	—	(1,578)
Balance at December 30, 2017	(38,163)	847	(20,610)	—	6,870	(51,056)
Other comprehensive loss before reclassifications	(16,094)	(802)	(3,642)	—	(8,686)	(29,224)
Amounts reclassified from AOCI	—	(371)	303	—	—	(68)
Net current-period other comprehensive loss	(16,094)	(1,173)	(3,339)	—	(8,686)	(29,292)
Reclassification of stranded effects of the Act	—	112	(1,018)	—	1,462	556
Balance at December 29, 2018	\$ (54,257)	\$ (214)	\$ (24,967)	\$ —	\$ (354)	\$ (79,792)

Reclassification adjustments out of AOCI were as follows:

(In thousands)	Amount reclassified from AOCI			Affected Line Item
	2018	2017	2016	
Unrealized losses (gains) on derivatives:				
Commodity contracts	\$(429)	\$1,309	\$1,061	Cost of goods sold
Interest rate swap	—	851	361	Interest expense
	58	(624)	(113)	Income tax expense (benefit)
	\$(371)	\$1,536	\$1,309	Net of tax and noncontrolling interests
Amortization of net loss and prior service cost on employee benefit plans	\$341	\$1,263	\$1,942	Other income, net
	(38)	(221)	(521)	Income tax benefit
	\$303	\$1,042	\$1,421	Net of tax and noncontrolling interests
Gain recognized upon sale of business	\$—	\$(3,777)	\$—	Gain on sale of assets
	—	—	—	Income tax expense
	\$—	\$(3,777)	\$—	Net of tax and noncontrolling interests
Sale of available-for-sale securities	\$—	\$(611)	\$—	Other income, net
	—	232	—	Income tax expense
	\$—	\$(379)	\$—	Net of tax and noncontrolling interests

Note 17 – Quarterly Financial Information (Unaudited)¹⁾

(In thousands, except per share data)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2018				
Net sales	\$640,060	\$662,773	\$645,958	\$559,087
Gross profit ⁽²⁾	94,390	98,953	79,002	85,133
Consolidated net income ⁽³⁾	24,344	33,882	20,863	27,731
Net income attributable to Mueller Industries, Inc.	24,128	33,182	20,292	26,857
Basic earnings per share	0.42	0.58	0.36	0.47
Diluted earnings per share	0.42	0.58	0.35	0.47
Dividends per share	0.10	0.10	0.10	0.10
2017				
Net sales	\$577,920	\$614,266	\$550,363	\$523,524
Gross profit ⁽²⁾	89,493	89,955	79,101	66,907
Consolidated net income ⁽⁴⁾	30,455	27,833	22,754	5,969 ⁽⁵⁾
Net income attributable to Mueller Industries, Inc.	29,987	27,633	22,258	5,720
Basic earnings per share	0.53	0.49	0.39	0.10
Diluted earnings per share	0.52	0.48	0.39	0.10
Dividends per share	8.10	0.10	0.10	0.10

The sum of quarterly amounts may not equal the annual amounts reported due to rounding. In addition, the

(1) earnings per share amounts are computed independently for each quarter, while the full year is based on the weighted average shares outstanding.

(2) Gross profit is net sales less cost of goods sold, which excludes depreciation and amortization.

(3) Includes income earned by ATCO, acquired during Q3 2018, and Die-Mold, acquired during Q1 2018.

(4) Includes income earned by Heatlink Group, acquired during Q2 2017.

Includes \$1.1 million of pre-tax charges related to asset impairments, \$4.3 million of interest expense on the

(5) Company's Subordinated Debentures, and pre-tax environmental expense for non-operating properties of \$6.2 million.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Mueller Industries, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Mueller Industries, Inc. (the Company) as of December 29, 2018 and December 30, 2017, the related consolidated statements of income, comprehensive income, changes in equity and cash flows for each of the three years in the period ended December 29, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 29, 2018 and December 30, 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 29, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 29, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 27, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the 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 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

We have served as the Company's auditor since 1991.

Memphis, Tennessee
February 27, 2019

MUELLER INDUSTRIES, INC.

SCHEDULE II - VALUATION AND QUALIFYING ACCOUNTS

Years Ended December 29, 2018, December 30, 2017, and December 31, 2016

(In thousands)	Balance at beginning of year	Additions Charged to costs and expenses	Other additions	Deductions	Balance at end of year
2018					
Allowance for doubtful accounts	\$ 980	\$(286)	\$ 220	\$ 78	\$836
Environmental reserves	\$ 28,004	\$ 1,981	\$ —	\$ 6,366	\$23,619
Valuation allowance for deferred tax assets	\$ 30,316	\$ 1,209	\$ 150	\$ 6,364	\$25,311
2017					
Allowance for doubtful accounts	\$637	\$422	\$(61)	\$18	\$980
Environmental reserves	\$21,864	\$7,491	\$—	\$1,351	\$28,004
Valuation allowance for deferred tax assets	\$18,681	\$7	\$11,628 ⁽¹⁾	\$—	\$30,316
2016					
Allowance for doubtful accounts	\$623	\$160	\$2	\$148	\$637
Environmental reserves	\$21,667	\$894	\$—	\$697	\$21,864
Valuation allowance for deferred tax assets	\$17,650	\$3	\$1,028	\$—	\$18,681

The valuation allowance increased by \$11.6 million during 2017 to a balance of \$30.3 million as of December 30, (1) 2017. The change to the valuation allowance was attributable to the recording of valuation allowances against tax attributes generated in 2017 primarily resulting from the Act and increased interest expense in state tax jurisdictions where the Company has no tax liability.