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 28, 2019 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	Trading Symbol	Name of each exchange on which registered
Common Stock, $0.01 Par Value	MLI	New York Stock Exchange

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 $1,597,828,319.

The number of shares of the Registrant's common stock outstanding as of February 21, 2020 was 56,995,167 excluding 23,187,837 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 2020 Annual Meeting of Stockholders, scheduled to be mailed on or about March 26, 2020 (Part III).

MUELLER INDUSTRIES, INC.

As used in this report, the terms "we," "us," "our," "Company," "Mueller," and "Registrant" mean Mueller Industries, Inc. and its 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 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. These acquisitions complement our existing copper tube, line sets, copper fittings, and plastics businesses in the Piping Systems segment.

We 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 ofDecember 28, 2019 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 assembles. 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 28, 2019 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), ATCO Rubber Products, Inc. (ATCO), and Linesets, Inc.

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 28, 2019 was not significant.

Labor Relations

At December 28, 2019, the Company employed approximately 4,964 employees, of which approximately 1,579 were represented by various unions. Those union contracts will expire as follows:

Location	Expiration Date
Port Huron, Michigan (Local 218 IAM)	May 7, 2023
Wynne, Arkansas (MCTP)	November 30, 2024
Port Huron, Michigan (Local 44 UAW)	June 26, 2022
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 2020. 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 $1.7 million for 2019, $2.0 million for 2018, and $7.5 million for 2017. The reserve for environmental matters was $20.9 million at December 28, 2019 and $23.6 million at December 29, 2018. 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 $2.1 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 14 – 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 2019, 2018, or 2017. 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.

As of January 31, 2020, the U.K. is no longer a member of 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. The U.K. and the EU are currently in negotiations on the terms. Finalized terms are due on December 31, 2020. During this eleven month period, the U.K. will continue to follow all EU rules, and their trading relationship will remain the same. As a result of Brexit, 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 also 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
Wynne, AR	400,000	Manufacturing & 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
Kansas City, MO	30,500	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
Monterrey, Mexico	132,000	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
Fort Worth, TX	153,374	Manufacturing	Owned
Vineland, NJ	136,000	Manufacturing & Distribution	Owned
Sacramento, CA	121,240	Manufacturing & Distribution	Owned

Location of Facility	Building Space (Sq. Ft.)	Primary Use	Owned or Leased
Bluffs, IL	107,000	Manufacturing	Owned
Fort Worth, TX	103,125	Manufacturing & Distribution	Owned
Hickory, NC	100,000	Manufacturing	Owned
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 14 – 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 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is listed on the New York Stock Exchange (NYSE) under the symbol "MLI." As of February 21, 2020, the number of holders of record of Mueller's common stock was 674.

During fiscal 2018 and 2019, we paid a quarterly cash dividend of $0.10 per share of common stock.

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 2020, 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 28, 2019, the Company has repurchased approximately 6.2 million shares under this authorization. Below is a summary of the Company's stock repurchases for the quarter ended December 28, 2019.

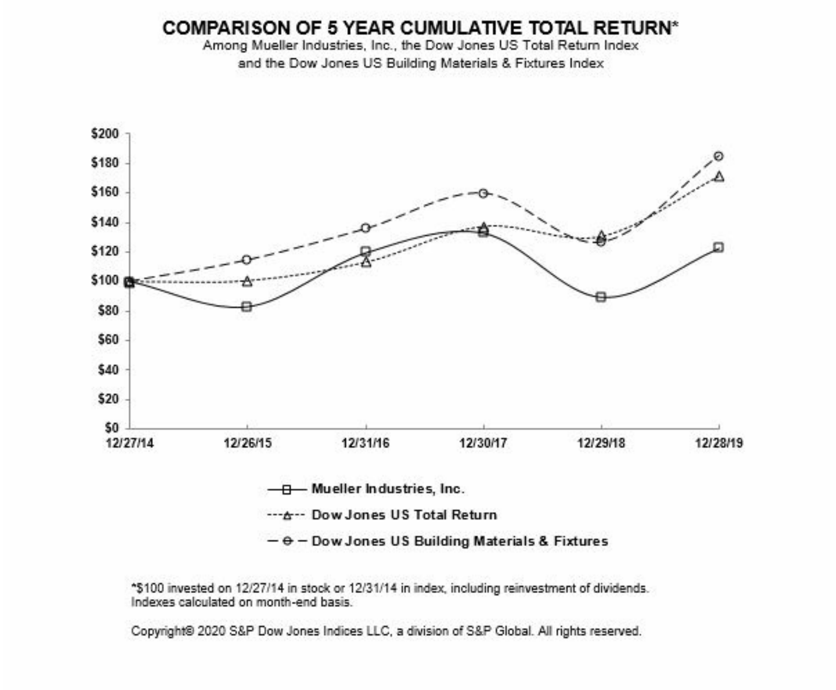
	(a) Total Number of Shares Purchased (1)	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number of Shares That May Yet Be Purchased Under the Plans or Programs (2)
September 28, 2019 – October 26, 2019	—	—	—	13,822,567
October 27, 2019 – November 23, 2019	10,109	32.09	—	13,822,567
November 24, 2019 – December 28, 2019	5,128	32.34	—	13,822,567
Total	15,237		—	

(1) *Includes shares tendered to the Company by holders of stock-based awards in payment of the purchase price and/or withholding taxes upon exercise and/or vesting.*

(2) *Shares available to be purchased under the Company's 20 million share repurchase authorization untilAugust 2020. The extension of the authorization was announced on October 23, 2019.*

Company Stock Performance

The following graph compares total stockholder return since December 27, 2014 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.



	2014	2015	2016	2017	2018	2019
Mueller Industries, Inc.	100.00	82.67	119.33	132.90	89.09	122.49
Dow Jones U.S. Total Return Index	100.00	100.63	112.96	137.24	130.42	171.04
Dow Jones U.S. Building Materials & Fixtures Index	100.00	114.37	135.47	159.65	126.50	185.11

ITEM 6. SELECTED FINANCIAL DATA

(In thousands, except per share data)	2019	2018	2017	2016	2015
For the fiscal year: [1]					
Net sales	$ 2,430,616	$ 2,507,878	$ 2,266,073	$ 2,055,622	$ 2,100,002
Operating income [2]	191,403	172,969	150,807	154,401	138,704
Net income attributable to Mueller Industries, Inc.	100,972 [3]	104,459 [4]	85,598	99,727 [5]	87,864 [6]
Diluted earnings per share	1.79	1.82	1.49	1.74	1.54
Cash dividends per share	0.40	0.40	3.40	0.375	0.30
At year-end:					
Total assets	1,370,940	1,369,549	1,320,173	1,447,476	1,338,801
Long-term debt	378,724	489,597	448,592	213,709	204,250

(1) *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., 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; and Turbotec Products, Inc., March 30, 2015.*

(2) *Adjusted retroactively to reflect adoption of ASU 2017-07 that occurred during 2018. The components of net 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 net expense of $3.6 million resulting from the change in fair value of contingent consideration.*

(4) *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.*

(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.*

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 28, 2019. 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 28, 2019 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.

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 28, 2019 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 28, 2019.

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 28, 2019, 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 28, 2019, 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 28, 2019, based on the COSO criteria**.**

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 28, 2019 and December 29, 2018, 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 28, 2019, and the related notes and financial statement schedule listed in the Index at Item 15(a) and our report dated February 26, 2020 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.

Ernst & Young LLP

Memphis, Tennessee
February 26, 2020

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 2020 Annual Meeting of Stockholders to be filed with the SEC on or aboutMarch 26, 2020, 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 for2019,” “2019 Grants of Plan Based Awards Table,” “Outstanding Equity Awards at Fiscal 2019 Year-End,” “2019 Option Exercises and Stock Vested,” “Potential Payments Upon Termination of Employment or Change in Control as of the End of 2019,” “2019 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 2020 Annual Meeting of Stockholders to be filed with the SEC on or aboutMarch 26, 2020, 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 28, 2019 (shares in thousands):

Plan category	(a) Number of securities to be issued upon exercise of outstanding options, warrants, and rights	(b) Weighted average exercise 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	939	$ 25.05	1,900
Equity compensation plans not approved by security holders	—	—	—
Total	939	$ 25.05	1,900

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

2020 Annual Meeting of Stockholders to be filed with the SEC on or aboutMarch 26, 2020, 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 its2020 Annual Meeting of Stockholders to be filed with the SEC on or about March 26, 2020, 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 2020 Annual Meeting of Stockholders to be filed with the SEC on or aboutMarch 26, 2020, 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:

1. Financial Statements: the financial statements, notes, and report of independent registered public accounting firm 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.

4.4 Description of securities

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 2019 Incentive Plan (incorporated by reference to Annex 1 to the Company's definitive proxy statement filed with the SEC on March 28, 2019).

10.7	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).
10.8	Summary description of the Registrant's 2020 incentive plan for certain key employees.
10.9	Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Brian K. Barksdale (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).
10.10	Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Jeffrey A. Martin (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).
10.11	Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Mark Millerchip (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).
10.12	Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Nicholas W. Moss (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).
10.13	Change in Control Agreement, effective July 26, 2016 by and between the Registrant and Steffen Sigloch (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).
10.14	Change in Control Agreement, effective January 3, 2017 by and between the Registrant and Christopher J. 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).
10.15	Employment Agreement, dated as of March 15, 2018, by and between Mueller Industries, Inc. and Gregory L. 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

10.16	Credit Agreement, dated as of December 6, 2016 among the Registrant (as borrower), Bank of America (as 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).
10.17	Amendment No. 1 to Credit Agreement among the Registrant (as borrower), Bank of America, N.A. (as agent), and certain lenders named therein dated April 22, 2019.

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.CAL	XBRL 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 26, 2020.

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 26, 2020
/s/ Terry Hermanson Terry Hermanson	Lead Independent Director	February 26, 2020
/s/ Elizabeth Donovan Elizabeth Donovan	Director	February 26, 2020
/s/ Gary S. Gladstein Gary S. Gladstein	Director	February 26, 2020
/s/ Paul J. Flaherty Paul J. Flaherty	Director	February 26, 2020
/s/ Gennaro J. Fulvio Gennaro J. Fulvio	Director	February 26, 2020
/s/ Scott J. Goldman Scott J. Goldman	Director	February 26, 2020
/s/ John B. Hansen John B. Hansen	Director	February 26, 2020
/s/ Charles P. Herzog, Jr. Charles P. Herzog, Jr.	Director	February 26, 2020

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 Jeffrey A. Martin Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)	February 26, 2020
/s/ Anthony J. Steinriede Anthony J. Steinriede Vice President – Corporate Controller	February 26, 2020

MUELLER INDUSTRIES, INC.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

FINANCIAL STATEMENT SCHEDULE

Schedule for the years ended December 28, 2019, December 29, 2018, and December 30, 2017

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.

- Climate: The Climate segment is composed of Refrigeration Products, Fabricated Tube Products, Westermeyer, Turbotec, ATCO, and Linesets, Inc. The segment manufactures and sells refrigeration valves and fittings, line sets, 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, actual housing starts in the U.S. were 1.29 million in 2019, which compares to 1.25 million in 2018 and 1.20 million in 2017. Mortgage rates remain at historically low levels, as the average 30-year fixed mortgage rate was approximately 3.94 percent in 2019 and 4.54 percent in 2018. 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 value of private nonresidential construction put in place was $450.5 billion in 2019, $450.9 billion in 2018, and $444.0 billion in 2017.

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 2019, 2018, and 2017:

				Percent Change	
(In thousands)	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
Net sales	$ 2,430,616	$ 2,507,878	$ 2,266,073	(3.1)%	10.7 %
Operating income	191,403	172,969	150,807	10.7	14.7
Net income	100,972	104,459	85,598	(3.3)	22.0

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

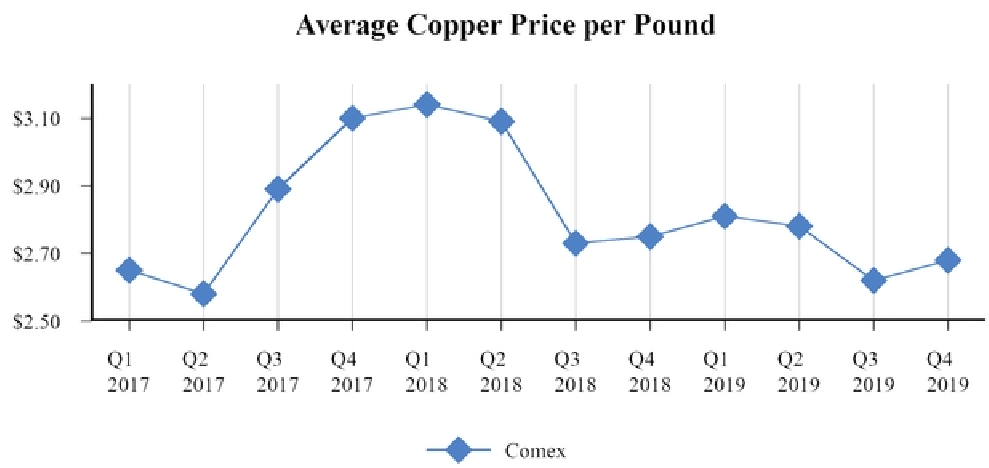
	2019 vs. 2018	2018 vs. 2017
Net selling price in core product lines	(3.7)%	4.4 %
Unit sales volume in core product lines	(4.4)	3.6
Acquisitions	4.2	4.7
Dispositions	—	(3.0)
Other	0.8	1.0
	(3.1)%	10.7 %

The decrease in net sales in 2019 was primarily due to (i) lower unit sales volume of $110.3 million in our core product lines, primarily brass rod and copper tube, and (ii) lower net selling prices of $91.7 million in our core product lines. These decreases were partially offset by (i) incremental sales of $100.1 million recorded by ATCO, acquired in July 2018, (ii) an increase in sales in our non-core product lines of $22.4 million, and (iii) incremental sales of $4.0 million recorded by Die-Mold, acquired in March 2018.

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.

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 for2019, 2018, and 2017:

(In thousands)	2019	2018	2017
Cost of goods sold	$ 2,035,610	$ 2,150,400	$ 1,940,617
Depreciation and amortization	42,693	39,555	33,944
Selling, general, and administrative expense	162,358	148,888	140,730
Gain on sale of assets, net	(963)	(253)	(1,491)
Impairment charges	—	—	1,466
Insurance recovery	(485)	(3,681)	—
Operating expenses	$ 2,239,213	$ 2,334,909	$ 2,115,266

	2019	2018	2017
Cost of goods sold	83.7 %	85.7 %	85.6 %
Depreciation and amortization	1.8	1.6	1.5
Selling, general, and administrative expense	6.6	5.9	6.2
Gain on sale of assets, net	—	—	(0.1)
Impairment charges	—	—	0.1
Insurance recovery	—	(0.1)	—
Operating expenses	92.1 %	93.1 %	93.3 %

The decrease in cost of goods sold in 2019 was primarily due to the decrease in sales volume in our core product lines and the decrease in the average cost of copper, our principal raw material. This was partially offset by the increase in sales volume resulting from the acquisition of ATCO. The increase in cost of goods sold in 2018 was primarily due to the increase in the average cost of copper, as well as 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.

Depreciation and amortization increased in 2019 as a result of long-lived assets of businesses acquired. 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.

Selling, general, and administrative expenses increased in 2019 primarily due to (i) expense recognized for contingent consideration arrangements associated with businesses acquired of $5.7 million, (ii) an increase in employment costs, including employee healthcare, of $4.9 million, (iii) incremental expenses of $4.7 million associated with ATCO and Die-Mold, (iv) a reduction of $3.5 million in fees received for services provided under certain third-party sales and distribution arrangements, and (v) an increase in product liability costs of $1.6 million. These increases were partially offset by (i) income of $2.1 million recognized as a result of the reduction of contingent consideration arrangements associated with businesses acquired, (ii) a decrease in legal and professional fees of $1.4 million, (iii) higher foreign currency transaction gains of $1.4 million, (iv) a reduction of $0.8 million in fees received for services provided under certain equipment transfer and licensing agreements, and (v) a decrease in supplies and utilities of $0.5 million. The increase in selling, general, and administrative expenses in 2018 was 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 in 2018 (fees from these arrangements are classified as a component of net sales in 2019), (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.

During 2019, we recognized a net gain of $1.0 million on the sale of real property. We also recognized an insurance recovery gain of $0.5 million related to the losses incurred due to the 2017 fire at our brass rod mill in Port Huron, Michigan.

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.

Interest expense increased in 2019 primarily as a result of increased borrowing costs associated with our unsecured $350.0 million revolving credit facility. The increase in 2018 was 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.

Environmental expense for our non-operating properties was significantly higher in 2017 than in 2019 or 2018 primarily as a result of ongoing remediation activities related to the Lead Refinery site.

Other income, net, was lower in 2019 primarily as a result of lower net periodic benefit income for our benefit plans, and higher in 2018 primarily as a result of higher net periodic benefit income for our benefit plans.

Income tax expense was $35.3 million in 2019, representing an effective tax rate of 21.2 percent. This rate was higher than what would be computed using the U.S. statutory federal rate primarily due to (i) the provision for state and local income taxes, net of the federal benefit, of $3.2 million, and (ii) the impact of investments in unconsolidated affiliates of $0.5 million. These increases were partially offset by other adjustments of $3.3 million.

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 $2.8 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 and (ii) 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.

During 2019, we recognized losses of $24.6 million on our investments in unconsolidated affiliates, net of foreign tax, compared to losses of $12.6 million in 2018. The loss on these investments for 2019 included net losses of $22.0 million for Tecumseh and net losses of $2.6 million for Mueller Middle East. Included in the losses for Tecumseh are $6.4 million of severance and restructuring expenses and a product liability settlement of $3.4 million. These expenses were offset by a gain on the sale of land of $1.8 million.

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.

Piping Systems Segment

The following table compares summary operating results for 2019, 2018, and 2017 for the businesses comprising our Piping Systems segment:

				Percent Change	
(In thousands)	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
Net sales	$ 1,542,456	$ 1,645,633	$ 1,564,950	(6.3)%	5.2 %
Operating income	131,879	122,829	99,596	7.4	23.3

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

	2019 vs. 2018	2018 vs. 2017
Net selling price in core product lines	(4.4)%	4.5 %
Unit sales volume in core product lines	(2.3)	3.4
Acquisitions	0.3	1.1
Dispositions	—	(4.3)
Other	0.1	0.5
	(6.3)%	5.2 %

The decrease in net sales in 2019 was primarily attributable to (i) lower net selling prices of $70.6 million in the segment's core product lines, primarily copper tube, and (ii) lower unit sales volume of $37.3 million in the segment's core product lines. These decreases were partially offset by incremental sales of $4.0 million recorded by Die-Mold.

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 following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for2019, 2018, and 2017:

(In thousands)	2019	2018	2017
Cost of goods sold	$ 1,313,980	$ 1,426,729	$ 1,369,161
Depreciation and amortization	22,621	23,304	21,777
Selling, general, and administrative expense	75,170	74,864	74,441
Gain on sale of assets, net	(1,194)	(2,093)	(1,491)
Impairment charges	—	—	1,466
Operating expenses	$ 1,410,577	$ 1,522,804	$ 1,465,354

	2019	2018	2017
Cost of goods sold	85.2 %	86.7 %	87.5 %
Depreciation and amortization	1.5	1.4	1.4
Selling, general, and administrative expense	4.9	4.5	4.7
Gain on sale of assets, net	(0.1)	(0.1)	(0.1)
Impairment charges	—	—	0.1
Operating expenses	91.5 %	92.5 %	93.6 %

The decrease in cost of goods sold in 2019 was primarily due to the decrease in the average cost of copper and the decrease in sales volume in the segment's core product lines. 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.

Depreciation and amortization decreased in 2019 as a result of several long-lived assets becoming fully depreciated. The increase in 2018 was 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.

Selling, general, and administrative expenses increased slightly for 2019, primarily due to (i) a reduction of $3.5 million in fees received for services provided under certain third-party sales and distribution arrangements, (ii) higher employment costs, including employee healthcare, of $0.9 million, and (iii) incremental expenses associated with Die-Mold of $0.6 million. These increases were partially offset by (i) income of $2.1 million recognized as a result of the reduction of contingent consideration arrangements associated with businesses acquired, (ii) higher foreign currency transaction gains of $1.4 million, and (iii) a decrease in supplies and utilities of $0.6 million. The increase in 2018 was 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 in 2018 (fees from these arrangements are classified as a component of net sales in 2019) and (ii) the absence of expenses associated with Mueller-Xingrong of $1.2 million.

During 2019, we recognized a gain of$1.2 million on the sale of real property.

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.

Industrial Metals Segment

The following table compares summary operating results for 2019, 2018, and 2017 for the businesses comprising our Industrial Metals segment:

(In thousands)	2019	2018	2017	Percent Change 2019 vs. 2018	Percent Change 2018 vs. 2017
Net sales	$ 554,372	$ 651,061	$ 602,131	(14.9)%	8.1 %
Operating income	61,724	75,607	74,364	(18.4)	1.7

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

	2019 vs. 2018	2018 vs. 2017
Net selling price in core product lines	(3.3)%	5.2 %
Unit sales volume in core product lines	(11.4)	5.1
Other	(0.2)	(2.2)
	(14.9)%	8.1 %

The decrease in net sales in 2019 was primarily due to (i) lower unit sales volume of $73.0 million and (ii) lower net selling prices of $21.0 million in the segment's core product lines, primarily brass rod.

The increase in net sales during 2018 was primarily due to higher net selling prices of $30.0 million and (ii) higher unit sales volume of $29.6 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 2019, 2018, and 2017:

(In thousands)	2019	2018	2017
Cost of goods sold	$ 473,010	$ 559,367	$ 506,973
Depreciation and amortization	7,489	7,568	7,516
Selling, general, and administrative expense	12,359	13,501	13,278
Loss (gain) on sale of assets, net	275	(1,301)	—
Insurance recovery	(485)	(3,681)	—
Operating expenses	$ 492,648	$ 575,454	$ 527,767

	2019	2018	2017
Cost of goods sold	85.3 %	85.9 %	84.2 %
Depreciation and amortization	1.4	1.2	1.2
Selling, general, and administrative expense	2.3	2.1	2.2
Loss (gain) on sale of assets, net	—	(0.2)	—
Insurance recovery	(0.1)	(0.6)	—
Operating expenses	88.9 %	88.4 %	87.6 %

The decrease in cost of goods sold in 2019 was primarily due to the decrease in sales volume in the segment's core product lines and the decrease in the average cost of copper. The increase in cost of goods sold in 2018 was primarily related to the increase in the average cost of copper and the increase in sales volume in the segment's core product lines..

Depreciation and amortization in 2019 was consistent with 2018 and 2017.

Selling, general, and administrative expenses decreased slightly in 2019 primarily due to lower employment costs, including incentive compensation, of $0.7 million. The increase in 2018 was primarily due to an increase in legal fees of $0.2 million.

During 2019, we recognized a loss of $0.3 million on the sale of real property and an insurance recovery gain of $0.5 million related to the losses incurred due to the 2017 fire at our brass rod mill in Port Huron, Michigan.

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.

Climate Segment

The following table compares summary operating results for 2019, 2018, and 2017 for the businesses comprising our Climate segment:

(In thousands)	2019	2018	2017	Percent Change 2019 vs. 2018	Percent Change 2018 vs. 2017
Net sales	$ 356,216	$ 229,069	$ 131,448	55.5 %	74.3 %
Operating income	42,727	24,118	20,325	77.2	18.7

Net sales for 2019 increased primarily as a result of incremental sales of $100.1 million recorded by ATCO. 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.

The following tables compare cost of goods sold and operating expenses as dollar amounts and as a percent of net sales for 2019, 2018, and 2017:

(In thousands)	2019	2018	2017
Cost of goods sold	$ 273,850	$ 182,456	$ 98,851
Depreciation and amortization	9,298	5,569	2,513
Selling, general, and administrative expense	30,385	16,926	9,759
Gain on sale of assets, net	(44)	—	—
Operating expenses	$ 313,489	$ 204,951	$ 111,123

	2019	2018	2017
Cost of goods sold	76.9 %	79.7 %	75.2 %
Depreciation and amortization	2.6	2.4	1.9
Selling, general, and administrative expense	8.5	7.4	7.4
Gain on sale of assets, net	—	—	—
Operating expenses	88.0 %	89.5 %	84.5 %

Cost of goods sold increased in 2019 due to the increase in volume and change in product mix within the segment primarily resulting from the ATCO acquisition. The increase in cost of goods sold in 2018 was related 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. Depreciation and amortization increased in 2019 and 2018 primarily as a result of depreciation and amortization of the long-lived assets acquired at ATCO. Selling, general, and administrative expenses increased in 2019 as a result of (i) expense of $5.7 million recognized for a contingent consideration arrangement associated with an acquired business, (ii) incremental expenses of $4.6 million associated with ATCO, (iii) an increase in employment costs of $1.7 million, (iv) an increase in agent commissions of $0.5 million, and (v) an increase in supplies, utilities, and rent costs of $0.4 million. Selling, general, and administrative expenses increased in 2018 as a result of incremental expenses associated with ATCO.

LIQUIDITY AND CAPITAL RESOURCES

The following table presents selected financial information for2019, 2018, and 2017:

(In thousands)	2019	2018	2017
Increase (decrease) in:			
Cash, cash equivalents, and restricted cash	$ 20,904	$ (49,425)	$ (233,906)
Property, plant, and equipment, net	(7,505)	66,312	9,090
Total debt	(110,444)	31,626	237,708
Working capital, net of cash and current debt	(35,231)	11,228	55,405
Net cash provided by operating activities	200,544	167,892	43,995
Net cash used in investing activities	(40,457)	(187,096)	(36,280)
Net cash used in financing activities	(139,694)	(28,269)	(244,566)

Cash Provided by Operating Activities

During 2019, net cash provided by operating activities was primarily attributable to (i) consolidated net income of$106.2 million, (ii) depreciation and amortization of $43.0 million, (iii) a decrease in inventories of $39.6 million, (iv) losses from unconsolidated affiliates of$24.6 million, (v) stock-based compensation expense of $8.7 million, and (vi) a decrease in accounts receivable of$6.5 million. These cash increases were partially offset by (i) an increase in other assets of $15.6 million, (ii) a decrease in other liabilities of $7.9 million, and (iii) a decrease in current liabilities of $7.1 million. The fluctuations in accounts receivable and inventories were primarily due to decreased selling prices and sales volume in certain businesses and changes working capital needs in 2019.

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.

Cash Used in Investing Activities

The major components of net cash used in investing activities in 2019 included (i) capital expenditures of $31.2 million and (ii) investments in our unconsolidated affiliates, Tecumseh and Mueller Middle East, of $16.0 million. These uses of cash were offset by (i) the $3.5 million working capital settlement received from the previous owners for the ATCO acquisition and (ii) proceeds on the sale of properties of $3.2 million.

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.

Cash Used in Financing Activities

For 2019, net cash used in financing activities consisted primarily of (i) $205.0 million used to reduce the debt outstanding under our Credit Agreement, (ii) $22.3 million used for the payment of regular quarterly dividends to stockholders of the Company, (iii) $4.3 million used for repayment of debt by Jungwoo-Mueller, (iv) $3.2 million used for payment of contingent consideration related to ATCO, and (v) $1.8 million used to repurchase common stock. These uses of cash were offset by the issuance of debt under our Credit Agreement of $100.0 million.

For 2018, net cash used in financing 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 financing 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.

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 28, 2019.

As of December 28, 2019, $65.3 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. These earnings could be remitted to the U.S. with a minimal tax cost. Accordingly, no additional income tax liability has been accrued with respect to these earnings or on any additional outside basis differences that may exist with respect to these entities.

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 2020, 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 $2.72 in 2019, $2.93 in 2018, and $2.80 in 2017.

We have significant environmental remediation obligations which we expect to pay over future years. Approximately $4.4 million was spent during 2019 for environmental matters. As of December 28, 2019, we expect to spend $0.8 million in 2020, $0.7 million in 2021, $0.6 million in 2022, $0.8 million in 2023, $0.7 million in 2024, and $17.3 million thereafter for ongoing projects.

Cash used to fund pension and other postretirement benefit obligations was $0.8 million in 2019 and $1.9 million in 2018. We anticipate making contributions of approximately $1.0 million to these plans in 2020.

The Company declared and paid a quarterly cash dividend of 10.0 cents per common share during each quarter of 2017, 2018, and 2019. 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 2019 our capital expenditures were $31.2 million. We anticipate investing approximately $45.0 million to $50.0 million for capital expenditures in 2020.

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 $90.0 million at December 28, 2019.

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 28, 2019 were $284.5 million.

Jungwoo-Mueller has several secured revolving credit arrangements with a total borrowing capacity of KRW25.8 billion (or approximately $21.9 million). Borrowings are secured by the real property and equipment of Jungwoo-Mueller and were bearing interest at a rate of 2.55 percent as of December 28, 2019. Total borrowings at Jungwoo-Mueller were $5.8 million as of December 28, 2019.

As of December 28, 2019, the Company's total debt was $386.3 million or 36.8 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 28, 2019, we were in compliance with all of our debt covenants.

Share Repurchase Program

The Company's Board of Directors has extended, until August 2020, 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 28, 2019, the Company had repurchased approximately 6.2 million shares under this authorization.

CONTRACTUAL CASH OBLIGATIONS

The following table presents payments due by the Company under contractual obligations with minimum firm commitments as of December 28, 2019:

(In millions)	Total	Payments Due by Year 2020	2021-2022	2023-2024	Thereafter
Total debt	$ 386.8	$ 7.5	$ 91.0	$ 1.4	$ 286.9
Operating and capital leases	35.7	6.6	10.0	5.3	13.8
Heavy machinery and equipment	13.7	11.1	2.6	—	—
Buildings	10.6	10.6	—	—	—
Purchase commitments (1)	687.5	686.4	0.8	0.3	—
Transition tax on accumulated foreign earnings	1.9	—	—	—	1.9
Interest payments (2)	129.5	20.0	37.0	34.1	38.4
Total contractual cash obligations	$ 1,265.7	$ 742.2	$ 141.4	$ 41.1	$ 341.0

(1) *This includes contractual supply commitments totaling $634.3 million at year-end prices; these contracts contain variable pricing based on Comex and the London Metals Exchange quoted prices. These commitments are for purchases of raw materials, primarily copper cathode and brass scrap, that are expected to be consumed in the ordinary course of business.*

(2) *These payments represent interest on long-term debt based on balances and rates in effect at December 28, 2019.*

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.

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 28, 2019, we held open futures contracts to purchase approximately $21.3 million of copper over the next 12 months related to fixed-price sales orders and to sell approximately $1.9 million of copper over the next seven 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 28, 2019.

Interest Rates

The Company had variable-rate debt outstanding of $97.0 million at December 28, 2019 and $202.6 million at December 29, 2018. 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 28, 2019, we had open forward contracts with a financial institution to sell approximately 0.1 million euros, 21.7 million Swedish kronor, and 8.1 million Norwegian kroner through April 2020.

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 $397.1 million at December 28, 2019 and $376.6 million at December 29, 2018. 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 28, 2019 and December 29, 2018 amounted to $39.7 million and $37.7 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 2019, the value of the British pound increased approximately three percent, the Mexican peso increased approximately 4 percent, the Canadian dollar increased approximately four percent, and the South Korean won decreased approximately four percent, relative to the U.S. dollar. The resulting net foreign currency translation gains were included in calculating net other comprehensive loss for the year ended December 28, 2019 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 28, 2019 and December 29, 2018, our inventory valuation reserves were $6.3 million and $7.0 million, respectively. The expense recognized in each of these periods was immaterial to our Consolidated Financial Statements.

Impairment of Goodwill

As of December 28, 2019, we had $153.3 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 2019 we recorded $1.5 million in additional goodwill associated with our ATCO and Die-Mold acquisitions in conjunction with the finalization of the purchase price allocations.

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 2019 and 2018, as applicable. The estimated fair value of each of these reporting units exceeded its carrying values in 2019 and 2018, and we do not believe that any of these reporting units were at risk of impairment as ofDecember 28, 2019.

Pension and Other Postretirement Benefit Plans

We sponsor several qualified and nonqualified pension and other postretirement benefit plans in the U.S. and certain foreign locations. We recognize 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. We evaluate the 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 2019, the average remaining service period for the pension plans wasnine years.

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 28, 2019, December 29, 2018, and December 30, 2017

(In thousands, except per share data)	2019	2018	2017 [(1)]
Net sales	$ 2,430,616	$ 2,507,878	$ 2,266,073
Cost of goods sold	2,035,610	2,150,400	1,940,617
Depreciation and amortization	42,693	39,555	33,944
Selling, general, and administrative expense	162,358	148,888	140,730
Gain on sale of assets, net	(963)	(253)	(1,491)
Impairment charges	—	—	1,466
Insurance recovery	(485)	(3,681)	—
Operating income	191,403	172,969	150,807
Interest expense	(25,683)	(25,199)	(19,502)
Environmental expense	(1,321)	(1,320)	(7,284)
Other income, net	1,684	3,967	2,951
Income before income taxes	166,083	150,417	126,972
Income tax expense	(35,257)	(30,952)	(37,884)
Loss from unconsolidated affiliates, net of foreign tax	(24,594)	(12,645)	(2,077)
Consolidated net income	106,232	106,820	87,011
Net income attributable to noncontrolling interests	(5,260)	(2,361)	(1,413)
Net income attributable to Mueller Industries, Inc.	$ 100,972	$ 104,459	$ 85,598
Weighted average shares for basic earnings per share	55,798	56,782	56,925
Effect of dilutive stock-based awards	545	487	559
Adjusted weighted average shares for diluted earnings per share	56,343	57,269	57,484
Basic earnings per share	$ 1.81	$ 1.84	$ 1.50
Diluted earnings per share	$ 1.79	$ 1.82	$ 1.49
Dividends per share	$ 0.40	$ 0.40	$ 8.40

See accompanying notes to consolidated financial statements.

[(1)] The Consolidated Statement of Income for 2017 has 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 in 2018. 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.

MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
Years Ended December 28, 2019, December 29, 2018, and December 30, 2017

(In thousands)	2019	2018	2017
Consolidated net income	$ 106,232	$ 106,820	$ 87,011
Other comprehensive income (loss), net of tax:			
Foreign currency translation	7,409	(16,876)	13,174
Net change with respect to derivative instruments and hedging activities, net of tax of $(195), $318, and $(541)	690	(1,173)	1,147
Net change in pension and postretirement obligation adjustments, net of tax of $(671), $670, and $(1,071)	3,112	(3,339)	2,436
Attributable to unconsolidated affiliates, net of tax of $244, $2,522, and $(505)	(839)	(8,686)	895
Other, net	—	—	(380)
Total other comprehensive income (loss), net	10,372	(30,074)	17,272
Consolidated comprehensive income	116,604	76,746	104,283
Comprehensive income attributable to noncontrolling interests	(4,610)	(1,579)	(2,785)
Comprehensive income attributable to Mueller Industries, Inc.	$ 111,994	$ 75,167	$ 101,498

See accompanying notes to consolidated financial statements.

MUELLER INDUSTRIES, INC.
CONSOLIDATED BALANCE SHEETS
As of December 28, 2019 and December 29, 2018

(In thousands, except share data)	2019	2018
Assets		
Current assets:		
Cash and cash equivalents	$ 97,944	$ 72,616
Accounts receivable, less allowance for doubtful accounts of $770 in 2019 and $836 in 2018	269,943	273,417
Inventories	292,107	329,795
Other current assets	33,778	26,790
Total current assets	693,772	702,618
Property, plant, and equipment, net	363,128	370,633
Operating lease right-of-use assets	26,922	—
Goodwill, net	153,276	150,335
Intangible assets, net	60,082	61,971
Investment in unconsolidated affiliates	48,363	58,042
Other noncurrent assets	25,397	25,950
Total Assets	$ 1,370,940	$ 1,369,549
Liabilities		
Current liabilities:		
Current portion of debt	$ 7,530	$ 7,101
Accounts payable	85,644	103,754
Accrued wages and other employee costs	41,673	38,549
Current portion of operating lease liabilities	5,250	—
Other current liabilities	94,190	83,397
Total current liabilities	234,287	232,801
Long-term debt, less current portion	378,724	489,597
Pension liabilities	9,126	14,237
Postretirement benefits other than pensions	13,082	14,818
Environmental reserves	19,972	20,009
Deferred income taxes	21,094	16,615
Noncurrent operating lease liabilities	22,388	—
Other noncurrent liabilities	10,131	18,212
Total liabilities	708,804	806,289
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 56,949,246 in 2019 and 56,702,997 in 2018	802	802
Additional paid-in capital	278,609	276,849
Retained earnings	903,070	824,737
Accumulated other comprehensive loss	(68,770)	(79,792)
Treasury common stock, at cost	(470,243)	(474,240)
Total Mueller Industries, Inc. stockholders' equity	643,468	548,356
Noncontrolling interests	18,668	14,904
Total equity	662,136	563,260
Commitments and contingencies	—	—
Total Liabilities and Equity	$ 1,370,940	$ 1,369,549

See accompanying notes to consolidated financial statements.

MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
Years Ended December 28, 2019, December 29, 2018, and December 30, 2017

(In thousands)	2019	2018	2017 [(1)]
Operating activities:			
Consolidated net income	$ 106,232	$ 106,820	$ 87,011
Reconciliation of consolidated net income to net cash provided by operating activities:			
Depreciation	37,337	35,118	30,800
Amortization of intangibles	5,356	4,437	3,144
Amortization of debt issuance costs	318	318	303
Loss from unconsolidated affiliates	24,594	12,645	2,077
Insurance proceeds - noncapital related	485	2,306	500
Change in the fair value of contingent consideration	3,625	—	—
Insurance recovery	(485)	(3,681)	—
Stock-based compensation expense	8,744	8,035	7,450
Gain on sale of business	—	—	(1,491)
Gain on disposals of assets	(963)	(253)	(624)
Impairment charges	—	—	1,466
Deferred income tax (benefit) expense	(428)	170	(3,160)
Changes in assets and liabilities, net of effects of businesses acquired and sold:			
Receivables	6,505	(11,342)	(1,779)
Inventories	39,561	27,512	(86,286)
Other assets	(15,639)	14,353	(5,325)
Current liabilities	(7,076)	(15,680)	10,678
Other liabilities	(7,944)	(14,769)	64
Other, net	322	1,903	(833)
Net cash provided by operating activities	200,544	167,892	43,995
Investing activities:			
Proceeds from sale of assets, net of cash transferred	3,240	18,703	31,564
Acquisition of businesses, net of cash acquired	3,465	(167,677)	(18,396)
Capital expenditures	(31,162)	(38,481)	(46,131)
Insurance proceeds - capital related	—	1,968	—
Investments in unconsolidated affiliates	(16,000)	(1,609)	(3,317)
Net cash used in investing activities	(40,457)	(187,096)	(36,280)
Financing activities:			
Dividends paid to stockholders of Mueller Industries, Inc.	(22,325)	(22,705)	(196,944)
Dividends paid to noncontrolling interests	(846)	(592)	(2,909)
Issuance of long-term debt	100,658	204,233	71,475
Repayments of long-term debt	(206,718)	(172,002)	(111,224)
Repayment of debt by consolidated joint ventures, net	(4,305)	(2,915)	(3,369)
Repurchase of common stock	(1,763)	(33,562)	—
Payment of contingent consideration	(3,170)	—	—
Net cash used to settle stock-based awards	(1,225)	(726)	(1,595)
Net cash used in financing activities	(139,694)	(28,269)	(244,566)
Effect of exchange rate changes on cash	511	(1,952)	2,945
Increase (decrease) in cash, cash equivalents, and restricted cash	20,904	(49,425)	(233,906)
Cash, cash equivalents, and restricted cash at the beginning of the year	77,138	126,563	360,469
Cash, cash equivalents, and restricted cash at the end of the year	$ 98,042	$ 77,138	$ 126,563

See accompanying notes to consolidated financial statements. Refer to Note 12 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.

MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY
Years Ended December 28, 2019, December 29, 2018, and December 30, 2017

	2019		2018		2017	
(In thousands)	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		$ 276,849		$ 274,585		$ 273,345
Issuance of shares under incentive stock option plans		(644)		(278)		(2,118)
Stock-based compensation expense		8,744		8,035		7,450
Issuance of restricted stock		(6,340)		(5,493)		(4,092)
Balance at end of year		$ 278,609		$ 276,849		$ 274,585
Retained earnings:						
Balance at beginning of year		$ 824,737		$ 743,503		$ 1,141,831
Net income attributable to Mueller Industries, Inc.		100,972		104,459		85,598
Dividends paid or payable to stockholders of Mueller Industries, Inc.		(22,639)		(23,009)		(483,926)
Reclassification of stranded effects of the Act		—		(556)		—
Other adjustments		—		340		—
Balance at end of year		$ 903,070		$ 824,737		$ 743,503
Accumulated other comprehensive loss:						
Balance at beginning of year		$ (79,792)		$ (51,056)		$ (66,956)
Total other comprehensive income (loss) attributable to Mueller Industries, Inc.		11,022		(29,292)		15,900
Reclassification of stranded effects of the Act		—		556		—
Balance at end of year		$ (68,770)		$ (79,792)		$ (51,056)

MUELLER INDUSTRIES, INC.
CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY
(continued)
Years Ended December 28, 2019, December 29, 2018, and December 30, 2017

	2019		2018		2017	
(In thousands)	Shares	Amount	Shares	Amount	Shares	Amount
Treasury stock:						
Balance at beginning of year	23,480	$ (474,240)	22,373	$ (445,723)	22,788	$ (450,338)
Issuance of shares under incentive stock option plans	(94)	1,908	(57)	1,136	(395)	7,828
Repurchase of common stock	162	(4,251)	1,437	(35,146)	188	(7,305)
Issuance of restricted stock	(314)	6,340	(273)	5,493	(208)	4,092
Balance at end of year	23,234	$ (470,243)	23,480	$ (474,240)	22,373	$ (445,723)
Noncontrolling interests:						
Balance at beginning of year		$ 14,904		$ 13,917		$ 37,753
Sale of Mueller-Xingrong		—		—		(23,712)
Dividends paid to noncontrolling interests		(846)		(592)		(2,909)
Net income attributable to noncontrolling interests		5,260		2,361		1,413
Foreign currency translation		(650)		(782)		1,372
Balance at end of year		$ 18,668		$ 14,904		$ 13,917

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 consists of 52 weeks ending on the last Saturday of December. These dates were December 28, 2019, December 29, 2018, and December 30, 2017.

Reclassifications

Certain reclassifications have been made to the prior years' Consolidated Financial Statements to conform to the current year's presentation.

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.

The Company's Domestic Piping Systems Group engages in certain transactions where it acts as an agent. Revenue from these transactions is recorded on a net basis.

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 28, 2019 and December 29, 2018, temporary investments consisted of money market mutual funds, commercial paper, bank repurchase agreements, and U.S. and foreign government securities totaling approximately$0.5 million and $0.6 million, respectively.

Amounts included in restricted cash relate to required deposits in brokerage accounts that facilitate the Company's hedging activities as well as imprest funds for the Company's self-insured workers' compensation program. See "Note 4 – Cash, Cash Equivalents, and Restricted Cash" for additional information.

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 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 5 – Inventories" for additional information.

Leases

The Company leases certain manufacturing facilities, distribution centers, office space, and equipment. Leases with an initial term of twelve months or less are not recorded on the balance sheet; expense for these leases is recognized on a straight line-basis over the term of the lease. Most of the Company's leases include one or more options to renew up to five years and have remaining terms of one to fifteen years. These options are not included in the Company's valuation of the right-of-use assets as the Company is not reasonably certain to exercise the options.

The Company has certain vehicle leases that are financing; however, these leases are deemed immaterial for disclosure. See "Note 8 – Leases" 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 9 – 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 10 – 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 a50 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 11 – 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 2019, the average remaining service period for the pension plans wasnine years. See "Note 13 – 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.

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 14 – 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. There were no awards excluded from the computation of diluted earnings per share for the year endedDecember 28, 2019, and approximately 54 thousand stock-based awards excluded from the computation of diluted earnings per share for the year endedDecember 29, 2018, 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 15 – 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 17 – 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 7 – 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 atDecember 28, 2019 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 gains of$0.2 million in 2019, losses of $1.0 million in 2018, and losses of $0.4 million in 2017.

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 July 2018, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) No. 2018-11, *Leases (Topic 842): Targeted Improvements* and ASU No. 2018-10, *Codification Improvements to Topic 842, Leases.* The ASUs 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 each lease with a term 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 Company adopted the ASU during the first quarter of 2019 using a modified retrospective approach and applied the transition provisions at the beginning of the fiscal year. Financial results reported in periods prior to 2018 are unchanged. The Company elected a package of practical expedients, which, among other things, does not require the reassessment of lease classification. The Company does not separate lease and non-lease components of contracts. The Company implemented a system to identify its entire population of leases and tested the population for completeness. As of the effective date, the Company recognized noncurrent right-of-use assets of $29.5 million and corresponding current and noncurrent lease liabilities of $4.8 million and $25.4 million, respectively. As of the adoption date of ASC 842, discount rates for existing leases were based on an estimate of the Company's incremental borrowing rate, adjusted for the term of the lease.

Recently Issued Accounting Standards

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Disclosure Framework - Measurement of Credit Losses on Financial Instruments.* The ASU significantly changes the current incurred credit loss model under U.S. GAAP, which delays recognizing credit losses until it is probable a loss has been incurred to a current expected credit losses model which requires immediate recognition of management estimates of credit losses. 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. 2018-14, *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.

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 $158.1 million, net of the working capital adjustments. The total purchase price consisted of $151.8 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 28, 2019, ATCO had net sales of approximately $190.1 million. 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.

	For the Year Ended	
(In thousands, except per share data)	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 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.

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. During 2019, the valuation of the ATCO acquisition was finalized. Changes to the purchase price allocation from the amounts presented in the Company's 2018 Annual Report on Form 10-K included the valuation of the contingent consideration, intangible assets, and working capital. These changes resulted in a decrease to goodwill of $0.5 million. During 2019, the valuation of the Die-Mold acquisition was finalized. Changes to the purchase price allocation from the amounts presented in the Company's 2018 Annual Report on Form 10-K included the recognition of a deferred tax liability of$2.0 million that resulted from a basis difference in the long-lived assets acquired. This change resulted in an increase to goodwill.

(in thousands)	ATCO		Die-Mold	Heatlink Group
Total consideration	$ 158,100		$ 13,629	$ 17,164
Allocated to:				
Accounts receivable	21,829		1,684	2,809
Inventories	31,666		1,833	4,648
Other current assets	1,051		267	508
Property, plant, and equipment	83,080		3,278	2,024
Goodwill	17,236	(1)	4,239	6,879
Intangible assets	23,360		5,209	6,413
Other assets	224		—	—
Total assets acquired	178,446		16,510	23,281
Accounts payable	8,093		710	3,633
Other current liabilities	10,187		173	593
Long-term debt	2,066		—	—
Other noncurrent liabilities	—		1,998	1,891
Total liabilities assumed	20,346		2,881	6,117
Net assets acquired	$ 158,100		$ 13,629	$ 17,164

(1) *Tax-deductible goodwill*

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
Intangible asset type:				
Customer relationships	20 years	$ 6,550	$ 3,077	$ 4,265
Non-compete agreements	3-5 years	—	70	74
Patents and technology	10-15 years	10,570	1,512	1,466
Trade names, licenses, and other	5-10 years	4,770	550	608
Supply contracts	5 years	1,470	—	—
Total intangible assets		$ 23,360	$ 5,209	$ 6,413

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 $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 2019, the segment recognized a gain of $1.2 million on the sale of real property.

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.

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 2019, the segment recognized a loss of $0.3 million on the sale of real property and an insurance recovery gain of $0.5 million related to the losses incurred due to the 2017 fire at the brass rod mill in Port Huron, Michigan.

During 2018, the segment 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 the brass rod mill in Port Huron, Michigan.

Climate

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

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 2019, 2018, and 2017, 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:

	For the Year Ended December 28, 2019			
(In thousands)	Piping Systems	Industrial Metals	Climate	Total
Tube and fittings	$ 1,271,558	$ —	$ —	$ 1,271,558
Brass rod and forgings	—	425,573	—	425,573
OEM components, tube & assemblies	29,103	48,104	133,651	210,858
Valves and plumbing specialties	241,795	—	—	241,795
Other	—	80,695	222,565	303,260
	$ 1,542,456	$ 554,372	$ 356,216	$ 2,453,044
Intersegment sales				(22,428)
Net sales				$ 2,430,616

	For the Year Ended December 29, 2018			
(In thousands)	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

Disaggregation of revenue from contracts with customers (continued):

(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

Summarized geographic information is as follows:

(In thousands)	2019	2018	2017
Net sales:			
United States	$ 1,775,321	$ 1,820,857	$ 1,556,825
United Kingdom	230,791	245,458	231,039
Canada	285,720	292,798	280,140
Asia	64,363	59,730	121,295
Mexico	74,421	89,035	76,774
	$ 2,430,616	$ 2,507,878	$ 2,266,073

(In thousands)	2019	2018	2017
Long-lived assets:			
United States	$ 286,727	$ 295,735	$ 238,752
United Kingdom	18,776	16,313	17,661
Canada	31,429	33,144	21,327
Asia	25,637	24,930	25,973
Mexico	559	511	608
	$ 363,128	$ 370,633	$ 304,321

Summarized segment information is as follows:

(In thousands)	For the Year Ended December 28, 2019				
	Piping Systems	Industrial Metals	Climate	Corporate and Eliminations	Total
Net sales	$ 1,542,456	$ 554,372	$ 356,216	$ (22,428)	$ 2,430,616
Cost of goods sold	1,313,980	473,010	273,850	(25,230)	2,035,610
Depreciation and amortization	22,621	7,489	9,298	3,285	42,693
Selling, general, and administrative expense	75,170	12,359	30,385	44,444	162,358
(Gain) loss on sale of assets, net	(1,194)	275	(44)	—	(963)
Insurance recovery	—	(485)	—	—	(485)
Operating income	131,879	61,724	42,727	(44,927)	191,403
Interest expense					(25,683)
Environmental expense					(1,321)
Other income, net					1,684
Income before income taxes					$ 166,083

(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, net	(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

Segment information (continued):

(In thousands)	For the Year Ended December 30, 2017				
	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, net	(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

(In thousands)	2019	2018	2017
Expenditures for long-lived assets (including those resulting from business acquisitions):			
Piping Systems	$ 15,505	$ 31,362	$ 18,124
Industrial Metals	9,101	8,066	5,322
Climate	3,845	85,471	2,191
General Corporate	2,711	37	22,518
	$ 31,162	$ 124,936	$ 48,155
Segment assets:			
Piping Systems	$ 796,262	$ 818,303	$ 801,468
Industrial Metals	161,904	173,725	212,638
Climate	249,853	246,851	73,458
General Corporate	162,921	130,670	232,609
	$ 1,370,940	$ 1,369,549	$ 1,320,173

Note 4 – Cash, Cash Equivalents, and Restricted Cash

(In thousands)	2019	2018
Cash & cash equivalents	$ 97,944	$ 72,616
Restricted cash included within other current assets	—	4,414
Restricted cash included within other assets	98	108
Total cash, cash equivalents, and restricted cash	$ 98,042	$ 77,138

Note 5 – Inventories

(In thousands)	2019	2018
Raw materials and supplies	$ 85,769	$ 89,641
Work-in-process	48,814	58,643
Finished goods	163,842	188,506
Valuation reserves	(6,318)	(6,995)
Inventories	$ 292,107	$ 329,795

Inventories valued using the LIFO method totaled $16.8 million at December 28, 2019 and $18.8 million at December 29, 2018. At December 28, 2019 and December 29, 2018, the approximate FIFO cost of such inventories was $87.8 million and $91.8 million, respectively. Additionally, the Company values certain inventories on an average cost basis.

At the end of 2019 and 2018, the FIFO value of inventory consigned to others was $5.5 million and $5.1 million, respectively.

Note 6 – Consolidated Financial Statement Details

Other Current Liabilities

Included in other current liabilities as of December 28, 2019 and December 29, 2018 were the following: (i) accrued discounts, allowances, and customer rebates of $53.9 million and $48.6 million, respectively, (ii) accrued interest of $6.0 million and $5.8 million, respectively, (iii) current taxes payable of $4.7 million and $5.0 million, respectively, and (iv) current environmental liabilities of $0.9 million and $3.6 million, respectively. In addition, as of December 28, 2019 this included accruals for contingent consideration arrangements associated with acquired businesses of $7.0 million.

Other Income, Net

(In thousands)	2019	2018	2017
Net periodic benefit income	$ 465	$ 2,914	$ 1,150
Interest income	722	624	684
Other	497	429	1,117
Other income, net	$ 1,684	$ 3,967	$ 2,951

Note 7 – 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 28, 2019, the Company held open futures contracts to purchase approximately $21.3 million of copper over the next 12 months related to fixed price sales orders. The fair value of those futures contracts was a $1.4 million net gain position, which was determined by obtaining quoted market prices (level 1 within the fair value hierarchy). In the next 12 months, the Company will reclassify into earnings realized gains or losses relating to cash flow hedges. At December 28, 2019, this amount was approximately $0.3 million of deferred net gains, net of tax.

The Company may also enter into futures contracts to protect the value of inventory against market fluctuations. At December 28, 2019, the Company held open futures contracts to sell approximately $1.9 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 loss 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:

	Asset Derivatives			Liability Derivatives		
		Fair Value			Fair Value	
(In thousands)	Balance Sheet Location	2019	2018	Balance Sheet Location	2019	2018
Commodity contracts - gains	Other current assets	$ 1,435	$ 88	Other current liabilities	$ 50	$ 103
Commodity contracts - losses	Other current assets	(12)	(1)	Other current liabilities	(159)	(1,382)
Total derivatives [1]		$ 1,423	$ 87		$ (109)	$ (1,279)

[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	2019	2018
Fair value hedges:			
Gain on commodity contracts (qualifying)	Cost of goods sold	$ —	$ 391
Gain (loss) on hedged item - inventory	Cost of goods sold	—	(385)
Undesignated derivatives:			
Gain on commodity contracts (nonqualifying)	Cost of goods sold	$ 2,443	$ 4,227

The following tables summarize amounts recognized in and reclassified from AOCI during the period:

(In thousands)	Year Ended December 28, 2019 Gain Recognized in AOCI (Effective Portion), Net of Tax	Classification Gains (Losses)	Gain Reclassified from AOCI (Effective Portion), Net of Tax
Cash flow hedges:			
Commodity contracts	$ 1,161	Cost of goods sold	$ (486)
Other	15	Other	—
Total	$ 1,176	Total	$ (486)

(In thousands)	Year Ended December 29, 2018 Loss Recognized in AOCI (Effective Portion), Net of Tax	Classification Gains (Losses)	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)

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 28, 2019 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 28, 2019 and December 29, 2018, the Company had recorded restricted cash in other current assets of \$0.2 million and \$3.6 million, respectively, as collateral related to open derivative contracts under the master netting arrangements.

Note 8 – Leases

The Company leases certain facilities, vehicles, and equipment which expire on various dates through2033. The following table includes supplemental information with regards to the Company's operating leases:

(In thousands, except lease term and discount rate)	December 28, 2019
Operating lease right-of-use assets	$ 26,922
Current portion of operating lease liabilities	5,250
Noncurrent operating lease liabilities	22,388
Total operating lease liabilities	$ 27,638
Weighted average discount rate	5.82 %
Weighted average remaining lease term (in years)	8.35

Some of the Company's leases include variable lease costs such as taxes, insurance, etc. These costs are immaterial for disclosure.

The following table presents certain information related to operating lease costs and cash paid during the period:

(In thousands)	For the Year Ended December 28, 2019
Operating lease costs	$ 6,818
Short term lease costs	4,951
Total lease costs	$ 11,769
Cash paid for amounts included in the measurement of lease liabilities	$ 6,703

Maturities of the Company's operating leases are as follows:

(In thousands)	Amount
2020	$ 6,635
2021	5,363
2022	4,620
2023	3,117
2024	2,247
2025 and thereafter	13,750
Total lease payments	35,732
Less imputed interest	(8,094)
Total lease obligations	27,638
Less current obligations	(5,250)
Noncurrent lease obligations	$ 22,388

Note 9 – Property, Plant, and Equipment, Net

(In thousands)	2019	2018
Land and land improvements	$ 31,987	$ 32,132
Buildings	203,762	201,176
Machinery and equipment	640,642	635,173
Construction in progress	18,920	22,618
	895,311	891,099
Less accumulated depreciation	(532,183)	(520,466)
Property, plant, and equipment, net	$ 363,128	$ 370,633

Depreciation expense for property, plant, and equipment was$37.3 million in 2019, $35.1 million in 2018, and $30.8 million in 2017.

Note 10 – 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	$ 166,428	$ 8,854	$ 4,416	$ 179,698
Accumulated impairment charges	(40,552)	(8,853)	—	(49,405)
Balance at December 30, 2017:	125,876	1	4,416	130,293
Additions [1]	5,049	—	17,770	22,819
Currency translation	(2,777)	—	—	(2,777)
Balance at December 29, 2018:	128,148	1	22,186	150,335
Additions [2]	1,999	—	—	1,999
Reductions [3]	—	—	(534)	(534)
Currency translation	1,476	—	—	1,476
Balance at December 28, 2019:				
Goodwill	172,175	8,854	21,652	202,681
Accumulated impairment charges	(40,552)	(8,853)	—	(49,405)
Goodwill, net	$ 131,623	$ 1	$ 21,652	$ 153,276

[1] *Includes finalization of the purchase price allocation adjustment for Heatlink Group of $2.8 million.*
[2] *Includes finalization of the purchase price allocation adjustment for Die-Mold of $2.0 million.*
[3] *Includes finalization of the purchase price allocation adjustment for ATCO of $0.5 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 2019, 2018, or 2017 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 28, 2019 was as follows:

(In thousands)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer relationships	$ 44,832	$ (8,773)	$ 36,059
Non-compete agreements	2,499	(2,156)	343
Patents and technology	19,804	(4,060)	15,744
Trade names and licenses	10,155	(3,249)	6,906
Other	1,676	(646)	1,030
Other intangible assets	$ 78,966	$ (18,884)	$ 60,082

The carrying amount of intangible assets atDecember 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

Amortization expense for intangible assets was$5.4 million in 2019, $4.4 million in 2018, and $3.1 million in 2017. Future amortization expense is estimated as follows:

(In thousands)	Amount
2020	$ 5,203
2021	4,916
2022	4,836
2023	4,525
2024	4,378
Thereafter	36,224
Expected amortization expense	$ 60,082

Note 11 – Investments in Unconsolidated Affiliates

Tecumseh

The Company owns a 50 percent interest in an unconsolidated affiliate that acquired Tecumseh. The Company also owns a50 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)	2019	2018
Current assets	$ 198,559	$ 228,214
Noncurrent assets	87,218	114,257
Current liabilities	147,801	175,371
Noncurrent liabilities	51,219	57,216
Net sales	$ 488,270	$ 509,517
Gross profit	58,494	59,385
Net loss	(44,053)	(20,049)

The Company’s loss from unconsolidated affiliates, net of foreign tax, for 2019 included net losses of $22.0 million for Tecumseh.

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 $5.0 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 2019 and 2018 included net losses of $2.6 million for Mueller Middle East.

Note 12 – Debt

(In thousands)	2019	2018
Subordinated Debentures with interest at 6.00%, due 2027	$ 284,479	$ 284,479
Revolving Credit Facility with interest at 3.20%, due 2021	90,000	195,000
Jungwoo-Mueller credit facility with interest at 2.86%, due 2019	—	5,264
Jungwoo-Mueller credit facility with interest at 2.55%, due 2020	5,768	5,104
2001 Series IRB's with interest at 3.03%, due 2021	1,250	2,250
Other	5,295	5,458
	386,792	497,555
Less debt issuance costs	(538)	(857)
Less current portion of debt	(7,530)	(7,101)
Long-term debt	$ 378,724	$ 489,597

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
2019	104%
2020	103
2021	102
2022 and thereafter	100

Revolving Credit Facility

The Company's Credit Agreement provides for an unsecured $350.0 million revolving credit facility (Revolving Credit Facility) that matures onDecember 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 28, 2019, the premium was 150.0 basis points for LIBOR loans and 50.0 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 $11.9 million at December 28, 2019. 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 KRW25.8 billion (or approximately $21.9 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 28, 2019, the Company was in compliance with all debt covenants.

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

(In thousands)	Amount
2020	$ 7,530
2021	90,502
2022	525
2023	804
2024	540
Thereafter	286,891
Long-term debt	$ 386,792

Net interest expense consisted of the following:

(In thousands)	2019	2018	2017
Interest expense	$ 25,957	$ 25,349	$ 19,716
Capitalized interest	(274)	(150)	(214)
	$ 25,683	$ 25,199	$ 19,502

Interest paid in 2019, 2018, and 2017 was $25.4 million, $25.2 million, and $13.8 million, respectively.

Note 13 – 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 2019 and 2018, and a statement of the plans' aggregate funded status:

	Pension Benefits		Other Benefits	
(In thousands)	2019	2018	2019	2018
Change in benefit obligation:				
Obligation at beginning of year	$ 166,739	$ 186,766	$ 14,382	$ 16,407
Service cost	—	88	260	235
Interest cost	5,972	5,745	609	447
Actuarial loss (gain)	17,061	(10,637)	(1,860)	(1,185)
Benefit payments	(9,883)	(10,368)	(832)	(892)
Settlement charge	—	—	(198)	(171)
Foreign currency translation adjustment	2,275	(4,855)	292	(459)
Obligation at end of year	182,164	166,739	12,653	14,382
Change in fair value of plan assets:				
Fair value of plan assets at beginning of year	164,603	186,336	—	—
Actual return on plan assets	26,734	(8,282)	—	—
Employer contributions	—	999	832	892
Benefit payments	(9,883)	(10,368)	(832)	(892)
Foreign currency translation adjustment	2,032	(4,082)	—	—
Fair value of plan assets at end of year	183,486	164,603	—	—
Funded (underfunded) status at end of year	$ 1,322	$ (2,136)	$ (12,653)	$ (14,382)

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

(In thousands)	Pension Benefits 2019	Pension Benefits 2018	Other Benefits 2019	Other Benefits 2018
Unrecognized net actuarial loss	$ 36,195	$ 39,101	$ (1,609)	$ 170
Unrecognized prior service credit	—	—	(5,485)	(6,387)

The Company sponsors one pension plan in the U.K. which comprised 43 and 45 percent of the above benefit obligation at December 28, 2019 and December 29, 2018, respectively, and 39 and 37 percent of the above plan assets at December 28, 2019 and December 29, 2018, respectively.

As of December 28, 2019, $1.6 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 2020.

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.

As of December 28, 2019 and December 29, 2018, the total funded status of the plans recognized in the Consolidated Balance Sheets was as follows:

(In thousands)	Pension Benefits 2019	Pension Benefits 2018	Other Benefits 2019	Other Benefits 2018
Long-term asset	$ 8,592	$ 10,580	$ —	$ —
Current liability	—	—	(1,013)	(1,080)
Long-term liability	(7,270)	(12,716)	(11,640)	(13,302)
Total funded (underfunded) status	$ 1,322	$ (2,136)	$ (12,653)	$ (14,382)

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

(In thousands)	2019	2018	2017
Pension benefits:			
Service cost	$ —	$ 88	$ 128
Interest cost	5,972	5,745	6,344
Expected return on plan assets	(8,103)	(9,522)	(9,374)
Amortization of net loss	1,950	1,151	2,206
Net periodic benefit income	$ (181)	$ (2,538)	$ (696)
Other benefits:			
Service cost	$ 260	$ 235	$ 235
Interest cost	609	447	599
Amortization of prior service credit	(902)	(902)	(901)
Amortization of net (gain) loss	(88)	92	(42)
Settlement charge	(2)	38	17
Net periodic benefit income	$ (123)	$ (90)	$ (92)

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	
	2019	2018	2019	2018
Discount rate	1.93 %	3.72 %	3.70 %	4.56 %
Expected long-term return on plan assets	3.84 %	5.05 %	N/A	N/A
Rate of compensation increases	N/A	N/A	5.00 %	5.00 %
Rate of inflation	3.20 %	3.40 %	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		
	2019	2018	2017	2019	2018	2017
Discount rate	3.72 %	3.22 %	3.61 %	4.56 %	3.89 %	4.21 %
Expected long-term return on plan assets	5.05 %	5.27 %	5.56 %	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	3.40 %	3.30 %	3.30 %	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 from4.0 to 7.0 percent for 2020, gradually decrease to 4.1 percent through 2040, 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:

	Pension Plan Assets	
Asset category	2019	2018
Fixed income securities (includes fixed income mutual funds)	55 %	54 %
Equity securities (includes equity mutual funds)	25	35
Multi-asset securities	9	—
Cash and equivalents (includes money market funds)	7	8
Alternative investments	4	3
Total	100 %	100 %

At December 28, 2019, 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 than30 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 3.84 percent for 2019 and 5.05 percent in 2018.

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.

Mutual funds – Valued at the net asset value of shares held by the plans atDecember 28, 2019 and December 29, 2018, 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:

	Fair Value Measurements at December 28, 2019			
(In thousands)	Level 1	Level 2	Level 3	Total
Cash and money market funds	$ 12,318	$ —	$ —	$ 12,318
Mutual funds (1)	—	163,253	—	163,253
Limited partnerships	—	—	7,915	7,915
Total	$ 12,318	$ 163,253	$ 7,915	$ 183,486

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

(1) *Approximately 80 percent of mutual funds are actively managed funds and approximately 20 percent of mutual funds are index funds. Additionally, 10 percent of the mutual funds' assets are invested in non-U.S. multi-asset securities, 28 percent in non-U.S. equities, and 62 percent in U.S. fixed income securities.*

(2) *Approximately 61 percent of mutual funds are actively managed funds and approximately 39 percent of mutual funds are index funds. Additionally, 5 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 1 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 28, 2019:

(In thousands)	Limited Partnerships
Balance, December 29, 2018	$ 5,028
Redemptions	(3,825)
Subscriptions	6,846
Net appreciation in fair value	(134)
Balance, December 28, 2019	$ 7,915

Contributions and Benefit Payments

The Company does not expect to contribute to its pension plans, other than to reimburse expenses, and expects to contribute $1.0 million to its other postretirement benefit plans in 2020. In November 2019, the Company's Board of Directors approved the termination of the Mueller Pension Plan effective January 2020. The termination is expected to be complete by the end of 2020. The Company expects future benefits to be paid from the plans as follows:

(In thousands)	Pension Benefits	Other Benefits
2020	$ 107,864	$ 1,014
2021	2,815	959
2022	2,905	953
2023	2,998	1,053
2024	3,094	1,062
2025-2029	17,020	4,944
Total	$ 136,696	$ 9,985

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 7, 2023 and June 26, 2022, 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 $1.2 million in 2019, $1.3 million in 2018, and $1.1 million in 2017. 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. While the IAM Plan remains well-funded at 89 percent, for 2019, it has been certified in the yellow zone due to a declining credit balance. However, as a result of a challenging investment environment and the decline of the IAM Plan's credit balance, the IAM National Pension Plan Board of Trustees has voluntarily elected to place the IAM Plan in the red zone for 2019. The action was taken to protect the IAM Plan's participants' core retirement benefits and strengthen the IAM Plan's financial health over the long term. For 2018, the IAM Plan was determined to have green zone status.

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 $5.4 million in 2019, $5.1 million in 2018, and $5.1 million in 2017. 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 $223 thousand, $153 thousand, and $182 thousand for the years ended 2019, 2018, and 2017, respectively.

Note 14 – 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 $1.7 million in 2019, $2.0 million in 2018, and $7.5 million in 2017 for pending environmental matters. Environmental reserves totaled $20.9 million at December 28, 2019 and $23.6 million at December 29, 2018. As of December 28, 2019, the Company expects to spend $0.8 million in 2020, $0.7 million in 2021, $0.6 million in 2022, $0.8 million in 2023, $0.7 million in 2024, and $17.3 million thereafter for ongoing projects.

<u>Non-operating Properties</u>

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. Construction of the remedy was completed in 2018.

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. EPA issued an interim record of decision in 2017 and has been remediating properties at the site.

The Company's reserve for its proportionate share of the remediation costs associated with thesethree Southeast Kansas sites is $5.6 million. EPA issued an interim record of decision in 2017 and has been remediating properties at the site.

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 2030 to address residual discharges of acid rock drainage. At this site, MRRC spent approximately $1.9 million from 2017 through 2019 for remediation, and currently estimates that it will spend between approximately $12.7 million and $17.7 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 2017 through 2019 with respect to this site. Approximate costs to comply with the post-closure permit, including associated general and administrative costs, are estimated at between $1.8 million and $2.3 million over the next 17 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 financial assurance 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 well as the possibility of up to $0.7 million in further payments for ongoing work by those PRPs, $0.4 million of which has been incurred by those PRPs and paid for by the Company to date. As of year-end, the Company has made payments of approximately $7.0 million related to the aforementioned agreement with the other PRPs. 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 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), including, but not limited to, EPA oversight costs for which EPA may attempt to seek reimbursement from the Company, and past costs for which other PRPs may attempt to seek contribution from the Company.

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.

<u>Operating Properties</u>

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 $0.6 million to $0.9 million over the next six 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 alleged 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, which is currently set to expire in January 2021, provided that the Company 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 was fully within the limits of the Company's applicable insurance coverage, and has been paid to claimants designated as eligible by the EEOC. The Consent Decree also required the Company to take a series of proactive measures to cultivate a work environment free from unlawful discrimination. Those measures have included, 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.

Guarantees

Guarantees, in the form of letters of credit, are issued by the Company generally to assure the payment of insurance deductibles, certain retiree health benefits, and debt at certain unconsolidated affiliates. The terms of the guarantees are generally one year but are renewable annually as required. These letters are primarily backed by the Company's revolving credit facility. The maximum payments that the Company could be required to make under its guarantees at December 28, 2019 were $11.9 million.

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 15 – Income Taxes

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

(In thousands)	2019	2018	2017
Domestic	$ 112,812	$ 105,455	$ 76,876
Foreign	53,271	44,962	50,096
Income before income taxes	$ 166,083	$ 150,417	$ 126,972

Income tax expense consists of the following:

(In thousands)	2019	2018	2017
Current tax expense:			
Federal	$ 19,066	$ 17,974	$ 28,584
Foreign	12,727	9,650	10,219
State and local	3,892	3,158	2,241
Current tax expense	35,685	30,782	41,044
Deferred tax (benefit) expense:			
Federal	1,725	(1,381)	(1,764)
Foreign	(2,311)	551	1,118
State and local	158	1,000	(2,514)
Deferred tax (benefit) expense	(428)	170	(3,160)
Income tax expense	$ 35,257	$ 30,952	$ 37,884

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)	2019	2018	2017
Expected income tax expense	$ 34,892	$ 31,588	$ 44,440
State and local income tax, net of federal benefit	3,234	3,495	1,135
Effect of foreign statutory rates different from U.S. and other foreign adjustments	(771)	759	(6,026)
U.S. production activities deduction	—	—	(1,575)
Investment in unconsolidated affiliates	538	(2,776)	216
Benefit of stock-based compensation deductions	(36)	(41)	(2,160)
Effect of tax on accumulated foreign earnings	(111)	(4,415)	12,893
Effect of tax rate change on net deferred tax liability balance	—	—	(12,067)
Other, net	(2,489)	2,342	1,028
Income tax expense	$ 35,257	$ 30,952	$ 37,884

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 continued to refine its calculation of the transition tax. Following the completion of this analysis, the Company recorded a reduction to income tax expense of $4.4 million, or eight cents per diluted share, to reduce this liability. During 2019, the Treasury Department finalized regulations related to the calculation of the transition tax, the impact of which was immaterial to the financial statements. The Company continues to assert that the undistributed earnings of most of its foreign subsidiaries are permanently reinvested. No taxes have been accrued with respect to these undistributed earnings or any outside basis differences.

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.

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 2019, 2018, and 2017.

The statute of limitations is open for the Company's federal tax return for 2015 and all subsequent years. The statutes of limitations for most state returns are open for 2016 and all subsequent years, and some state and foreign returns are also open for some earlier tax years due to differing statute periods. The Internal Revenue Service is currently auditing the Company's 2015 and 2017 tax returns. 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)	2019	2018
Deferred tax assets:		
Inventories	$ 12,247	$ 12,297
Other postretirement benefits and accrued items	9,271	9,213
Other reserves	6,834	7,847
Foreign tax attributes	5,909	6,252
State tax attributes, net of federal benefit	22,395	27,651
Stock-based compensation	3,378	2,949
Right of Use Liability	5,965	—
Basis difference in unconsolidated affiliates	6,547	1,067
Total deferred tax assets	72,546	67,276
Less valuation allowance	(23,130)	(25,311)
Deferred tax assets, net of valuation allowance	49,416	41,965
Deferred tax liabilities:		
Property, plant, and equipment	47,791	44,910
Pension	949	250
Right of Use Asset	5,967	—
Other Liabilities	311	—
Total deferred tax liabilities	55,018	45,160
Net deferred tax liabilities	$ (5,602)	$ (3,195)

As of December 28, 2019, after consideration of the federal impact, the Company had state income tax credit carryforwards of $2.3 million, all of which expire by 2022, 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 $8.4 million, after consideration of the federal impact, expiring between 2020 and 2034. The state tax credit and NOL carryforwards are offset by valuation allowances totaling $10.7 million.

As of December 28, 2019, the Company had other foreign tax attributes with potential tax benefits of $5.0 million that have an unlimited life. These attributes were offset by a valuation allowance totaling $3.0 million. The Company also had other foreign tax attributes of $0.9 million, which have limited lives expiring between 2025 and 2039.

Income taxes paid were approximately $41.8 million in 2019, $38.1 million in 2018, and $42.5 million in 2017.

Note 16 – Equity

The Company's Board of Directors has extended, until August 2020, 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 28, 2019, the Company has repurchased approximately 6.2 million shares under this authorization.

Note 17 – 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 thanten years.

During the years ended December 28, 2019, December 29, 2018, and December 30, 2017, the Company recognized stock-based compensation, as a component of selling, general, and administrative expense, in its Consolidated Statements of Income of $8.7 million, $8.0 million, and $7.5 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 2019, 2018, and 2017 was $8.78, $9.64, and $9.38, 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:

	2019	2018	2017
Expected term	7.8 years	7.6 years	7.7 years
Expected price volatility	28.6%	27.2%	28.9%
Risk-free interest rate	2.4%	2.9%	2.1%
Dividend yield	1.4%	1.3%	1.3%

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 $1.6 million, $0.9 million, and $10.2 million in 2019, 2018, and 2017, respectively. The total fair value of options that vested was $1.0 million each year in 2019, 2018, and 2017.

At December 28, 2019, the aggregate intrinsic value of all outstanding options was $6.3 million with a weighted average remaining contractual term of 5.5 years. Of the outstanding options, 613 thousand are currently exercisable with an aggregate intrinsic value of $5.8 million, a weighted average exercise price of $22.34, and a weighted average remaining contractual term of 4.5 years.

The total compensation expense not yet recognized related to unvested options at December 28, 2019 was $1.5 million, with an average expense recognition period of 3.0 years.

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 2019, 2018, and 2017 was $28.82, $32.04, and $30.97, respectively.

The aggregate intrinsic value of outstanding and unvested awards was $33.7 million at December 28, 2019. Total compensation expense for restricted stock awards not yet recognized was $18.7 million with an average expense recognition period of3.2 years. The total fair value of awards that vested was$5.6 million, $3.7 million, and $3.5 million in 2019, 2018, and 2017, 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:

	Stock Options		Restricted Stock Awards	
(Shares in thousands)	Shares	Weighted Average Exercise Price	Shares	Weighted Average Grant Date Fair Value
Outstanding at December 29, 2018	1,014	$ 23.90	930	$ 32.14
Granted	34	28.82	316	28.82
Exercised/Released	(94)	13.37	(182)	31.06
Forfeited	(15)	29.31	(2)	34.12
Outstanding at December 28, 2019	939	25.05	1,062	31.34

Approximately 1.9 million shares were available for future stock incentive awards atDecember 28, 2019.

Note 18 – 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 Gain (Loss) on Derivatives	Pension/ OPEB Liability Adjustment	Attributable to Unconsol. Affiliates	Total
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)
Other comprehensive income (loss) before reclassifications	8,059	1,176	2,315	(839)	10,711
Amounts reclassified from AOCI	—	(486)	797	—	311
Balance at December 28, 2019	$ (46,198)	$ 476	$ (21,855)	$ (1,193)	$ (68,770)

Reclassification adjustments out of AOCI were as follows:

	Amount reclassified from AOCI			
(In thousands)	2019	2018	2017	Affected Line Item
Unrealized losses (gains) on derivatives:				
Commodity contracts	$ (587)	$ (429)	$ 1,309	Cost of goods sold
Interest rate swap	—	—	851	Interest expense
	101	58	(624)	Income tax expense (benefit)
	$ (486)	$ (371)	$ 1,536	Net of tax and noncontrolling interests
Amortization of net loss and prior service cost on employee benefit plans	$ 960	$ 341	$ 1,263	Other income, net
	(163)	(38)	(221)	Income tax benefit
	$ 797	$ 303	$ 1,042	Net of tax and noncontrolling interests
Gain recognized upon sale of business	$ —	$ —	$ (3,777)	Gain on sale of assets, net
	—	—	—	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 19 – Quarterly Financial Information (Unaudited) *[1]*

(In thousands, except per share data)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2019				
Net sales	$ 611,781	$ 666,394	$ 608,602	$ 543,839
Gross profit [2]	100,388	102,446	97,814	94,358
Consolidated net income	17,139	28,676	30,444	29,973
Net income attributable to Mueller Industries, Inc.	15,723	27,986	29,093	28,170
Basic earnings per share	0.28	0.50	0.52	0.50
Diluted earnings per share	0.28	0.50	0.52	0.50
Dividends per share	0.10	0.10	0.10	0.10
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

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

Note 20 – Subsequent Events

On February 12, 2020, Mueller Copper Tube Company, a wholly owned subsidiary of the Company, collected approximately $21.9 million related to its claim under the Deepwater Horizon Economic and Property Damage Settlement Program, which as previously reported by the Company, was originally approved in November 2018, subject to appeal. The collected amount represents settlement proceeds received after the payment of fees and expenses.

On January 17, 2020, the Company entered into a stock purchase agreement pursuant to which the Company acquired all of the outstanding stock of Shoals Tubular, Inc. (STI) for approximately $15.4 million, net of working capital adjustments. STI is a manufacturer of brazed manifolds, headers, and distributor assemblies used primarily by manufactures of residential heating and air conditioning units. STI will be reported with and complements the Company's existing business in its Climate segment.

In January 2020, the Company completed the purchase of its corporate headquarters located in Collierville, TN for $10.6 million. In 2019, the building was leased and was included in the operating lease right-of-use assets line item in the Consolidated Balance Sheet. In 2020, it will be included in property, plant, and equipment, net. The corporate headquarters lease represents $9.3 million and $9.5 million of the total operating lease right-of-use-assets and related lease liabilities at year-end. Remaining lease payments under the previous agreement were $14.5 million at the end of 2019 and are included in the operating lease maturities table in "Note 8 – Leases."

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 28, 2019 and December 29, 2018, 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 28, 2019, 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 28, 2019 and December 29, 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 28, 2019, 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 28, 2019, 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 26, 2020 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.

Critical Audit Matters

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

Defined Benefit Pension Obligation

Description of the Matter	At December 28, 2019, the aggregate defined benefit pension obligation was $182.2 million, and the fair value of pension plan assets was $183.5 million, resulting in an overfunded defined benefit pension obligation of $1.3 million. As disclosed in Notes 1 and 13 to the consolidated financial statements, 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, and certain employee-related factors such as mortality. Auditing the defined benefit pension obligation is complex and required the involvement of our actuarial specialists due to the highly judgmental nature of actuarial assumptions (e.g., discount rate, expected return on plan assets, and mortality rate) used in the measurement process and the geographical differences of the plans, which require different considerations for the relevant assumptions based on the respective economic and demographic environments. These assumptions have a significant effect on the projected benefit obligation.
How We Addressed the Matter in Our Audit	We obtained an understanding, evaluated the design and tested the operating effectiveness of controls that address the measurement and valuation of the defined benefit pension obligation. For example, we tested controls over management's review of the defined benefit pension obligation, including the significant actuarial assumptions used by management and the related data inputs. To test the defined benefit pension obligation, our audit procedures included, among others, evaluating the methodology used, the significant actuarial assumptions discussed above and testing the completeness and accuracy of the underlying data, including the participant data used by management. We involved our actuarial specialist to assist with our procedures. For example, we compared the actuarial assumptions used by management to historical trends and evaluated the change in the defined benefit pension obligation from prior year due to the change in service cost, interest cost, actuarial gains and losses, benefit payments, contributions and other activities. In addition, we evaluated management's methodology for determining the discount rate that reflects the maturity and duration of the benefit payments that is used to measure the defined benefit pension obligation. As part of this assessment, we compared management's selected discount rate to an independently developed range of reasonable discount rates. To evaluate the mortality rate assumption, we assessed whether the information is consistent with publicly available information, and whether any market data adjusted for entity-specific factors were applied. Lastly, to evaluate the expected return on plan assets, we assessed whether management's assumption was consistent with a range of returns for a portfolio of comparative investments.

Valuation of Goodwill - Heatlink Group Reporting Unit

Description of the Matter	At December 28, 2019, the Company's goodwill was $153.3 million, of which $131.6 million related to the Piping Systems segment which includes the Heatlink Group reporting unit. As disclosed in Notes 1 and 10 to the consolidated financial statements, 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. Auditing management's annual goodwill impairment test for the Heatlink Group reporting unit was complex and highly judgmental due to the significant estimates required to determine the fair value of the reporting unit. Fair value for the Heatlink Group reporting unit is determined using the income approach, incorporating market participant considerations and management's assumptions on revenue growth rates, operating margins, discount rates and a terminal value, among other factors. Fair value estimates of reporting units with fair values that do not significantly exceed their carrying values are sensitive to these assumptions and are directly impacted by the condition of the markets in which the reporting unit operates.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of the controls over the goodwill impairment process. For example, we tested controls over management's review of the significant assumptions used in the reporting unit valuations as well as management's review around the reasonableness of the data used in these valuations.

To test the estimated fair value of the Heatlink Group reporting unit, we performed audit procedures that included, among others, evaluating methodologies used, involving our valuation specialists in testing the significant assumptions and valuation methodology described above and testing the underlying data used by the Company in its analysis for completeness and accuracy. We compared the significant assumptions used by management to current industry and economic trends, historical results and other guideline companies within the same industry, as well as other relevant factors. We assessed the historical accuracy of management's estimates and performed sensitivity analyses of significant assumptions to evaluate the change in the fair value of the reporting unit resulting from changes in the inputs and assumptions. We evaluated the incorporation of the applicable assumptions into the model and tested the model's computational accuracy.

Ernst + Young LLP

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

Memphis, Tennessee
February 26, 2020

MUELLER INDUSTRIES, INC.
SCHEDULE II - VALUATION AND QUALIFYING ACCOUNTS
Years Ended December 28, 2019, December 29, 2018, and December 30, 2017

(In thousands)	Balance at beginning of year	Additions: Charged to costs and expenses	Additions: Other additions	Deductions	Balance at end of year
2019					
Allowance for doubtful accounts	$ 836	$ (81)	$ 263	$ 248	$ 770
Environmental reserves	$ 23,619	$ 1,659	$ —	$ 4,412	$ 20,866
Valuation allowance for deferred tax assets	$ 25,311	$ 2,919	$ 290	$ 5,390	$ 23,130
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

(1) *The valuation allowance increased by $11.6 million during 2017 to a balance of $30.3 million as of December 30, 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.*

Exhibit 4.4

DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

As of February 21, 2020, Mueller Industries, Inc. had one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended: Common Stock, $0.01 par value per share (the "Common Stock").

The following summary describes our Common Stock and the material provisions of our Restated Certificate of Incorporation, dated February 8, 2007 (the "Certificate of Incorporation"), and our Amended and Restated By-laws, effective as of January 15, 2016 (the "Bylaws"). Because the following is only a summary, it does not contain all of the information that may be important to you, and is qualified in its entirety by the full text of our Certificate of Incorporation and our Bylaws, copies of which are on file with the SEC and included as exhibits to our Annual Report on Form 10-K for the year ended December 31, 2019. You should refer to the text of these documents for a complete description. Unless the context requires otherwise, references in this exhibit to "Mueller," the "Company," "we," "us," and "our" refer to Mueller Industries, Inc. together with its consolidated subsidiaries.

We are authorized to issue 1,000,000 shares of capital stock, of which:

- 100,000,000 shares, par value $0.01 per share, are designated as Common Stock; and
- 5,000,000 shares, par value $1.00 per share, are designated as Preferred Stock

As of February 21, 2020, we had outstanding 56,995,167 shares of Common Stock, excluding 23,187,837 treasury shares, and no shares of Preferred Stock.

Common Stock

Voting Rights

Except as otherwise provided for in our Certificate of Incorporation, holders of our Common Stock are entitled to one (1) vote per share on all matters submitted to our stockholders for a vote. Our Common Stock does not have cumulative voting rights.

Dividends

Subject to the rights of holders of outstanding shares of Preferred Stock, the holders of Common Stock are entitled to receive dividends, if any, as may be declared from time to time by the Board of Directors in its discretion out of funds legally available for the payment of dividends.

Liquidation

Upon our liquidation, dissolution or winding-up, the holders of Common Stock shall be entitled to share ratably in all assets remaining after the payment of any liabilities and the liquidation preferences of any outstanding shares of Preferred Stock.

No Preemptive, Redemption or Conversion Rights

Our Common Stock is not subject to redemption or sinking fund provisions and does not have any conversion rights. Our Common Stock does not have preemptive or other rights to subscribe for additional shares of any class of our capital stock.

Voting Rights for the Election of Directors

Our Board of Directors is not classified. Our Bylaws provide that our Board of Directors may consist of one (1) or more members, and that, until such time as our Board of Directors determines otherwise, the number of directors shall be nine (9).

Our Bylaws provide that directors are elected at the annual meeting of the stockholders at which a quorum is present, and the persons receiving a plurality of the votes cast shall be so elected. Our Certificate of Incorporation does not provide for cumulative voting in the election of directors.

Our Board of Directors has the ability to fill vacancies on our Board of Directors.

Exhibit 4.4

Special Stockholder Meetings

Our Bylaws provide that special meetings of the stockholders may be called only by our Chairman or our Chief Executive Officer. Special meetings may be called by the Chairman only upon written request of a majority of the Entire Board of Directors (as defined below).

"Entire Board of Directors" means the total number of directors which the Company would have if there were no vacancies.

Exhibit 10.8

2020 INCENTIVE PLAN FOR CERTAIN KEY EMPLOYEES

The Company has a discretionary annual incentive program under which exempt salaried employees may earn cash payments based on a percentage of base annual salary. The actual percent is based on a variety of guidelines including performance levels of the respective business units primarily measured by operating income subject to certain adjustments.

The payment to an employee is based upon (i) their assigned grade level, (ii) actual company earnings achieved relative to a pre-determined target, which is adjusted upward if company performance exceeds target and reduced if company performance is less than target, and (iii) base salary paid during the fiscal year.

AMENDMENT NO. 1 TO CREDIT AGREEMENT

This **AMENDMENT NO. 1 TO CREDIT AGREEMENT** (this "Amendment") dated as of April 22, 2019 is entered into by and among **MUELLER INDUSTRIES, INC.**, a Delaware corporation (the "Borrower"), **BANK OF AMERICA, N.A.**, in its capacity as administrative agent for the Lenders (as defined in the Credit Agreement described below) (in such capacity, the "Administrative Agent") and in its capacity as L/C Issuer and Swing Line Lender (each as defined in the Credit Agreement described below), each of the Lenders signatory hereto, and each of the Subsidiary Guarantors (as defined in the Credit Agreement described below) signatory hereto. Each capitalized term used and not otherwise defined in this Amendment has the definition specified in the Credit Agreement described below.

WITNESSETH:

WHEREAS, the Borrower, the Administrative Agent, the L/C Issuer, the Swing Line Lender and the Lenders party thereto have entered into that certain Credit Agreement dated as of December 6, 2016 (the "Credit Agreement"), pursuant to which the Lenders have made available to the Borrower a revolving credit facility with a swing line sublimit and a letter of credit sublimit;

WHEREAS, the Borrower has advised the Administrative Agent, the L/C Issuer, the Swing Line Lender and the Lenders that it desires to amend the Credit Agreement to increase the investment allowance under Section 7.02(e) of the Credit Agreement to $25,000,000; and

WHEREAS, the Administrative Agent, the L/C Issuer and the Lenders are willing to so amend the Credit Agreement on the terms and conditions contained in this Amendment;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by the parties hereto, the parties hereto hereby agree as follows:

1. Amendments to Credit Agreement. Subject to the terms and conditions set forth herein and in reliance upon the representations and warranties set forth herein, the Credit Agreement is amended as follows:

(a) Section 1.01 of the Credit Agreement is amended to restate the definitions of "Base Rate", "Cash Management Agreement", and "Federal Funds Rate" as set forth below and to add the following new definitions of "Benefit Plan" and "PTE" in the appropriate alphabetical order therein:

"Base Rate" means for any day a fluctuating rate per annum equal to the highest of (a) the Federal Funds Rate plus 1/2 of 1%, (b) the rate of interest in effect for such day as publicly announced from time to time by Bank of America as its "prime rate," and (c) the Eurodollar Rate (determined in accordance with clause (b) of the definition thereof) plus 1.00%; and if Base Rate shall be less than zero, such rate shall be deemed zero for purposes of this Agreement. The "prime rate" is a rate set by Bank of America based upon various factors including Bank of America's costs and desired return, general economic conditions and other factors, and is used as a reference point for pricing some loans, which may be priced at, above, or below such announced rate. Any change in such prime rate announced by Bank of America shall take effect at the opening of business on the day specified in the public announcement of such change. If the Base Rate is being used as an alternate rate of interest pursuant to Section 3.03 hereof, then the Base Rate shall be the greater of clauses (a) and (b) above and shall be determined without reference to clause (c) above.

"Benefit Plan" means any of (a) an "employee benefit plan" (as defined in ERISA) that is subject to Title I of ERISA, (b) a "plan" as defined in and subject to Section 4975 of the Code or (c) any Person whose assets include (for purposes of ERISA Section 3(42) or otherwise for purposes of Title I of ERISA or Section 4975 of the Code) the assets of any such "employee benefit plan" or "plan".

"Cash Management Agreement" means any agreement to provide cash management services, including treasury, depository, overdraft, credit or debit card, p-cards (including purchasing cards and commercial cards), electronic funds transfer and other cash management arrangements.

"Federal Funds Rate" means, for any day, the rate per annum equal to the weighted average of the rates on overnight Federal funds transactions with members of the Federal Reserve System, as published by the Federal Reserve Bank of New York on the Business Day next succeeding such day; provided that (a) if such day is not a Business Day, the Federal Funds Rate for such day shall be such rate on such transactions on the next preceding Business Day as so published on the next succeeding Business Day, and (b) if no such rate is so published on such next succeeding Business Day, the Federal Funds Rate for such day shall be the average rate (rounded upward, if necessary, to a whole multiple of 1/100 of 1%) charged to Bank of America on such day on such transactions as determined by the Administrative Agent. If the Federal Funds Rate shall be less than zero, such rate shall be deemed zero for purposes of this Agreement.

"PTE" means a prohibited transaction class exemption issued by the U.S. Department of Labor, as any such exemption may be amended from time to time.

(b) Section 1.02 of the Credit Agreement is amended to add a new clause (d) to the end thereof to read as follows:

(d) Any reference herein to a merger, transfer, consolidation, amalgamation, consolidation, assignment, sale, disposition or transfer, or similar term, shall be deemed to apply to a division of or by a limited liability company, or an allocation of assets to a series of a limited liability company (or the unwinding of such a division or allocation), as if it were a merger, transfer, consolidation, amalgamation, consolidation, assignment, sale, disposition or transfer, or similar term, as applicable, to, of or with a separate Person. Any division of a limited liability company shall constitute a separate Person hereunder (and each division of any limited liability company that is a Subsidiary, joint venture or any other like term shall also constitute such a Person or entity).

(c) Section 1.03(b) of the Credit Agreement is amended to restate the last sentence thereof in its entirety to read as follows:

"Without limiting the foregoing, leases (whether or not in effect on the date hereof) shall continue to be classified and accounted for on a basis consistent with that reflected in the Audited Financial Statements for all purposes of this Agreement, notwithstanding any change in GAAP relating thereto, unless the parties hereto shall enter into a mutually acceptable amendment addressing such changes, as provided for above."

(d) Section 5.12 of the Credit Agreement is amended to add a new clause (g) to the end thereof to read as follows:

(g) The Borrower represents and warrants as of the April 22, 2019, that the Borrower is not and will not be using "plan assets" (within the meaning of 29 CFR § 2510.3-101, as modified by Section 3(42) of ERISA or otherwise) of one or more Benefit Plans in connection with the Loans, the Letters of Credit or the Commitments.

(e) Section 5.19 of the Credit Agreement is amended to add a new sentence to the end thereof to read as follows:

"The Borrower and its Subsidiaries have conducted their businesses in compliance in all material respects with all applicable Sanctions and have instituted and maintained policies and procedures designed to promote and achieve compliance with such Sanctions."

(f) Section 7.02(e) of the Credit Agreement is amended to change the reference to "$5,000,000" therein to "$25,000,000".

(g) Section 7.02(f) of the Credit Agreement is amended to change the reference to "$5,000,000" therein to "$8,000,000".

(h) The first sentence of Section 7.04 of the Credit Agreement is amended to add the parenthetical clause "(including by division)" immediately following the reference to "Person" in the second line thereof.

(i) Article IX is amended to add a new Section 9.12 to the end thereof to read as follows:

9.12Certain ERISA Matters.

(a) Each Lender (x) represents and warrants, as of the date such Person became a Lender party hereto, to, and (y) covenants, from the date such Person became a Lender party hereto to the date such Person ceases being a Lender party hereto, for the benefit of, the Administrative Agent and not, for the avoidance of doubt, to or for the benefit of the Borrower, that at least one of the following is and will be true:

(1) such Lender is not using "plan assets" (within the meaning of Section 3(42) of ERISA or otherwise) of one or more Benefit Plans with respect to such Lender's entrance into, participation in, administration of and performance of the Loans, the Letters of Credit, the Commitments or this Agreement,

(2) the transaction exemption set forth in one or more PTEs, such as PTE 84-14 (a class exemption for certain transactions determined by independent qualified professional asset managers), PTE 95-60 (a class exemption for certain transactions involving insurance company general accounts), PTE 90-1 (a class exemption for certain transactions involving insurance company pooled separate accounts), PTE 91-38 (a class exemption for certain transactions involving bank collective investment funds) or PTE 96-23 (a class exemption for certain transactions determined by in-house asset managers), is applicable with respect to such Lender's entrance into, participation in, administration of and performance of the Loans, the Letters of Credit, the Commitments and this Agreement,

(3) (A) such Lender is an investment fund managed by a "Qualified Professional Asset Manager" (within the meaning of Part VI of PTE 84-14), (B) such Qualified Professional Asset Manager made the investment decision on behalf of such Lender to enter into, participate in, administer and perform the Loans, the Letters of Credit, the Commitments and this Agreement, (C) the entrance into, participation in, administration of and performance of the Loans, the Letters of Credit, the Commitments and this Agreement satisfies the requirements of sub-sections (b) through (g) of Part I of PTE 84-14 and (D) to the best knowledge of such Lender, the requirements of subsection (a) of Part I of PTE 84-14 are satisfied with respect to such Lender's entrance into, participation in, administration of and performance of the Loans, the Letters of Credit, the Commitments and this Agreement, or

(4) such other representation, warranty and covenant as may be agreed in writing between the Administrative Agent, in its sole discretion, and such Lender.

(b) In addition, unless either (1) sub-clause (i) in the immediately preceding clause (a) is true with respect to a Lender or (2) a Lender has provided another representation, warranty and covenant in accordance with sub-clause (iv) in the immediately preceding clause (a), such Lender further (x) represents and warrants, as of the date such Person became a Lender party hereto, to, and (y) covenants, from the date such Person became a Lender party hereto to the date such Person ceases being a Lender party hereto, for the benefit of, the Administrative Agent and not, for the avoidance of doubt, to or for the benefit of the Borrower, that the Administrative Agent is not a fiduciary with respect to the assets of such Lender involved in such Lender's entrance into, participation in, administration of and performance of the Loans, the Letters of Credit, the Commitments and this Agreement (including in connection with the reservation or exercise of any rights by the Administrative Agent under this Agreement, any Loan Document or any documents related hereto or thereto

2. **Effectiveness; Condition Precedent.** The parties hereto agree that this Amendment and the amendments provided in Section 1 shall become effective upon the Administrative Agent's receipt of a counterpart of this Amendment, duly executed and delivered by each of the Borrower, the Subsidiary Guarantors, the Administrative Agent and Lenders constituting Required Lenders.

3. **Representations and Warranties**. In order to induce the Administrative Agent, the Lenders, the Swing Line Lender and the L/C Issuer to enter into this Amendment, the Borrower represents and warrants to the Administrative Agent, the Swing Line Lender, such Lenders and the L/C Issuer as follows:

(a) The representations and warranties made by it in Article V of the Credit Agreement, and by each Loan Party in each of the Loan Documents to which such Loan Party is a party, are true and correct in all material respects on and as of the date hereof, except that (i) if a qualifier relating to materiality or Material Adverse Effect applies, such representation or warranty is true and correct in all respects and (ii) to the extent that such representations and warranties specifically refer to an earlier date, in which case they are true and correct in all material respects as of such earlier date (except that if a qualifier relating to materiality or Material Adverse Effect applies, such representation or warranty is true and correct in all respects as of such earlier date).

(b) Since the date of the most recent financial reports of the Borrower delivered pursuant to Section 6.01 of the Credit Agreement, no act, event, condition or circumstance has occurred or arisen which, singly or in the aggregate with one or more other acts, events, occurrences or conditions (whenever occurring or arising), has had or could reasonably be expected to have a Material Adverse Effect;

(c) This Amendment has been duly authorized, executed and delivered by the Borrower and the Subsidiary Guarantors party hereto and constitutes a legal, valid and binding obligation of each such Person, except as may be limited by general principles of equity or by the effect of any applicable bankruptcy, insolvency, reorganization, moratorium or similar law affecting creditors' rights generally; and

(d) No Default or Event of Default has occurred and is continuing or will exist after giving effect to this Amendment.

4. **Fees and Expenses**. The Borrower shall pay on demand all reasonable costs and expenses of the Administrative Agent in connection with the preparation, negotiation, execution, and delivery of this Amendment and any other documents prepared in connection herewith, including, without limitation, the reasonable fees, charges and disbursements of one counsel for the Administrative Agent.

5. **Entire Agreement**. This Amendment, together with the Loan Documents (collectively, the "Relevant Documents"), sets forth the entire understanding and agreement of the parties hereto in relation to the subject matter hereof and supersedes any prior negotiations and agreements among the parties relating to such subject matter. No promise, condition, representation or warranty, express or implied, not set forth in the Relevant Documents shall bind any party hereto, and no such party has relied on any such promise, condition, representation or warranty. Each of the parties hereto acknowledges that, except as otherwise expressly stated in the Relevant Documents, no representations, warranties or commitments, express or implied, have been made by any party to the other in relation to the subject matter hereof or thereof. None of the terms or conditions of this Amendment may be changed, modified, waived or canceled orally or otherwise, except in writing and in accordance with Section 10.01 of the Credit Agreement.

6. **Ratification and Confirmation of Loan Documents.** The Borrower and the Subsidiary Guarantors each hereby consents, acknowledges and agrees to the amendments set forth herein and hereby confirms and ratifies in all respects the Loan Documents to which such Person is a party (including without limitation, with respect to each Subsidiary Guarantor, the continuation of its payment and performance obligations under the Subsidiary Guaranty), in each case upon and after the effectiveness of the amendments contemplated hereby.

7. **Counterparts**. This Amendment may be executed in any number of counterparts, each of which shall be deemed an original as against any party whose signature appears thereon, and all of which shall together constitute one and the same instrument. Delivery of an executed counterpart of a signature page of this Amendment by telecopy, facsimile or other electronic transmission (including .pdf) shall be effective as delivery of a manually executed counterpart of this Amendment.

8. **Governing Law.** This Amendment shall in all respects be governed by, and construed in accordance with, the laws of the State of New York.

9. **Enforceability**. Should any one or more of the provisions of this Amendment be determined to be illegal or unenforceable as to one or more of the parties hereto, all other provisions nevertheless shall remain effective and binding on the parties hereto.

10. **References**. All references in any of the Loan Documents to the "Credit Agreement" shall mean the Credit Agreement, as amended hereby and as from time to time hereafter further amended, modified, supplemented, restated or amended and restated.

11. **Successors and Assigns**. This Amendment shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assignees to the extent such assignees are permitted assignees as provided in Section 10.06 of the Credit Agreement.

[Signature pages follow.]

IN WITNESS WHEREOF, the parties hereto have caused this Amendment No. 1 to Credit Agreement to be executed as of the date first above written.

BORROWER:

MUELLER INDUSTRIES, INC.

By:______
Name: Jeffrey A. Martin
Title: Chief Financial Officer and Treasurer

SUBSIDIARY GUARANTORS:

B & K INDUSTRIES, INC.
B&K LLC
CLIMATE COMPONENTS, LLC
DENO INVESTMENT COMPANY II, INC.
EXTRUDED METALS, INC.
HOWELL METAL COMPANY
ITAWAMBA INDUSTRIAL GAS COMPANY, INC.
LINCOLN BRASS WORKS, INC.
LINESETS, INC.

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

MCTC, LLC

By: **Mueller Brass Co.,** as Managing Member

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

MCTP, LLC

By: **Mueller Copper Tube Products, Inc.,** as Managing Member

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

SUBSIDIARY GUARANTORS, *continued*:

MICRO GAUGE, INC.
MICROGAUGE MACHINING INC.
MPC FOUNDRY, INC.
MPC MACHINE SHOP, INC.
MUELLER BRASS CO.
MUELLER BRASS FORGING COMPANY, INC.

MUELLER BRASS HOLDING COMPANY, INC.
MUELLER CASTING COMPANY, INC.
MUELLER COPPER TUBE COMPANY, INC.
MUELLER COPPER TUBE PRODUCTS, INC.
MUELLER COPPER TUBE WEST CO.
MUELLER EAST, INC.
MUELLER FITTINGS COMPANY, INC.
MUELLER FITTINGS, LLC
MUELLER FORMED TUBE COMPANY, INC.
MUELLER IMPACTS COMPANY, INC.
MUELLER INDUSTRIAL REALTY CO.
MUELLER LBHC, INC.

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

MUELLER PACKAGING, LLC

By: **Mueller Casting Company, Inc.,** as Managing Member

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

MUELLER PLASTIC CORPORATION, INC.
MUELLER PLASTIC HOLDING COMPANY, INC.
MUELLER PRESS COMPANY, INC.
MUELLER REFRIGERATION HOLDING COMPANY, INC.

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

SUBSIDIARY GUARANTORS, *continued*:

MUELLER REFRIGERATION PRODUCTS COMPANY, INC.
MUELLER REFRIGERATION, LLC
MUELLER SOUTHEAST, INC.
MUELLER STREAMLINE CO.
MUELLER TOOL AND MACHINE, INC.
OVERSTREET-HUGHES CO., INC.

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

PRECISION TUBE COMPANY, LLC

By: **Mueller Streamline Co.,** as Managing Member

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

PROPIPE TECHNOLOGIES, INC.
SHERWOOD VALVE LLC
SHERWOOD VALVE PRODUCTS, INC.
SOUTHLAND PIPE NIPPLES COMPANY, INC.

TURBOTEC PRODUCTS, INC.
WESTERMEYER INDUSTRIES, INC.

By:______
Name: Jeffrey A. Martin
Title: Vice President-Finance and Treasurer

ADMINISTRATIVE AGENT:

BANK OF AMERICA, N.A., as
Administrative Agent

By:______
Name:
Title:

BANK OF AMERICA, N.A.,
as a Lender, Swing Line Lender and L/C Issuer

By:______
Name:
Title:

REGIONS BANK, as a Lender

By:______
Name:
Title:

SUNTRUST BANK, as a Lender

By:______
Name:
Title:

WELLS FARGO BANK, NATIONAL ASSOCIATION, as a Lender

By:______
Name:
Title:

FIRST TENNESSEE BANK, as a Lender

By:______
Name:
Title:

U.S. BANK NATIONAL ASSOCIATION,
as a Lender

By:______
Name:
Title:

Exhibit 21.0

MUELLER INDUSTRIES, INC.
List of Subsidiaries

Subsidiary*	State or Country of Incorporation
ATCO Rubber Products, Inc.	Michigan
Mueller Brass Holding Company, Inc.	Delaware
Mueller Brass Co. (Assumed name: Mueller Brass Products)	Michigan
Extruded Metals, Inc.	Delaware
Mueller Industrial Realty Co.	Michigan
Itawamba Industrial Gas Company, Inc.	Mississippi
Streamline Copper & Brass Ltd.	Canada
Mueller Plastics Holding Company, Inc.	Ohio
Mueller Plastics Corporation, Inc.	Delaware
MPC Foundry, Inc.	Delaware
MPC Machine Shop, Inc.	Delaware
Mueller Brass Forging Company, Inc.	Delaware
Mueller Copper Tube Company, Inc.	Delaware
Mueller Fittings, LLC	Mississippi
Mueller Fittings Company, Inc.	Michigan
MCTC, LLC	Mississippi
Mueller East, Inc.	Delaware
Mueller Formed Tube Company, Inc.	Delaware
Mueller Impacts Company, Inc.	Delaware
Mueller Press Company, Inc.	Mississippi
Mueller Refrigeration Products Company, Inc.	Delaware
Mueller LBHC, Inc.	Delaware
Lincoln Brass Works, Inc. (Assumed name: Mueller Gas Products)	Michigan
Overstreet-Hughes, Co., Inc. (Assumed name: Fabricated Tube Products)	Tennessee
Mueller Refrigeration LLC	Delaware
Mueller Refrigeration Holding Company, Inc.	Delaware
Mueller Streamline Co.	Delaware
B&K, LLC (d/b/a BK Products)	Delaware
Heatlink Group USA, LLC (Incorporated 2/7/2019)	Tennessee
Precision Tube Company, LLC	Pennsylvania
Mueller Southeast, Inc.	Pennsylvania
Southland Pipe Nipples Company, Inc.	Texas
Mueller Tool and Machine, Inc.	Delaware
Mueller Casting Company, Inc.	Delaware
Mueller Packaging, LLC	Mississippi
Micro Gauge, Inc.	Michigan
Microgauge Machining, Inc.	Michigan
Propipe Technologies, Inc. (Assumed name: Mueller Gas Products)	Ohio
WTC Holding Company	Michigan
MA Industrial Secured Lending, LLC [(4)]	Delaware
Muellux Holding Company I SARL	Luxembourg
Muellux Holding Company II SARL	Luxembourg

Subsidiary*	State or Country of Incorporation
Mueller Middle East B.S.C. [(7)]	Bahrain
Mueller Europe Investment Company Ltd.	United Kingdom
Jungwoo Metal Ind. Co., Ltd. [(5)]	South Korea
Mueller Europe, Limited	United Kingdom
Westermeyer Industries, Inc.	Illinois
Sherwood Valve Products, Inc.	Ohio
Sherwood Valve LLC	Delaware
DENO Investment Company, Inc.	Michigan
Mueller de Mexico, S.A. de C.V. [(1)]	Mexico
DENO Holding Company, Inc.	Michigan
B & K Industries, Inc.	Illinois
Mueller Copper Tube Products, Inc.	Delaware
MCTP, LLC	Michigan
Howell Metal Company (d/b/a Precision Tube in VA 4/2019)	Virginia
Turbotec Products, Inc.	Connecticut
Mueller Canada Holding Co. Ltd.	Alberta
Pexcor Manufacturing Co., Inc.	Alberta
Heatlink Group, Inc.	Alberta
Great Lakes Copper Ltd.	Nova Scotia
Die-Mold Tool Limited	Ontario
Linesets, Inc.	Delaware
Climate Components, LLC	Delaware
Arava Natural Resources Company, Inc.	Delaware
United States Fuel Company	Nevada
King Coal Company	Utah
Canco Oil & Gas Ltd.	Alberta, Canada
Aegis Oil and Gas Leasing Ltd.	Alberta, Canada
Bayard Mining Corp.	Delaware
Washington Mining Company	Maine
Amwest Exploration Company	Delaware
USSRAM Exploration Company	Maine
White Knob Mining Company	Idaho
Arava Exploration Company	Colorado
Summit Systems, Inc.	Delaware
Mining Remedial Recovery Company	Delaware
Carpentertown Coal & Coke Company	Pennsylvania
U.S.S. Lead Refinery, Inc.	Maine
Leon Water Enterprises, Inc. (50%)	Texas
Macomber Construction Company	Ohio
Macomber, Incorporated	Ohio
Macomber Building and Land Corporation	Delaware
DENO Investment Company II, Inc.	Michigan
Tecumseh Products Holdings LLC [(6)]	Delaware
Tecumseh Products Co.	Michigan
MII Financial Corporation	Michigan
Mueller Streamline Holding S.L.U.	Spain
WTC HoldCo I, LLC	Delaware
WTC HoldCo II, LLC	Delaware

Subsidiary*	State or Country of Incorporation
Mueller Comercial de Mexico S. de R.L. de C.V.(2)	Mexico
NICNA Mexico Servicios, S. de R.L. de C.V.(3)	Mexico
NICNA Mexico Proyectos, S. de R.L. de C.V.(3)	Mexico
Mueller Streamline II, LLC	Delaware
Changzhou Mueller Refrigerant Valve Manufacturing Co., Ltd.	China
Mueller Industries Trading (Shanghai) Co., Ltd.	China
Mueller Streamline Trading, LLC	Delaware
Mueller Streamline China, LLC	Delaware

**All subsidiaries are 100% owned, except as shown.*

(1) Owned by DENO Investment Company, Inc. (99.94%) and Mueller Streamline Co. (.06%)

(2) Owned by Mueller Streamline Holding S.L.U. (99.983%), WTC HoldCo I, LLC (0.016%), and WTC HoldCo II, LLC (0.001%)

(3) Less than 1% of the outstanding common stock is owned by WTC HoldCo I, LLC

(4) Owned by WTC Holding Company (50%)

(5) Owned by Muellux Europe Investment Company Ltd. (60%)

(6) Owned by DENO Investment Company, Inc. (50%)

(7) Owned by Muellux Holding Company II SARL (40%)

Exhibit 23.0

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

1) Form S-3 No. 333-182906 pertaining to the registration of 20,845,718 shares of Mueller Industries, Inc. common stock,
2) Form S-8 No. 333-232882 pertaining to the Mueller Industries, Inc. 2019 Incentive Plan,
3) Form S-8 No. 333-197609 pertaining to the Mueller Industries, Inc. 2014 Incentive Plan,
4) Form S-8 No. 333-160718 pertaining to the Mueller Industries, Inc. 2009 Stock Incentive Plan,
5) Form S-8 No. 333-138413 pertaining to the Mueller Industries, Inc. 2002 Stock Option Plan,
6) Form S-8 No. 333-91238 pertaining to the Mueller Industries, Inc. 2002 Stock Option Plan,

of our reports dated February 26, 2020, with respect to the consolidated financial statements of Mueller Industries, Inc. and the effectiveness of internal control over financial reporting of Mueller Industries, Inc., included in this Annual Report (Form 10-K) for the year ended December 28, 2019.

/s/ Ernst & Young LLP
Ernst & Young LLP

Memphis, Tennessee
February 26, 2020

Exhibit 31.1

CERTIFICATION

I, Gregory L. Christopher, certify that:

1. I have reviewed this annual report on Form 10-K of Mueller Industries, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: February 26, 2020

/s/ Gregory L. Christopher
Gregory L. Christopher
Chief Executive Officer

Exhibit 31.2

CERTIFICATION

I, Jeffrey A. Martin, certify that:

1. I have reviewed this annual report on Form 10-K of Mueller Industries, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: February 26, 2020

/s/ Jeffrey A. Martin
Jeffrey A. Martin
Chief Financial Officer

Exhibit 32.1

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

In connection with the Annual Report of Mueller Industries, Inc. (the "Company") on Form 10-K for the period ending December 28, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Gregory L. Christopher, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

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

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

/s/ Gregory L. Christopher
Gregory L. Christopher
Chief Executive Officer
Date: February 26, 2020

Exhibit 32.2

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

In connection with the Annual Report of Mueller Industries, Inc. (the "Company") on Form 10-K for the period ending December 28, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Jeffrey A. Martin, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

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

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

/s/ Jeffrey A. Martin
Jeffrey A. Martin
Chief Financial Officer
Date: February 26, 2020