

MSA Safety Inc
Form 10-K
February 22, 2019
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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

Commission File No. 1-15579

For the fiscal year ended
December 31, 2018

MSA SAFETY INCORPORATED
(Exact name of registrant as specified in its charter)
Pennsylvania
(State or other jurisdiction of
incorporation or organization)

46-4914539
(IRS Employer Identification
No.)

1000 Cranberry Woods Drive
Cranberry Township, Pennsylvania
(Address of principal executive
offices)

Registrant's telephone number, including area
code: (724) 776-8600

16066-5207
(Zip code)

(Title of each class)
Common Stock, no par value

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

(Name of each exchange on
which registered)
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 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 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 (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in the definitive proxy statement incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company

Emerging growth company

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

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

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As of February 14, 2019, there were outstanding 38,529,585 shares of common stock, no par value. The aggregate market value of voting stock held by non-affiliates as of June 30, 2018 was approximately \$3.3 billion.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the May 15, 2019 Annual Meeting of Shareholders are incorporated by reference into Part III.

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Forward-Looking Statements

This report may contain (and verbal statements made by MSA Safety Incorporated (MSA) may contain) forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. These statements relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. These risks and other factors include, but are not limited to, those listed in this report under “Risk Factors,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” and elsewhere in this report. In some cases, you can identify forward-looking statements by words such as “may,” “will,” “should,” “expects,” “intends,” “plans,” “anticipates,” “believes,” “estimates,” “predicts,” “potential” or other comparable words. Results, performance or outcomes may differ materially from those expressed or implied by these forward-looking statements. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance or achievements. We are under no duty to update publicly any of the forward-looking statements after the date of this report, whether as a result of new information, future events or otherwise.

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PART I

Item 1. Business

Overview—Established in 1914, MSA Safety Incorporated is the global leader in the development, manufacture and supply of safety products that protect people and facility infrastructures. Recognized for their market leading innovation, many MSA products integrate a combination of electronics, mechanical systems and advanced materials to protect users against hazardous or life-threatening situations. The Company's comprehensive product line, which is governed by rigorous safety standards across highly regulated industries, is used by workers around the world in a broad range of markets, including the oil, gas and petrochemical industry, fire service, construction, industrial manufacturing applications, utilities, mining and the military. The Company's core products include breathing apparatus where self-contained breathing apparatus ("SCBA") is the principal product, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel and fall protection devices.

The company's leading market positions across nearly all of its core products are supported and enabled by a strong commitment to investing in new product development that continually raises the bar for safety equipment performance, all while upholding an unwavering commitment to integrity. We dedicate significant resources to research and development, which allows us to produce innovative safety products that are often first to market. Our global product development teams include cross-functional associates throughout the Company, including research and development, marketing, sales, operations and quality management. Our engineers and technical associates work closely with the safety industry's leading standards-setting groups and trade associations to develop industry specific product standards and to anticipate their impact on our product lines.

Segments—We tailor our product offerings and distribution strategy to satisfy distinct customer preferences that vary across geographic regions. To best serve these customer preferences, we have organized our business into six geographic operating segments that are aggregated into three reportable geographic segments: Americas, International and Corporate. Segment information is presented in Note 7 of the consolidated financial statements in Part II Item 8 of this Form 10-K.

Because our financial statements are stated in U.S. dollars and much of our business is conducted outside the U.S., currency fluctuations may affect our results of operations and financial position and may affect the comparability of our results between financial periods.

Products—We manufacture and sell a comprehensive line of safety products to protect the health and safety of workers and facility infrastructures around the world in the oil, gas and petrochemical industry, fire service, construction, industrial manufacturing applications, utilities, mining and the military. Our products protect people against a wide variety of hazardous or life-threatening situations.

The following is a brief description of each of our product categories:

Core products. MSA's corporate strategy includes a focus on driving sales of core products, where we have leading market positions and a distinct competitive advantage. Core products, as mentioned above, include breathing apparatus where SCBA is the principal product, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel and fall protection devices. These products receive the highest levels of investment and resources as they typically realize higher levels of return on investment than non-core products. Core products comprised approximately 87% and 86% of sales in 2018 and 2017, respectively.

The following is a brief description of our core product offerings:

Breathing apparatus products. Breathing apparatus products include SCBA, face masks and respirators, where SCBA is the primary product offering. SCBA are used by first responders, petrochemical plant workers and anyone entering an environment deemed immediately dangerous to life and health. Our primary breathing apparatus product, the MSA G1 SCBA, is a revolutionary platform that offers many customizable and differentiated features, including the first and only Integrated Thermal Imaging Camera available on the market. We currently have 11 patents issued and an additional 3 patents pending for the MSA G1 SCBA. Our newest breathing apparatus product, the MSA M1 SCBA, represents the most advanced and ergonomic SCBA we have ever launched for our international markets. We sell breathing apparatus across both the Americas and International segments.

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Fixed gas and flame detection instruments ("FGFD"). Our permanently installed fixed gas and flame detection instruments are used in oil, gas and petrochemical facilities and general industrial production facilities to detect the presence or absence of various gases in the air. Typical applications of these instruments include the detection of an oxygen deficiency in confined spaces or the presence of combustible or toxic gases. FGFD product lines generate a meaningful portion of overall revenue from recurring business including replacement components and related service. A portion of business from this product line is project-oriented and more closely associated with upstream exploration and production activity. We sell these instruments in both our Americas and International segments. Key products include:

Permanently installed gas detection monitoring systems. This product line is used to monitor for combustible and toxic gases and oxygen deficiency in virtually any application where continuous monitoring is required. Our systems are used for gas detection in the oil and gas industry, petrochemical, pulp and paper, wastewater, refrigerant monitoring, pharmaceutical production and general industrial applications. These systems utilize a wide array of sensor technologies including electrochemical, catalytic, infrared and ultrasonic. During 2017, we launched a new line of advanced gas detection monitors. The S5000 and Ultima®X5000 gas monitors – known collectively as MSA's Series 5000 Transmitters – enhance facility and worker safety while lowering overall cost of ownership for our customers.

Flame detectors and open-path infrared gas detectors. These instruments are used for plant-wide monitoring of toxic gases and for detecting the presence of flames. These systems use infrared optics to detect potentially hazardous conditions across long distances, making them suitable for use in such applications as offshore oil rigs, storage vessels, refineries, pipelines and ventilation ducts.

Portable gas detection instruments. Our hand-held portable gas detection instruments are used to detect the presence or absence of various gases in the air. The product is used by oil, gas and petrochemical workers, general industrial workers, miners, utility workers, first responders or anyone working in a confined space environment. Typical applications of these instruments include the detection of an oxygen deficiency in confined spaces or the presence of combustible or toxic gases. Our single- and multi-gas detectors provide portable solutions for detecting the presence of oxygen, combustible gases and various toxic gases, including hydrogen sulfide, carbon monoxide, ammonia and chlorine, either singularly or up to six gases at once. Our ALTAIR® 2X, ALTAIR® 4XR and ALTAIR® 5X Multigas Detectors, with our internally developed XCell® sensor technology, provide faster response times and unsurpassed durability. We sell portable gas detection instruments in both our Americas and International segments.

In 2018, MSA launched Safety io, LLC, its first subsidiary focused on using wireless technology and cloud-based computing to enable a broad range of "connected" safety services. Our Safety io Grid product supports MSA portable gas detection fleet management and live monitoring efforts.

Industrial head protection. We offer a complete line of industrial head protection and accessories that includes the iconic V-Gard® helmet brand, a bellwether product in MSA's portfolio for over 50 years. We offer customers a wide range of color choices and we are a world leader in the application of customized logos. Our industrial head protection products have a wide user base, including oil, gas and petrochemical workers, steel and construction workers, miners and industrial workers. Our Fas-Trac® III Suspension system was designed to provide enhanced comfort without sacrificing safety. Our strongest sales of head protection products have historically been in North America and Latin America.

Firefighter helmets and protective apparel. We offer a complete line of fire helmets that includes our Cairns® and Gallet® helmet brands. Our Cairns helmets are primarily used by firefighters in North America while the Gallet helmets are primarily used by firefighters across our International segment. The acquisition of Globe Holding Company, LLC ("Globe"), a leading innovator and provider of firefighter protective clothing and boots, strengthens our position as a leader in the North American market for firefighter personal protective equipment (PPE). We can now help protect firefighters from head to toe, with Cairns Helmets, our industry leading G1 SCBA, and Globe turnout gear and boots.

Fall protection. Our broad line of fall protection equipment includes harnesses, lanyards, self-retracting lifelines, engineered systems and confined space equipment. Fall protection equipment is used by workers in the construction industry, oil, gas and petrochemical market, utilities industry, aerospace industry, general industrial applications and anyone working at height.

Non-core products. MSA maintains a portfolio of non-core products. Non-core products reinforce and extend the core offerings, drawing upon our customer relationships, distribution channels, geographical presence and technical experience. These products are complementary to the core offerings and have their roots within the core product value chain. Key non-core products include respirators, eye and face protection, ballistic helmets and gas masks. Ballistic helmet and gas mask sales are the primary sales to our military customers and were approximately \$47 million globally in 2018 compared to \$36 million in 2017.

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Customers—Our customers generally fall into two categories: distributors and end-users. In our Americas segment, the majority of our sales are made through distribution. In our International segment, sales are made through both indirect and direct sales channels. For the year ended December 31, 2018, no individual customer represented more than 10% of our sales.

Sales and Distribution—Our sales and distribution team consists of marketing, field sales and customer service organizations. In most geographic areas, our field sales organizations work jointly with select distributors to call on end-users and educate them about hazards, exposure limits, safety requirements and product applications, as well as the specific performance attributes of our products. We believe that understanding end-user requirements is critical to increasing MSA's market share.

The in-depth customer training and education provided by our sales associates to our customers is critical to ensuring proper use of many of our products, such as SCBA and gas detection instruments. As a result of our sales associates working closely with end-users, they gain valuable insight into customer preferences and needs. To better serve our customers and to ensure that our sales associates are among the most knowledgeable and professional in the industry, we place significant emphasis on training our sales associates in product application, industry standards and regulations.

We believe our sales and distribution strategy allows us to deliver a customer value proposition that differentiates our products and services from those of our competitors, resulting in increased customer loyalty and demand.

In areas where we use indirect selling, we promote, distribute and service our products to general industry through authorized national, regional and local distributors. Some of our key distributors include W.W. Grainger Inc., Airgas, Casco Industries, Sonepar, Witmer Public Safety Group, Ten-8 Fire Equipment, Essendant and Fastenal. In North America, we distribute fire service products primarily through specially trained local and regional distributors who provide advanced training and service capabilities to volunteer and paid municipal fire departments. In our International segment, we primarily sell to and service the fire service market directly. Because of our broad and diverse product line and our desire to reach as many markets and market segments as possible, we have over 3,200 authorized distributor locations worldwide. No individual distributor accounts for more than 10% of our sales.

Competition—The global safety products market is broad and highly fragmented with few participants offering a comprehensive line of safety products. The sophisticated safety products market in which we compete is comprised of both core and non-core offerings and is a subset of the larger PPE market. We maintain leading positions in nearly all of our core products. Over the long-term, we believe global demand for safety products will continue to grow.

Purchases of these products are non-discretionary, protecting workers' health in hazardous and life-threatening work environments. Their use is often mandated by government and industry regulations, which are increasingly enforced on a global basis.

The safety products market is highly competitive, with participants ranging in size from small companies focusing on a single type of PPE to several large multinational corporations that manufacture and supply many types of sophisticated safety products. Our main competitors vary by region and product. We believe that participants in this industry compete primarily on the basis of product characteristics (such as functional performance, technology, agency approvals, design and style), brand name recognition and after-market service support.

We believe we compete favorably within each of our operating segments as a result of our high quality, innovative offerings and strong brand trust and recognition.

Research and Development—To achieve and maintain our market leading positions, we operate several sophisticated research and development facilities. We believe our dedication and commitment to innovation and research and development allows us to produce state-of-the-art safety products that are often first to market and exceed industry standards. Our primary engineering groups are located in the United States, Germany, China and France. Our global product development teams include cross-geographic and cross-functional members from various areas throughout the company, including research and development, marketing, sales, operations and quality management. These teams are responsible for setting product line strategies based on their understanding of customers' needs and available technology, as well as the opportunities and challenges they foresee in each product area. We believe our team-based, cross-geographical and cross-functional approach to new product development is a source of competitive advantage. Our approach to the new product development process allows us to tailor our product offerings and product line

strategies to satisfy distinct customer preferences and industry regulations that vary across our operating segments.

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We believe another important aspect of our approach to new product development is that our engineers and technical associates work closely with the safety industry's leading standards-setting groups and trade associations. These organizations include the National Institute for Occupational Safety and Health ("NIOSH"), the National Fire Protection Association ("NFPA"), American National Standards Institute ("ANSI"), International Safety Equipment Association ("ISEA") and their overseas counterparts. Key members of our management team understand the impact that these standard-setting organizations have on our new product development pipeline. As such, management devotes significant time and attention to anticipating a new standard's impact on our sales and operating results. Because of our understanding of customer needs, membership on global standards-setting bodies, investment in research and development and our unique new product development process, we believe we are well positioned to anticipate and adapt to changing product standards. While we acknowledge that the length of the approval process can be unpredictable, we also believe that we are well positioned to gain the approvals and certifications necessary to meet new government and multinational product regulations.

Patents and Intellectual Property—We own significant intellectual property, including a number of domestic and foreign patents, patent applications and trademarks related to our products, processes and business. Although our intellectual property plays an important role in maintaining our competitive position in a number of markets that we serve, no single patent, or patent application, trademark or license is, in our opinion, of such value to us that our business would be materially affected by the expiration or termination thereof, other than the "MSA" trademark. Our patents expire at various times in the future not exceeding 20 years. Our general policy is to apply for patents on an ongoing basis in the United States and other countries, as appropriate, to perfect our patent development. In addition to our patents, we have also developed or acquired a substantial body of manufacturing know-how that we believe provides a significant competitive advantage over our competitors.

Raw Materials and Suppliers—Many of the components of our products are formulated, machined, tooled or molded in-house from raw materials, which comprise approximately two-thirds of our cost of sales. For example, we rely on integrated manufacturing capabilities for breathing apparatus, gas masks, ballistic helmets, hard hats and circuit boards. The primary raw materials that we source from third parties include electronic components, rubber, high density polyethylene, chemical filter media, eye and face protective lenses, air cylinders, certain metals and ballistic resistant, flame resistant and non-ballistic fabrics. We purchase these materials both domestically and internationally, and we believe our supply sources are both well established and reliable. We have close vendor relationship programs with the majority of our key raw material suppliers. Although we generally do not have long-term supply contracts, thus far we have not experienced any significant problems in obtaining adequate raw materials. Please refer to MSA's Form SD filed on May 31, 2018 for further information on our conflict minerals analysis. Form SD may be obtained free of charge at www.sec.gov.

Associates—At December 31, 2018, we employed approximately 4,800 associates, of which approximately 2,000 were employed by our International segment. None of our U.S. associates are subject to the provisions of a collective bargaining agreement. Some of our associates outside the United States are members of unions. We have not experienced a significant work stoppage in over 10 years and believe our relations with our associates are strong.

Environmental Matters—Our facilities and operations are subject to laws and regulations relating to environmental protection and human health and safety. In the opinion of management, compliance with current environmental protection laws will not have a material adverse effect on our financial condition. See Item 1A, Risk Factors, for further information regarding our environmental risks which could impact the Company.

Seasonality—Our operating results are not significantly affected by seasonal factors. Sales are generally higher during the second and fourth quarters. During periods of economic expansion or contraction and following significant catastrophes, our sales by quarter have varied from this seasonal pattern. Government-related sales tend to spike in the fourth quarter. Americas sales tend to be strong during the oil and gas market turnaround seasons late in the first quarter, early in the second quarter and then again at the end of the third quarter and beginning of the fourth quarter. International segment sales are typically weaker for the Europe region in the summer holiday months of July and August and seasonality can be affected by the timing of delivery of larger orders. Invoicing and the delivery of larger orders can affect sales patterns variably across all reporting segments.

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Available Information—Our Internet address is www.MSAafety.com. We make the following filings available free of charge on the Investor Relations page on our website as soon as reasonably practicable after they have been electronically filed with or furnished to the Securities and Exchange Commission ("SEC"): our annual reports on Form 10-K, our quarterly reports on Form 10-Q, our current reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as well as our proxy statement. Information contained on our website is not part of this annual report on Form 10-K or our other filings with the SEC. The SEC maintains an Internet site at www.sec.gov that contains reports, proxy and information statements and other information regarding issuers like us who file electronically with the SEC.

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Item 1A. Risk Factors

Claims of injuries from our products, product defects or recalls of our products could have a material adverse effect on our business, operating results, financial condition and liquidity.

MSA and its subsidiaries face an inherent business risk of exposure to product liability claims arising from the alleged failure of our products to prevent the types of personal injury or death against which they are designed to protect. In the event the parties using our products are injured or any of our products prove to be defective, we could be subject to claims with respect to such injuries. In addition, we may be required to or may voluntarily recall or redesign certain products that could potentially be harmful to end users. Any claim or product recall that results in significant expense or negative publicity against us could have a material adverse effect on our business, operating results, financial condition and liquidity, including any successful claim brought against us in excess or outside of available insurance coverage.

Our subsidiary, Mine Safety Appliances Company, LLC, may experience losses from cumulative trauma product liability claims. The inability to collect insurance receivables and the transition to becoming largely self-insured for cumulative trauma product liability claims could have a material adverse effect on our business, operating results, financial condition and liquidity.

Our subsidiary, Mine Safety Appliances Company, LLC (“MSA LLC”) was named as a defendant in 1,481 cumulative trauma lawsuits comprised of 2,355 claims at December 31, 2018. Cumulative trauma product liability claims involve exposures to harmful substances (e.g., silica, asbestos and coal dust) that occurred years ago and may have developed over long periods of time into diseases such as silicosis, asbestosis, mesothelioma, or coal worker’s pneumoconiosis. The products at issue were manufactured many years ago and are not currently offered by MSA LLC. A reserve has been established with respect to cumulative trauma product liability claims currently asserted and estimated incurred but not reported (“IBNR”) cumulative trauma product liability claims. Because our cumulative trauma product liability risk is subject to inherent uncertainties, including unfavorable trial rulings or developments, an increase in newly filed claims, or more aggressive settlement demands, and since MSA LLC is largely self-insured, there can be no certainty that MSA LLC may not ultimately incur losses in excess of presently recorded liabilities. These losses could have a material adverse effect on our business, operating results, financial condition and liquidity. We will adjust the reserve relating to cumulative trauma product liability claims from time to time based on whether the actual numbers, types, and settlement values of claims asserted differ from current projections and estimates or there are significant changes in the facts underlying the assumptions used in establishing the reserve. These adjustments may be material and could materially impact future periods in which the reserve is adjusted.

In the normal course of business, MSA LLC makes payments to settle these types of cumulative trauma product liability claims and for related defense costs, and records receivables for the amounts believed to be recoverable under insurance. MSA LLC has recorded insurance receivables totaling \$71.7 million and notes receivable of \$59.6 million at December 31, 2018. As described in greater detail in Note 19 of the consolidated financial statements in Part II Item 8 of this Form 10-K, MSA LLC is now largely self-insured for cumulative trauma product liability claims. As a result, additional amounts recorded as insurance receivables will be limited and based on calculating the amounts to be reimbursed pursuant to negotiated Coverage-in-Place Agreements. Various factors could affect the timing and amount of recovery of the insurance receivables, including: assumptions regarding claims composition (which are relevant to calculating reimbursement under the terms of certain Coverage-in-Place Agreements) and the extent to which insurers may become insolvent in the future. Failure to recover amounts due from MSA LLC’s insurance carriers would result in MSA LLC being unable to recover for amounts already paid to resolve claims (and recorded as insurance receivables) and could have a material adverse effect on our business, operating results, financial condition and liquidity.

Going forward, most of MSA LLC's cumulative trauma product liability costs will be expensed without the expectation of insurance reimbursement. MSA LLC expects to obtain some limited insurance reimbursement from negotiated Coverage-in-Place Agreements (although that coverage may not be immediately triggered or accessible) or from other sources of coverage, but the precise amount of insurance reimbursement that may be available cannot be determined with specificity at this time.

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Unfavorable economic and market conditions could materially and adversely affect our business, results of operations and financial condition.

We are subject to risks arising from adverse changes in global economic conditions. We have significant operations in a number of countries outside the U.S., including some in emerging markets. Long-term economic uncertainty in some of the regions of the world in which we operate, such as Asia, Latin America, the Middle East and Europe, could result in declines in revenue, profitability and cash flow due to reduced orders, payment delays, supply chain disruptions or other factors caused by the economic challenges faced by our customers and suppliers.

A portion of MSA's sales are made to customers in the oil, gas and petrochemical market. These sales expose MSA to the risks of doing business in that global market. We estimate that between 25% - 30% of our global business is sold into the energy market vertical with the most significant exposure in industrial head protection, portable gas detection and FGFD. Approximately 10% - 15% of consolidated revenue, primarily in industrial head protection and portable gas detection, is more exposed to a pullback in employment trends across the energy market. Another 5% - 10% of consolidated revenue, primarily in FGFD is more exposed to a pullback in capital equipment spending within the energy market. It is possible that the volatility in upstream, midstream and downstream markets, could negatively impact our business and could result in declines in our consolidated results of operations and cash flow.

A reduction in the spending patterns of government agencies or delays in obtaining government approval for our products could materially and adversely affect our net sales, earnings and cash flow.

The demand for our products sold to the fire service market, the homeland security market and other government agencies is, in large part, driven by available government funding. Government budgets are set annually and we cannot assure that government funding will be sustained at the same level in the future. A significant reduction in available government funding could result in declines in our consolidated results of operations and cash flow.

Our inability to successfully identify, consummate and integrate current and future acquisitions or to realize anticipated cost savings and other benefits could adversely affect our business.

One of our operating strategies is to selectively pursue acquisitions. On July 31, 2017, we completed the acquisition of Globe Holding Company, LLC ("Globe"), which is a leading innovator and provider of firefighter protective clothing and boots. Please refer to Note 13 of the consolidated financial statements in Part II Item 8 of this Form 10-K for further details. Any future acquisitions will depend on our ability to identify suitable acquisition candidates and successfully consummate such acquisitions. Acquisitions involve a number of risks including:

- failure of the acquired businesses to achieve the results we expect;
- diversion of our management's attention from operational matters;
- our inability to retain key personnel of the acquired businesses;
- risks associated with unanticipated events or liabilities;
- potential disruption of our existing business; and
- customer dissatisfaction or performance problems at the acquired businesses.

If we are unable to integrate or successfully manage businesses that we have recently acquired, including Globe, or may acquire in the future, we may not realize anticipated cost savings, improved manufacturing efficiencies and increased revenue, which may result in material adverse short- and long-term effects on our consolidated operating results, financial condition and liquidity. Even if we are able to integrate the operations of our acquired businesses into our operations, we may not realize the full benefits of the cost savings, revenue enhancements or other benefits that we may have expected at the time of acquisition. In addition, even if we achieve the expected benefits, we may not be able to achieve them within the anticipated time frame, and such benefits may be offset by costs incurred in integrating the acquired companies and increases in other expenses.

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Our plans to continue to improve productivity and reduce complexity may not be successful, which could adversely affect our ability to compete.

MSA has integrated parts of its European operating segment that have historically been individually managed entities, into a centrally managed organization model. We have begun to and plan to continue to leverage the benefits of scale created from this approach and are in the process of implementing a more efficient and cost-effective enterprise resource planning system in additional locations across the International Segment. MSA runs the risk that these and similar initiatives may not be completed substantially as planned, may be more costly to implement than expected, or may not have the positive effects anticipated. In addition, these various initiatives require MSA to implement a significant amount of organizational change which could divert management's attention from other concerns, and if not properly managed, could cause disruptions in our day-to-day operations and have a negative impact on MSA's financial results. It is also possible that other major productivity and streamlining programs may be required in the future.

Our plans to improve future profitability through restructuring programs may not be successful and could lead to unintended consequences.

We have incurred and may incur restructuring charges primarily related to severance costs for staff reductions associated with our ongoing initiatives to drive profitable growth and right size our operations. For example in 2016, certain employees in the Americas segment were offered a voluntary retirement incentive package ("VRIP"). Non-cash special termination benefit expense of approximately \$11.4 million was recorded in the first quarter of 2017 related to elections under the VRIP. Our cost structure in future periods is somewhat dependent upon our ability to maintain increased productivity without backfilling certain positions. If our programs are not successful, there could be a material adverse effect on our business and consolidated results of operations.

Our future results are subject to the risk that purchased components and materials are unavailable or available at excessive cost due to material shortages, excessive demand, currency fluctuation, inflationary pressure and other factors.

We depend on various components and materials to manufacture our products. Although we have not experienced any substantial difficulty in obtaining components and materials, it is possible that any of our supplier relationships could be terminated or otherwise disrupted. Any sustained interruption in our receipt of adequate supplies could have a material adverse effect on our business, results of operations and financial condition. Our inability to successfully manage price fluctuations due to market demand, currency risks or material shortages, or future price fluctuations could have a material adverse effect on our business and our consolidated results of operations and financial condition.

A failure of our information systems or a cybersecurity breach could materially and adversely affect our business, results of operations and financial condition.

The proper functioning and security of our information systems is critical to the operation and reputation of our business. Our information systems may be vulnerable to damage or disruption from natural or man-made disasters, computer viruses, power losses or other system or network failures. In addition, hackers, cyber-criminals and other persons could attempt to gain unauthorized access to our information systems with the intent of harming our company, harming our information systems or obtaining sensitive information such as intellectual property, trade secrets, financial and business development information, and customer and vendor related information. If our information systems or security fail, or if there is any compromise or breach of our security, it could result in a violation of applicable privacy and other laws, legal and financial exposure, remediation costs, negative impacts on our customers' willingness to transact business with us, or a loss of confidence in our security measures, which could have an adverse effect on our business, our reputation and our consolidated results of operations and financial condition.

Like many companies, from time to time, we have experienced attacks on our computer systems by unauthorized outside parties. Because the techniques used by computer hackers and others to access or sabotage networks continually evolve and generally are not recognized until launched against a target, we may be unable to anticipate, prevent or detect these attacks. As a result, the impact of any future incident cannot be predicted, including the failure of our information systems or misappropriation of our technologies and/or processes. Any such system failure or loss of such information could harm our competitive position, or cause us to incur significant costs to remedy the damages

caused by the incident. We routinely implement improvements to our network security safeguards as well as cybersecurity initiatives. We also maintain a robust cyber response plan, including an assessment of triggers for internal and external reporting of cyber incidents. We expect to continue devoting substantial resources to the security of our information technology systems. We cannot assure that such system improvements will be sufficient to prevent or limit the damage from any future cyber-attack or disruption to our information systems.

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If we fail to introduce successful new products or extend our existing product lines, we could lose our market position and our financial performance could be materially and adversely affected.

In the safety products market, there are frequent introductions of new products and product line extensions. If we are unable to identify emerging consumer and technological trends, maintain and improve the competitiveness of our products and introduce new products, we may lose our market position, which could have a material adverse effect on our business, financial condition and results of operations. We continue to invest significant resources in research and development and market research. However, continued product development and marketing efforts are subject to the risks inherent in the development process. These risks include delays, the failure of new products and product line extensions to achieve anticipated levels of market acceptance and the risk of failed product introductions.

If we lose any of our key personnel or are unable to attract, train and/or retain qualified personnel or plan the succession of senior management, our ability to manage our business and continue our growth could be negatively impacted.

Our success depends in large part on the continued contributions of our key management, engineering and sales and marketing personnel, many of whom are highly skilled and would be difficult to replace. Our success also depends on the abilities of new personnel to function effectively, both individually and as a group. If we are unable to attract, effectively integrate and retain management, engineering or sales and marketing personnel, then the execution of our growth strategy and our ability to react to changing market requirements may be impeded, and our business could suffer as a result.

In addition, hiring, training, and successfully integrating replacement critical personnel could be time consuming, may cause additional disruptions to our operations, and may be unsuccessful, which could negatively impact future revenues. Competition for personnel is intense, and we cannot assure you that we will be successful in attracting and retaining qualified personnel. The hiring of new personnel may also result in increased costs and we do not currently maintain key person life insurance.

Our success also depends on effective succession planning. Failure to ensure effective transfer of knowledge and smooth transitions involving senior management could hinder our strategic planning and execution. From time to time, senior management or other key employees may leave our company. While we strive to reduce the negative impact of such changes, the loss of any key employee could result in significant disruptions to our operations, including adversely affecting the timeliness of product releases, the successful implementation and completion of company initiatives, the effectiveness of our disclosure controls and procedures and our internal control over financial reporting, and the results of our operations.

The markets in which we compete are highly competitive, and some of our competitors have greater financial and other resources than we do. The competitive pressures faced by us could materially and adversely affect our business, results of operations and financial condition.

The safety products market is highly competitive, with participants ranging in size from small companies focusing on single types of safety products, to large multinational corporations that manufacture and supply many types of safety products. Our main competitors vary by region and product. We believe that participants in this industry compete primarily on the basis of product characteristics (such as functional performance, agency approvals, design and style), price, service and delivery, customer support, the ability to meet the special requirements of customers, brand name trust and recognition, and e-business capabilities. Some of our competitors have greater financial and other resources than we do and our business could be adversely affected by competitors' new product innovations, technological advances made to competing products and pricing changes made by us in response to competition from existing or new competitors. We may not be able to compete successfully against current and future competitors and the competitive pressures faced by us could have a material adverse effect our business, consolidated results of operations and financial condition. In addition, e-business is a rapidly developing area, and the execution of a successful e-business strategy involves significant time, investment and resources. If we are unable to successfully expand e-business capabilities in support of our customer needs, our brands may lose market share, which could negatively impact revenue and profitability.

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We are subject to various federal, state and local laws and regulations across our global organization and any violation of these laws and regulations could adversely affect our results of operations.

We are subject to numerous, and sometimes conflicting, laws and regulations on matters as diverse as anticorruption, import/export controls, product content requirements, trade restrictions, tariffs, taxation, sanctions, internal and disclosure control obligations, securities regulation, anti-competition, data privacy and labor relations, among others. This includes laws and regulations in emerging markets where legal systems may be less developed or familiar to us. Compliance with diverse legal requirements is costly, time consuming and requires significant resources. Violations of one or more of these laws or regulations in the conduct of our business could result in significant fines, criminal sanctions against us or our officers, prohibitions on doing business and damage to our reputation. These actions could result in liability for significant monetary damages, fines and/or criminal prosecution, unfavorable publicity and other reputational damage and have a material adverse effect on our business, consolidated results of operations and financial condition.

We are subject to various environmental laws and any violation of these laws could adversely affect our results of operations.

Included in the extensive laws, regulations and ordinances, to which we are subject, are those relating to the protection of the environment. Examples include those governing discharges to air and water, handling and disposal practices for solid and hazardous wastes and the maintenance of a safe workplace. These laws impose penalties for noncompliance and liability for response costs and certain damages resulting from past and current spills, disposals, or other releases of hazardous materials. We could incur substantial costs as a result of noncompliance with or liability for cleanup pursuant to these environmental laws. Such laws continue to change, and we may be subject to more stringent environmental laws in the future. If more stringent environmental laws are enacted, these future laws could have a material adverse effect on our business, consolidated results of operations and financial condition.

We benefit from free trade laws and regulations, such as the United States-Mexico-Canada Agreement and any changes to these laws and regulations could adversely affect our results of operations.

Existing free trade laws and regulations, such as the United States-Mexico-Canada Agreement (“USMCA”), provide certain beneficial duties and tariffs for qualifying imports and exports, subject to compliance with the applicable classification and other requirements. Changes in laws or policies governing the terms of foreign trade, and in particular increased trade restrictions, tariffs or taxes on imports from countries where we manufacture products, such as China and Mexico, could have a material adverse effect on our business, consolidated results of operations and financial condition.

We are subject to various U.S and foreign tax laws and any changes in these laws related to the taxation of businesses and resolutions of tax disputes could adversely affect our results of operations.

The U.S. Congress, the Organization for Economic Co-operation and Development (or, OECD) and other government agencies in jurisdictions in which we and our affiliates invest or do business have maintained a focus on issues related to the taxation of multinational companies. The OECD has changed numerous long-standing tax principles through its base erosion and profit shifting (“BEPS”) project which could adversely impact our effective tax rate.

We are subject to regular review and audit by both foreign and domestic tax authorities. While we believe our tax positions will be sustained, the final outcome of tax audits and related litigation may differ materially from the tax amounts recorded in our consolidated financial statements, which could have a material adverse effect on our consolidated results of operations, financial condition and cash flows.

Our ability to market and sell our products is subject to existing government regulations and standards. Changes in such regulations and standards or our failure to comply with them could materially and adversely affect our results of operations.

Most of our products are required to meet performance and test standards designed to protect the safety of people and infrastructures around the world. Our inability to comply with these standards could result in declines in revenue, profitability and cash flow. Changes in regulations could reduce the demand for our products or require us to re-engineer our products, thereby creating opportunities for our competitors. Regulatory approvals for our products may be delayed or denied for a variety of reasons that are outside of our control. Additionally, market anticipation of significant new standards can cause customers to accelerate or delay buying decisions.

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Damage to the reputation of MSA or to one or more of our product brands could adversely affect our business. Developing and maintaining our reputation, as well as the reputation of our brands, is a critical factor in our relationship with customers, distributors and others. Our inability to address negative publicity or other issues, including concerns about product safety or quality, real or perceived, could negatively impact our business which could have a material adverse effect on our business, consolidated results of operations and financial condition. We have significant international operations and are subject to the risks of doing business in foreign countries. We have business operations in over 40 foreign countries. In 2018, approximately half of our net sales were made by operations located outside the United States. Those operations are subject to various political, economic and other risks and uncertainties, which could have a material adverse effect on our business. These risks include the following:

- unexpected changes in regulatory requirements;
- changes in trade policy or tariff regulations;
- changes in tax laws and regulations;
- changes to the Company's legal structure could have unintended tax consequences;
- inability to generate sufficient profit in certain foreign jurisdictions could lead to additional valuation allowances on deferred tax assets;
- intellectual property protection difficulties;
- difficulty in collecting accounts receivable;
- complications in complying with a variety of foreign laws and regulations, some of which may conflict with U.S. laws;
- foreign privacy laws and regulations;
- trade protection measures and price controls;
- trade sanctions and embargoes;
- nationalization and expropriation;
- increased international instability or potential instability of foreign governments;
- effectiveness of worldwide compliance with MSA's anti-bribery policy, local laws and the U.S. Foreign Corrupt Practices Act;
- difficulty in hiring and retaining qualified employees;
- the ability to effectively negotiate with labor unions in foreign countries;
- the need to take extra security precautions for our international operations;
- costs and difficulties in managing culturally and geographically diverse international operations; and
- risks associated with the United Kingdom's decision to exit the European Union, including disruptions to trade and free movement of goods, services and people to and from the United Kingdom; increased foreign exchange volatility with respect to the British pound; and additional legal and economic uncertainty.

Any one or more of these risks could have a negative impact on the success of our international operations and, thereby, have a material adverse effect our business, consolidated results of operations and financial condition.

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Because we derive a significant portion of our sales from the operations of our foreign subsidiaries, future currency exchange rate fluctuations could adversely affect our results of operations and financial condition, and could affect the comparability of our results between financial periods.

In 2018, our operations outside of the United States accounted for approximately half of our net sales. The results of our foreign operations are generally reported in the local currency of the affiliate and then translated into U.S. dollars at the applicable exchange rates for inclusion in our consolidated financial statements. The exchange rates between some of these currencies and the U.S. dollar have fluctuated significantly in recent years and may continue to do so in the future. A weakening of the currencies in which sales are generated relative to the currencies in which costs are denominated would decrease our results of operations and cash flow. Although the Company uses instruments to hedge certain foreign currency risks, these hedges only offset a portion of the Company's exposure to foreign currency fluctuations.

In addition, because our consolidated financial statements are stated in U.S. dollars, such fluctuations may affect our consolidated results of operations and financial position, and may affect the comparability of our results between financial periods. Our inability to effectively manage our exchange rate risks or any volatility in currency exchange rates could have a material adverse effect on our business, consolidated results of operations and financial condition.

Our continued success depends on our ability to protect our intellectual property. If we are unable to protect our intellectual property, our business could be materially and adversely affected.

Our success depends, in part, on our ability to obtain and enforce patents, maintain trade secret protection and operate without infringing on the proprietary rights of third parties. We have been issued patents and have registered trademarks with respect to many of our products, but our competitors could independently develop similar or superior products or technologies, duplicate any of our designs, trademarks, processes or other intellectual property or design around any processes or designs on which we have or may obtain patents or trademark protection. In addition, it is possible that third parties may have, or will acquire, licenses for patents or trademarks that we may use or desire to use, so that we may need to acquire licenses to, or to contest the validity of, such patents or trademarks of third parties. Such licenses may not be made available to us on acceptable terms, if at all, and we may not prevail in contesting the validity of third party rights.

We also protect trade secrets, know-how and other confidential information against unauthorized use by others or disclosure by persons who have access to them, such as our employees, through contractual arrangements. These agreements may not provide meaningful protection for our trade secrets, know-how or other proprietary information in the event of any unauthorized use, misappropriation or disclosure of such trade secrets, know-how or other proprietary information. Our inability to maintain the proprietary nature of our technologies could have a material adverse effect on our consolidated results of operations and financial condition.

If our goodwill, other intangible assets and long-lived assets become impaired, we may be required to record significant charges to earnings.

We review our long-lived assets for impairment when events or changes in circumstances indicate the carrying amount may not be recoverable. Goodwill and indefinite-lived intangible assets are required to be assessed for impairment at least annually. Factors that may be considered a change in circumstances, indicating that the carrying amount of our goodwill, indefinite-lived intangible assets or long-lived assets may not be recoverable, include slower growth rates in our markets, reduced expected future cash flows, increased country risk premiums as a result of political uncertainty and a decline in stock price and market capitalization. We consider available current information when calculating our impairment charge. If there are indicators of impairment, our long-term cash flow forecasts for our operations deteriorate or discount rates increase, we may be required to recognize additional impairment charges in later periods. See Note 12 of the consolidated financial statements in Part II Item 8 of this Form 10-K for the carrying amounts of goodwill in each of our reporting segments and details on indefinite-lived intangible assets that we hold.

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Risks related to our defined benefit pension and other post-retirement plans could adversely affect our results of operations and cash flow.

Significant changes in actual investment return on pension assets, discount rates, and other factors could adversely affect our results of operations and pension contributions in future periods. U.S. generally accepted accounting principles require that we calculate income or expense for the plans using actuarial valuations. These valuations reflect assumptions about financial markets and interest rates, which may change based on economic conditions. Funding requirements for our pension plans may become more significant. However, the ultimate amounts to be contributed are dependent upon, among other things, interest rates, underlying asset returns and the impact of legislative or regulatory changes related to pension funding obligations. For further information regarding our pension plans, refer to "Pensions and Other Post-retirement Benefits" in Note 14 of the consolidated financial statements in Part II Item 8 of this Form 10-K.

If we fail to meet our debt service requirements or the restrictive covenants in our debt agreements or if interest rates increase, our results of operations and financial condition could be materially and adversely affected.

We have a substantial amount of debt upon which we are required to make scheduled interest and principal payments and we may incur additional debt in the future. A significant portion of our debt bears interest at variable rates that may increase in the future. Our debt agreements require us to comply with certain restrictive covenants. If we are unable to generate sufficient cash to service our debt or if interest rates increase, our consolidated results of operations and financial condition could be materially and adversely affected. Additionally, a failure to comply with the restrictive covenants contained in our debt agreements could result in a default, which if not waived by our lenders, could substantially increase borrowing costs and require accelerated repayment of our debt. Please refer to Note 11 of the consolidated financial statements in Part II Item 8 of this Form 10-K for commentary on our compliance with the restrictive covenants.

Item 1B. Unresolved Staff Comments

None.

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Item 2. Properties

Our principal executive offices are located at 1000 Cranberry Woods Drive, Cranberry Township, PA 16066 in a 212,000 square-foot building owned by us. We own or lease our primary facilities in the United States and in a number of other countries. We believe that all of our facilities, including the manufacturing facilities, are in good repair and in suitable condition for the purposes for which they are used. The following table sets forth a list of our primary facilities:

Location	Function	Square Feet	Owned or Leased
Americas			
Murrysville, PA	Office and Manufacturing	295,000	Owned
Cranberry Twp., PA	Office, Research and Development and Manufacturing	212,000	Owned
New Galilee, PA	Distribution	120,000	Leased
Jacksonville, NC	Manufacturing	107,000	Owned
Jacksonville, NC	Manufacturing	79,000	Leased
Queretaro, Mexico	Office and Manufacturing	77,000	Leased
Sao Paulo, Brazil	Office, Manufacturing and Distribution	74,000	Owned
Cranberry Twp., PA	Research and Development	68,000	Owned
Lake Forest, CA	Office, Research and Development and Manufacturing	62,000	Leased
Lima, Peru	Office and Distribution	34,000	Owned
Santiago, Chile	Office and Distribution	32,000	Leased
Cundinamarca, Colombia	Office	22,000	Leased
Corona, CA	Manufacturing	19,000	Leased
Pittsfield, NH	Office and Manufacturing	16,000	Owned
Pasadena, TX	Office and Distribution	15,000	Leased
Torreón, Mexico	Office	15,000	Leased
Houston, TX	Office and Distribution	15,000	Leased
Santiago, Chile	Office	13,000	Leased
Edmonton, Canada	Distribution	13,000	Leased
Buenos Aires, Argentina	Office and Distribution	9,000	Owned
São Paulo, Brazil	Distribution	9,000	Leased
Antofagasta, Chile	Office	9,000	Leased
International			
Berlin, Germany	Office, Research and Development, Manufacturing and Distribution	340,000	Leased
Suzhou, China	Office and Manufacturing	193,000	Owned
Devizes, UK	Office, Manufacturing and Distribution	115,000	Owned
Châtillon-sur-Chalaronne, France	Office, Research and Development, Manufacturing and Distribution	94,000	Owned
Beijing, China	Office	56,000	Leased
Milan, Italy	Office	43,000	Owned
Mohammedia, Morocco	Manufacturing	24,000	Owned
Barcelona, Spain	Office	23,000	Leased
Bucharest, Romania	Office	23,000	Leased
Galway, Ireland	Office and Manufacturing	20,000	Owned
Woodlands, Singapore	Distribution	19,000	Leased
Warsaw, Poland	Office and Distribution	18,000	Leased
Sydney, Australia	Office and Manufacturing	18,000	Leased
Kozina, Slovenia	Office and Manufacturing	13,000	Leased
Essen, Germany	Office and Distribution	10,000	Leased

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Jakarta Utara, Indonesia	Office	10,000	Leased
Puchong, Malaysia	Office and Distribution	9,000	Leased
Rapperswil, Switzerland	Office	8,000	Leased
Berlin, Germany	Office	8,000	Leased
Ostrava, Czechia	Office	7,000	Leased

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Item 3. Legal Proceedings

Please refer to Note 19 to the consolidated financial statements in Part II Item 8 of this Form 10-K.

Item 4. Mine Safety Disclosures

Not applicable.

Executive Officers of the Registrant

The following sets forth the names and ages of our executive officers as of February 22, 2019:

Name	Age	Title
Nishan J. Vartanian ^(a)	59	President and Chief Executive Officer since May 2018.
Steven C. Blanco ^(b)	52	Vice President and President, MSA Americas segment since August 2017.
Kenneth D. Krause ^(c)	44	Senior Vice President, Chief Financial Officer and Treasurer since February 2018.
Bob Leenen ^(d)	45	Vice President and President, MSA International segment since September 2017.
Douglas K. McClaine ^(e)	61	Senior Vice President, Secretary and Chief Legal Officer since March 2016.

Prior to his present position, Mr. Vartanian was President and Chief Operating Officer since June 2017; Senior (a) Vice President and President, MSA Americas since July 2015; and prior thereto served as Vice President and President, MSA North America.

(b) Prior to his present position, Mr. Blanco served as Vice President and General Manager, Northern North America since August 2015 and prior thereto was Vice President, Global Operational Excellence.

Prior to his present position, Mr. Krause was Vice President, Chief Financial Officer and Treasurer since December (c) 2015; Vice President, Strategic Finance since August 2015; and prior thereto served as Treasurer and Executive Director, Global Finance and Assistant Treasurer.

(d) Prior to his present position, Mr. Leenen was Regional Chief Financial Officer, MSA International and Finance Director, Europe.

(e) Prior to his present position, Mr. McClaine was Vice President, Secretary and General Counsel.

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PART II

Item 5. Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Our common stock is traded on the New York Stock Exchange under the symbol "MSA." Dividends declared were as follows:

	2018	2017
First Quarter	\$0.35	\$0.33
Second Quarter	0.38	0.35
Third Quarter	0.38	0.35
Fourth Quarter	0.38	0.35

On February 14, 2019, there were 184 registered holders of our shares of common stock.

Issuer Purchases of Equity Securities

Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Number of Shares that May Yet Be Purchased Under the Plans or Programs
October 1 — October 31, 2018	1,256	\$ 106.29	—	776,668
November 1 — November 30, 2018	2,619	109.53	—	744,244
December 1 — December 31, 2018	1,103	95.32	—	860,456

The share repurchase program authorizes up to \$100.0 million in repurchases of MSA common stock in the open market and in private transactions. The share purchase program has no expiration date. The maximum number of shares that may be purchased is calculated based on the dollars remaining under the program and the respective month-end closing share price. We have purchased a total of 318,941 shares, or \$18.9 million, since this program's inception.

The above shares purchased during the quarter relate to stock compensation transactions.

We do not have any other share repurchase programs.

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Comparison of Five-Year Cumulative Total Return

The following paragraph compares the most recent five year performance of MSA stock with (1) the Standard & Poor's 500 Composite Index and (2) the Russell 2000 Index. Because our competitors are principally privately held concerns or subsidiaries or divisions of corporations engaged in multiple lines of business, we do not believe it feasible to construct a peer group comparison on an industry or line-of-business basis. The Russell 2000 Index, while including corporations both larger and smaller than MSA in terms of market capitalization, is composed of corporations with an average market capitalization similar to us.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN

ASSUMES INITIAL INVESTMENT OF \$100

Among MSA Safety Incorporated, the S&P 500 Index, and the Russell 2000 Index

Assumes \$100 invested on December 31, 2013 in stock or index, including reinvestment of dividends. Fiscal year ending December 31.

	Value at December 31,					
	2013	2014	2015	2016	2017	2018
MSA Safety Incorporated	\$100.00	\$106.04	\$89.24	\$146.17	\$166.55	\$205.83
S&P 500 Index	100.00	113.69	115.26	129.05	157.22	150.33
Russell 2000 Index	100.00	104.89	100.26	121.63	129.44	124.09

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Item 6. Selected Financial Data

(In thousands, except as noted)

	2018	2017 ^(a)	2016 ^(b)	2015 ^(c)	2014
Statement of Income Data:					
Net sales	\$1,358,104	\$1,196,809	\$1,149,530	\$1,130,783	\$1,133,885
Income from continuing operations	125,115	26,956	94,107	69,590	87,447
(Loss) income from discontinued operations	—	—	(755	) 1,217	1,059
Net income attributable to MSA Safety Incorporated	124,150	26,027	91,936	70,807	88,506
Earnings per share attributable to MSA common shareholders:					
Basic per common share (in dollars):					
Income from continuing operations	\$3.23	\$0.68	\$2.47	\$1.86	\$2.34
(Loss) income from discontinued operations	—	—	(0.02	) 0.03	0.03
Net income	3.23	0.68	2.45	1.89	2.37
Diluted per common share (in dollars):					
Income from continuing operations	\$3.18	\$0.67	\$2.44	\$1.84	\$2.30
(Loss) income from discontinued operations	—	—	(0.02	) 0.03	0.03
Net income	3.18	0.67	2.42	1.87	2.33
Dividends paid per common share (in dollars)	1.49	1.38	1.31	1.27	1.23
Weighted average common shares outstanding—basic	38,362	37,997	37,456	37,293	37,138
Weighted average common shares outstanding—diluted	38,961	38,697	37,986	37,710	37,728
Balance Sheet Data:					
Total assets ^(d)	\$1,608,012	\$1,684,826	\$1,353,920	\$1,422,863	\$1,263,412
Long-term debt, net ^(d)	341,311	447,832	363,836	458,022	243,620
Total MSA Safety Incorporated shareholders' equity	633,882	597,601	558,165	516,496	533,809

^(a) Includes Globe from the date of acquisition on July 31, 2017. In addition, we were able to reasonably estimate the potential liability for IBNR cumulative trauma product liability claims in the fourth quarter of 2017 and recognized a significant charge which reduced net income by approximately \$85 million as compared to prior years as we became substantially self insured for cumulative trauma product liability claims during 2017. See Note 19 to the Consolidated Financial Statements in Part II Item 8 of this Form 10-K for additional information.

^(b) Includes Senscient from the date of acquisition on September 19, 2016.

^(c) Includes Latchways from the date of acquisition on October 21, 2015.

^(d) The Company adopted Accounting Standards Update (ASU) No. 2015-03, Interest - Imputation of Interest and ASU No. 2015-15, Interest - Imputation of Interest on January 1, 2016, which requires an entity to present the debt issuance costs related to a recognized debt liability as a direct deduction from the carrying amount of that debt liability, consistent with debt discounts. All prior periods presented in this Annual Report on Form 10-K were recast to reflect the change in accounting principle retrospectively applied as of December 31, 2015.

The data presented in the Selected Financial Data table should be read in conjunction with comments provided in Management's Discussion and Analysis of Financial Condition and Results of Operations in Part II Item 7 and the Consolidated Financial Statements in Part II Item 8 of this Form 10-K.

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Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis should be read in conjunction with the historical financial statements and other financial information included elsewhere in this annual report on Form 10-K. This discussion may contain forward-looking statements that involve risks and uncertainties. The forward-looking statements are not historical facts, but rather are based on current expectations, estimates, assumptions and projections about our industry, business and future financial results. Our actual results could differ materially from the results contemplated by these forward-looking statements due to a number of factors, including those discussed in the sections of this annual report entitled "Forward-Looking Statements" and "Risk Factors."

MSA Safety Incorporated ("MSA") is organized into six geographical operating segments that are aggregated into three reportable geographic segments: Americas, International and Corporate. The Americas segment is comprised of our operations in North America and Latin America geographies. The International segment is comprised of our operations of all geographies outside of the Americas. Certain global expenses are allocated to each segment in a manner consistent with where the benefits from the expenses are derived. Please refer to Note 7—Segment Information of the consolidated financial statements in Part II Item 8 of this Form 10-K for further information.

MSA's South African personal protective equipment distribution business and MSA's Zambian operations had historically been part of the International reportable segment. On February 29, 2016, the Company sold 100% of the stock associated with these operations. In accordance with generally accepted accounting principles, these operations and related results are excluded from continuing operations and are presented as discontinued operations in all periods presented. Please refer to Note 20—Discontinued Operations of the consolidated financial statements in Part II Item 8 of this Form 10-K for further commentary on these discontinued operations.

On September 19, 2016, the Company acquired 100% of the common stock of Senscient, Inc. for \$19.1 million in cash. Senscient, which is headquartered in the United Kingdom, is a leader in laser-based gas detection technology. The acquisition of Senscient expands and enhances MSA's technology offerings in the global market for fixed gas and flame detection systems, as the Company continues to execute its core product growth strategy. The acquisition was funded through borrowings on our unsecured senior revolving credit facility. The data presented in Part II Item 6 of this Form 10-K should be read in conjunction with the following comments. Additionally, please refer to Note 13—Acquisitions of the consolidated financial statements in Part II Item 8 of this Form 10-K for further information. On July 31, 2017, the Company acquired 100% of the common stock of Globe Holding Company, LLC ("Globe") for \$215 million in cash plus a working capital adjustment of \$1.4 million. Based in Pittsfield, NH, Globe is a leading innovator and provider of firefighter protective clothing and boots. This acquisition aligns with the Company's corporate strategy in that it strengthens our leading position in the North American fire service market. The transaction was funded through borrowings on our unsecured senior revolving credit facility. The data presented in Part II Item 6 of this Form 10-K should be read in conjunction with the following comments. Additionally, please refer to Note 13—Acquisitions of the consolidated financial statements in Part II Item 8 of this Form 10-K for further information.

Table of Contents**BUSINESS OVERVIEW**

We are a global leader in the development, manufacture and supply of safety products that protect people and facility infrastructures. Recognized for their market leading innovation, many MSA products integrate a combination of electronics, mechanical systems and advanced materials to protect users against hazardous or life-threatening situations. The Company's comprehensive product line, which is governed by rigorous safety standards across highly regulated industries, is used by workers around the world in a broad range of markets, including the oil, gas and petrochemical industry, fire service, construction, industrial manufacturing applications, utilities, mining and the military. MSA's core products include breathing apparatus where self-contained breathing apparatus ("SCBA") is the principal product, fixed gas and flame detection systems, portable gas detection instruments, industrial head protection products, firefighter helmets and protective apparel, and fall protection devices. We are committed to providing our customers with service unmatched in the safety industry and, in the process, enhancing our ability to provide a growing line of safety solutions for customers in key global markets.

We tailor our product offerings and distribution strategy to satisfy distinct customer preferences that vary across geographic regions. To best serve these customer preferences, we have organized our business into six geographical operating segments that are aggregated into three reportable geographic segments: Americas, International and Corporate. In 2018, 63% and 37% of our net sales were made by our Americas and International segments, respectively.

Americas. Our largest manufacturing and research and development facilities are located in the United States. We serve our markets across the Americas with manufacturing facilities in the U.S., Mexico and Brazil. Operations in other Americas segment countries focus primarily on sales and distribution in their respective home country markets. **International.** Our International segment includes companies in Europe, Middle East, Africa, and the Asia Pacific region, some of which are in developing regions of the world. In our largest International affiliates (in Germany, France, United Kingdom, Ireland and China), we develop, manufacture and sell a wide variety of products. In China, the products manufactured are sold primarily in the home country as well as regional markets. Operations in other International segment countries focus primarily on sales and distribution in their respective home country markets. Although some of these companies may perform limited production, most of their sales are of products manufactured in our plants in Germany, France, the U.S., United Kingdom, Ireland and China or are purchased from third party vendors.

Corporate. The Corporate segment primarily consists of general and administrative expenses incurred in our corporate headquarters, costs associated with corporate development initiatives, legal expense, interest expense, foreign exchange gains or losses, and other centrally-managed costs. Corporate general and administrative costs comprise the majority of the expense in the Corporate segment. During the years ended December 31, 2018, 2017 and 2016 corporate general and administrative costs were \$31.2 million, \$37.6 million, and \$38.9 million, respectively.

RESULTS OF OPERATIONS

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

Net Sales (In millions)	2018	2017	Dollar Increase	Percent Increase
Consolidated	\$1,358.1	\$1,196.8	\$161.3	13.5%
Americas	854.3	736.8	117.5	15.9%
International	503.8	460.0	43.8	9.5%

Net Sales from continuing operations. Net sales for the year ended December 31, 2018 were \$1.4 billion, an increase of \$161 million, from \$1.2 billion for the year ended December 31, 2017. Organic constant currency sales increased by 8.0% for the year ended December 31, 2018, ahead of what we targeted for the year. As we start 2019, we are targeting mid-single digit revenue growth. Please refer to the Net Sales table below for a reconciliation of the year over year sales change.

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Net Sales (Percent Change)	Year Ended December 31, 2018 versus December 31, 2017		
	Americas International Consolidated		
GAAP reported sales change	15.9%	9.5%	13.5%
Currency translation effects	(1.1)%	1.9%	0.1%
Constant currency sales change	17.0%	7.6%	13.4%
Acquisitions	8.8%	0.1%	5.4%
Organic constant currency change	8.2%	7.5%	8.0%

Note: Organic constant currency sales change is a non-GAAP financial measure provided by the Company to give a better understanding of the Company's underlying business performance. Organic constant currency sales change is calculated by removing the percentage impact from acquisitions and currency translation effects from the overall percentage change in net sales.

Net sales for the Americas segment were \$854.3 million for the year ended December 31, 2018, an increase of \$117.5 million, or 16%, compared to \$736.8 million for the year ended December 31, 2017. During 2018, constant currency sales in the Americas segment increased 17% compared to 2017, driven primarily by the acquisition of Globe, which increased sales in the Americas segment by 9% during the period. The 8% organic growth during 2018, was driven by growth throughout our core product portfolio.

Net sales for the International segment were \$503.8 million for the year ended December 31, 2018, an increase of \$43.8 million, or 10%, compared to \$460.0 million for the year ended December 31, 2017. During the year ended December 31, 2018, constant currency sales in the International segment increased 8% as we recognized stronger sales driven by growth throughout our product portfolio.

Gross profit. Gross profit for the year ended December 31, 2018 was \$611.9 million, an increase of \$73.0 million, or 14%, compared to \$538.9 million for the year ended December 31, 2017. The ratio of gross profit to net sales was 45.1% in 2018 compared to 45.0% in 2017. The slightly higher gross profit ratio is attributable to improved price realization and improved leverage on indirect costs, offset by inflationary pressures and dilution associated with a less favorable product mix from the Globe acquisition. The impact of the Globe acquisition reduced the gross profit percentage by 1% or 100 basis points.

Selling, general and administrative expenses. Selling, general and administrative ("SG&A") expenses were \$324.8 million for the year ended December 31, 2018, an increase of \$24.7 million, or 8%, compared to \$300.1 million for the year ended December 31, 2017. The increase is related to increased SG&A expenses related to the Globe acquisition, higher variable compensation cost due to stronger revenue, profitability and cash flow performance as well as higher selling and marketing costs to invest resources in driving revenue growth. Selling, general and administrative expenses were 23.9% of net sales in 2018, compared to 25.1% of net sales in 2017. Please refer to the Selling, general and administrative expenses table for a reconciliation of the year over year expense change.

Selling, general, and administrative expenses (Percent Change)	Year Ended December 31, 2018 versus December 31, 2017
	Consolidated
GAAP reported change	8.2%
Less: Currency translation effects	(1.0)%
Constant currency change	9.2%
Less: Acquisitions and related strategic transaction costs	0.6%
Organic constant currency change	8.6%

Note: Organic constant currency change is a non-GAAP financial measure provided by the Company to give a better understanding of the Company's underlying business performance. Organic constant currency change in selling, general, and administrative expenses is calculated by deducting the percentage impact from acquisitions and related strategic transaction costs as well as the currency translation effects from the overall percentage change in selling, general, and administrative expense. Management believes excluding acquisitions and currency translation effects provides investors with a greater level of clarity into spending levels on a year-over-year basis.

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Research and development expense. Research and development expense was \$52.7 million for the year ended December 31, 2018, an increase of \$2.6 million, or 5%, compared to \$50.1 million for the year ended December 31, 2017. Research and development expense was 3.9% of net sales in 2018, compared to 4.2% of net sales in 2017. We continue to develop new products for global safety markets, including the newly unveiled M1 SCBA for which we began production at the end of 2018, as well as the V Series product family of fall protection for the industrial market. During 2018, we capitalized \$1.6 million of software development costs. Please refer to Note 1—Significant Accounting Policies of the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information.

Restructuring, net of adjustments. During the year ended December 31, 2018, the Company recorded restructuring charges of \$13.2 million, primarily related to severance costs for staff reductions associated with our ongoing initiatives to drive profitable growth in Europe and the legal and operational realignment of our U.S. and Canadian operations. This compared to charges of \$17.6 million during the year ended December 31, 2017, primarily related to non-cash special termination benefit expense of \$11.4 million for the voluntary retirement incentive package elected by certain employees in the Americas segment and severance costs for staff reductions associated with our ongoing initiatives to drive profitable growth in Europe and right size our operations in Australia and Africa. We expect to make progress on our International segment footprint rationalization project in the first quarter of 2019. While these actions may drive noncash restructuring charges associated with the write-off of cumulative currency translation, we expect these actions to drive a more efficient business model and are similar to the steps we took to reduce our footprint and improve our efficiency in other areas of the International segment.

Currency exchange. Currency exchange losses were \$2.3 million during the year ended December 31, 2018, compared to losses of \$5.1 million during the year ended December 31, 2017. Currency exchange losses in both years were related to management of foreign currency exposure on unsettled intercompany balances. Refer to Note 17—Derivative Financial Instruments of the consolidated financial statements in Part II Item 8 of this Form 10-K for information regarding our currency exchange rate risk management strategy.

Other operating expense. Other operating expense during the year ended December 31, 2018 was \$45.3 million and was primarily related to an increase in our reserve for cumulative trauma product liability claims. That increase resulted from the Company's revision of its estimates of potential liability for cumulative trauma product liability claims as part of its annual review process. This compared to Other operating expense during the year ended December 31, 2017 of \$126.4 million. In the fourth quarter of 2017, MSA LLC determined that a reasonable estimate of the liability for incurred but not reported ("IBNR") cumulative trauma liability claims was \$111.1 million as of December 31, 2017. MSA LLC recorded a total charge of \$126.4 million before tax (\$85.0 million after tax) during 2017 representing the estimated liability in excess of available insurance coverage for both asserted and IBNR cumulative trauma product liability claims. Please refer to Note 19—Contingencies of the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information.

GAAP operating income. Consolidated operating income for the year ended December 31, 2018 was \$173.5 million compared to \$39.6 million for the year ended December 31, 2017. The increase in operating results was primarily driven by higher sales volumes, lower restructuring and other operating expense, partially offset by higher SG&A costs.

Adjusted operating income. Americas adjusted operating income for the year ended December 31, 2018 was \$206.8 million, an increase of \$31.2 million, or 18%, compared to \$175.6 million for the year ended December 31, 2017. The increase was primarily related to the higher level of sales partially offset by higher SG&A costs as a result of higher variable compensation cost due to stronger revenue performance, and higher selling and marketing costs to invest resources in driving revenue growth.

International adjusted operating income for the year ended December 31, 2018 was \$59.9 million, an increase of \$9.5 million, or 19%, compared to \$50.4 million for the year ended December 31, 2017. The increase was primarily attributable to higher sales volumes and improvements associated with our ongoing initiatives to right size our operations in Europe.

Corporate segment adjusted operating loss for the year ended December 31, 2018 was \$31.9 million, an improvement of \$1.1 million, or 3%, compared to an operating loss of \$33.0 million for the year ended December 31, 2017, reflecting lower legal expenses.

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The following tables reconcile GAAP operating income to adjusted operating income (loss). Adjusted operating margin % is calculated as adjusted operating income divided by net sales.

Adjusted operating income (In thousands)	Year Ended December 31, 2018			
	Americas	International	Corporate	Consolidated
Net sales	\$854,287	\$503,817	\$—	\$1,358,104
GAAP operating income				173,479
Restructuring charges (Note 2)				13,247
Currency exchange losses, net				2,330
Other operating expense (Note 19)				45,327
Strategic transaction costs (Note 13)				421
Adjusted operating income (loss)	\$206,839	\$59,866	\$(31,901)	\$234,804
Adjusted operating margin %	24.2	% 11.9	%	
Adjusted operating income (In thousands)	Year Ended December 31, 2017			
	Americas	International	Corporate	Consolidated
Net sales	\$736,847	\$459,962	\$—	\$1,196,809
GAAP operating income				39,577
Restructuring charges (Note 2)				17,632
Currency exchange losses, net				5,127
Other operating expense (Note 19)				126,432
Strategic transaction costs (Note 13)				4,225
Adjusted operating income (loss)	\$175,589	\$50,391	\$(32,987)	\$192,993
Adjusted operating margin %	23.8	% 11.0	%	

Note: Adjusted operating income is a non-GAAP financial measure used by the chief operating decision maker to evaluate segment performance and allocate resources. Adjusted operating income is reconciled above to the nearest GAAP financial measure, Operating income (loss) and excludes restructuring, currency exchange, other operating expense and strategic transaction costs.

Total other expense, net. Other expense for the year ended December 31, 2018 was \$11.1 million, an increase of \$1.3 million, or 14%, compared to \$9.8 million for the year ended December 31, 2017. The increase was related to higher interest expense and the loss on extinguishment of debt which were only partially offset by higher interest income. Income taxes. The reported effective tax rate for the the year ended December 31, 2018, was 22.9%, which included a benefit of 1.6% for certain share-based payments related to the application of ASU 2016-09 09 as discussed in Note 1—Significant Accounting Policies of the consolidated financial statements in Part II Item 8 of this Form 10-K and a charge of 1.1% associated with to exit taxes related to our U.S., Canadian and European realignment. This compared to a reported effective tax rate of 9.5% for the year ended December 31, 2017, which included a benefit of 28.0% for certain share-based payments related to the adoption of ASU 2016-09 and a benefit of 8.4% associated with the reduction of exit taxes related to our European reorganization. The remaining effective tax rate change was primarily due to the decrease in the U.S. federal statutory rate and benefits associated with the foreign provisions of U.S. tax reform, partially offset by the increased profitability in less favorable tax jurisdictions, higher entity losses in jurisdictions where we cannot take tax benefits and reduced manufacturing deduction benefits.

During 2018, the Company recorded \$1.8 million of foreign income tax reserves related to the legal and operational realignment of our U.S., Canadian and European operations.

On December 22, 2017, SAB 118 was issued to address the application of U.S. GAAP in situations when a registrant does not have the necessary information available, prepared or analyzed in reasonable detail to complete the accounting for certain income tax effects of the Act. In accordance with SAB 118, the Company calculated its best estimate of the impact of the Act and recorded income tax expense of \$19.8 million during the fourth quarter of 2017. At December 31, 2018, the Company has now completed its accounting for all of the enactment-date income tax effects of the Act. Accordingly, we reduced our estimate for the one-time transition tax by \$2.0 million and increased our estimate for the revaluation of U.S. deferred tax assets and liabilities by \$2.5 million and a \$2.0 million increase associated with prepaid taxes for updated regulations related to the Act.

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Net income from continuing operations attributable to MSA Safety Incorporated. Net income from continuing operations was \$124.2 million for the year ended December 31, 2018, or \$3.18 per diluted share, compared to \$26.0 million, or \$0.67 per diluted share, for the year ended December 31, 2017 as a result of the factors described above. Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales			Dollar	Percent
(In millions)	2017	2016	Increase	Increase
			(Decrease)	(Decrease)
Consolidated Continuing Operations	\$1,196.8	\$1,149.5	\$47.3	4.1%
Americas	736.8	678.4	58.4	8.6%
International	460.0	471.1	(11.1)	(2.4)%

Net Sales from continuing operations. Net sales for the year ended December 31, 2017, were \$1,196.8 million, an increase of \$47.3 million, from \$1,149.5 million for the year ended December 31, 2016. Organic constant currency sales decreased by 1% for the year ended December 31, 2017. Please refer to the Net Sales from Continuing Operations table below for a reconciliation of the year over year sales change.

Net Sales from Continuing Operations	Year Ended December 31, 2017 versus December 31, 2016		
(Percent Change)	Americas	International	Consolidated Continuing Operations
GAAP reported sales change	8.6%	(2.4)%	4.1%
Currency translation effects	0.3%	1.5%	0.8%
Constant currency sales change	8.3%	(3.9)%	3.3%
Acquisitions and related strategic transaction costs	6.9%	0.7%	4.3%
Organic constant currency change	1.4%	(4.6)%	(1.0)%

Note: Organic constant currency sales change is a non-GAAP financial measure provided by the Company to give a better understanding of the Company's underlying business performance. Organic constant currency sales change is calculated by removing the percentage impact from acquisitions and related strategic transaction costs as well as currency translation effects from the overall percentage change in net sales.

Net sales for the Americas segment were \$736.8 million for the year ended December 31, 2017, an increase of \$58.4 million, or 9%, compared to \$678.4 million for the year ended December 31, 2016. During 2017, constant currency sales in the Americas segment increased 8% compared to the prior year period, driven primarily by the acquisition of Globe on July 31, 2017, which provided a 7% increase in sales. We also saw growth in head protection and fall protection on improving conditions in industrial markets. These increases were partially offset by a lower level of shipments of self-contained breathing apparatus ("SCBA"). At December 31, 2017, we entered 2018 with a strong pipeline of business secured in the fire service market as the fourth quarter order book for SCBA reflected our highest incoming order total of this entire replacement cycle.

Net sales for the International segment were \$460.0 million for the year ended December 31, 2017, a decrease of \$11.1 million, or 2%, compared to \$471.1 million for the year ended December 31, 2016. Constant currency sales in the International segment decreased 4% during 2017, primarily due to a lower volume of non-core military helmet sales in Europe as well as less breathing apparatus, fall protection, and portable instruments sales across the segment. These decreases were partially offset by a higher volume of FGFD sales in the Middle East and head protection across the segment.

Gross profit. Gross profit for the year ended December 31, 2017, was \$538.9 million, an increase of \$16.6 million, or 3%, compared to \$522.2 million for the year ended December 31, 2016. The ratio of gross profit to net sales was 45.0% in 2017 compared to 45.4% in 2016. The slightly lower gross profit ratio during 2017 is primarily attributable to lower product margins from our Globe acquisition mostly offset by improved margins across many of our core products.

Selling, general and administrative expenses. Selling, general and administrative expenses were \$300.1 million for the year ended December 31, 2017, a decrease of \$8.2 million, or 3%, compared to \$308.2 million for the year ended December 31, 2016. Selling, general and administrative expenses were 25.1% of net sales in 2017 compared to 26.8% of net sales in 2016. Excluding acquisitions and related strategic transaction costs of \$9.9 million, organic constant currency selling, general and administrative expenses decreased 6%, or \$16.3 million, in the current period exceeding

our \$10 million full year savings target. Lower payroll expense, variable compensation expense and corporate legal costs were key drivers of cost savings. The following table presents a reconciliation of the year over year expense change for selling, general, and administrative expenses.

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Selling, general, and administrative expenses (Percent Change)	Year Ended
	December 31, 2017 versus December 31, 2016 Consolidated Continuing Operations
GAAP reported change	(2.7)%
Currency translation effects	0.8%
Constant currency change	(3.5)%
Acquisitions and related strategic transaction costs	2.0%
Organic constant currency change	(5.5)%

Note: Organic constant currency change is a non-GAAP financial measure provided by the Company to give a better understanding of the Company's underlying business performance. Organic constant currency change in selling, general, and administrative expenses is calculated by removing the percentage impact from acquisitions and related strategic transaction costs as well as currency translation effects from the overall percentage change in GAAP selling, general, and administrative expense. Management believes excluding acquisitions and currency translation effects provide investors with a greater level of clarity into spending levels on a year-over-year basis.

Research and development expense. Research and development expense was \$50.1 million for the year ended December 31, 2017, an increase of \$3.3 million, or 7%, compared to \$46.8 million for the year ended December 31, 2016. Research and development expense was 4.2% of net sales in 2017, compared to 4.1% of net sales in 2016.

Restructuring charges. During the year ended December 31, 2017, the Company recorded restructuring charges of \$17.6 million, primarily related to the voluntary retirement incentive package discussed below as well as to severance costs for staff reductions associated with our ongoing initiatives to drive profitable growth in Europe and right size our operations in Australia and Africa. This compared to charges of \$5.7 million during the year ended December 31, 2016, primarily related to severance costs for staff reductions associated with ongoing initiatives to right size our operations in Europe, Brazil, and Japan.

In September 2016, certain employees in the Americas segment were offered a voluntary retirement incentive package ("VRIP"). The election window for participation closed on October 17, 2016. The employees were required to render service through January 31, 2017, to receive the VRIP and had until February 6, 2017, to revoke their election. None of the 83 employees who accepted the VRIP revoked their election to retire under the terms of the plan. Non-cash special termination benefit expense of \$11.4 million was incurred in the first quarter of 2017 related to these elections. All benefits were paid from our over funded North America pension plan.

Currency exchange. Currency exchange losses were \$5.1 million during the year ended December 31, 2017, compared to \$0.8 million during the year ended December 31, 2016. Currency exchange losses in both years were mostly unrealized and related primarily to the effect of the strengthening U.S. dollar on intercompany balances. Refer to Note 17—Derivative Financial Instruments of the consolidated financial statements in Part II Item 8 of this Form 10-K for information regarding our currency exchange rate risk management strategy.

Other operating expense. Other operating expense during the year ended December 31, 2017, was \$126.4 million. In August 2017, MSA LLC agreed to resolve certain asserted cumulative trauma product liability claims. This charge is related to legacy products designed, manufactured and sold years ago and are not currently sold by the Company. Additionally, in the fourth quarter of 2017, MSA LLC determined that a reasonable estimate of the liability for incurred but not reported ("IBNR") cumulative trauma liability claims is \$111.1 million as of December 31, 2017. MSA LLC recorded a total charge of \$126.4 million before tax (\$85.0 million after tax) representing the estimated liability in excess of available insurance coverage for both asserted and IBNR cumulative trauma liability claims. Cumulative trauma product liability claims incurred in the year ended December 31, 2016 were covered by insurance. Please refer to Note 19—Contingencies of the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information.

GAAP operating income. Consolidated operating income for the year ended December 31, 2017, was \$39.6 million compared to \$160.7 million for the year ended December 31, 2016. The reduction in operating income was primarily driven by the Other operating expense and restructuring charges associated with the voluntary retirement incentive package, partially offset by lower selling, general, and administrative expenses resulting from our cost reduction programs as discussed above.

Adjusted operating income. Americas adjusted operating income for the year ended December 31, 2017, was \$175.6 million, an increase of \$21.3 million, or 14%, compared to \$154.3 million for the year ended December 31, 2016. The improvement was driven by higher sales volumes and lower selling, general and administrative costs resulting from effective cost management. Additionally, we continued to see strength in gross margins during 2017 from improvements in margins across many of our core products.

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International adjusted operating income for the year ended December 31, 2017 was \$50.4 million, a decrease of \$1.1 million, or 2%, compared to \$51.5 million for the year ended December 31, 2016. The decrease in adjusted operating income is primarily attributable to lower sales volumes.

Corporate segment adjusted operating loss for the year ended December 31, 2017, was \$33.0 million, a decrease of \$3.1 million, or 9%, compared to an operating loss of \$36.1 million for the year ended December 31, 2016, reflecting lower legal expenses and variable compensation expense partially offset by higher stock compensation and corporate development expenses.

The following table reconciles GAAP operating income to adjusted operating income. Adjusted operating margin % is calculated as adjusted operating income divided by net sales.

Adjusted operating income (In thousands)	Year Ended December 31, 2017			
	Americas	International	Corporate	Consolidated Continuing Operations
Net sales	\$736,847	\$459,962	\$ —	\$1,196,809
GAAP operating income				39,577
Restructuring charges (Note 2)				17,632
Currency exchange losses, net				5,127
Other operating expense (Note 19)				126,432
Strategic transaction costs (Note 13)				4,225
Adjusted operating income	175,589	50,391	(32,987)	192,993
Adjusted operating margin %	23.8	% 11.0	%	
Adjusted operating income (In thousands)	Year Ended December 31, 2016			
	Americas	International	Corporate	Consolidated Continuing Operations
Net sales	\$678,433	\$471,097	\$ —	\$1,149,530
GAAP operating income				160,702
Restructuring and other charges				5,694
Currency exchange losses, net				766
Strategic transaction costs (Note 13)				2,531
Adjusted operating income	154,298	51,490	(36,095)	169,693
Adjusted operating margin %	22.7	% 10.9	%	

Note: Adjusted operating income (loss) is a non-GAAP financial measure used by the chief operating decision maker to evaluate segment performance and allocate resources. Adjusted operating income (loss) is reconciled above to the nearest GAAP financial measure, Operating income (loss) and excludes restructuring, currency exchange, other operating expense and strategic transaction costs.

Total other expense, net. Other expense for the year ended December 31, 2017, was \$9.8 million, an increase of \$1.0 million, or 12%, compared to \$8.8 million for the year ended December 31, 2016.

Income taxes. The reported effective tax rate for the year ended December 31, 2017, was 9.5%, which included a benefit of 28.0% for certain share-based payments related to the adoption of ASU 2016-09 as discussed in Note 1—Significant Accounting Policies of the consolidated financial statements in Part II Item 8 of this Form 10-K and a benefit of 8.4% associated with the reduction of exit taxes related to our European reorganization as well as benefits related to higher profitability in more favorable tax jurisdictions and additional manufacturing deduction benefits. The unfavorable effects of U.S. tax reform partially offset these benefits. The reported effective tax rate for the year ended December 31, 2016, was 38.1%, inclusive of 4.3% associated with exit taxes related to our European reorganization. The remaining effective tax rate change was primarily due to additional manufacturing deduction benefits and the release of a valuation allowance on foreign losses.

The Tax Cuts and Jobs Act of 2017 ("the Act"), which was signed into law on December 22, 2017, resulted in significant changes to the U.S. corporate income tax system including reducing the U.S. corporate rate to 21% starting

in 2018. The Act also created a territorial tax system with a one-time mandatory tax on previously deferred foreign earnings of U.S. subsidiaries.

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On December 22, 2017, SAB 118 was issued to address the application of US GAAP in situations when a registrant does not have the necessary information available, prepared or analyzed in reasonable detail to complete the accounting for certain income tax effects of the Act. In accordance with SAB 118, the Company calculated its best estimate of the impact of the Act and recorded income tax expense of \$19.8 million during the fourth quarter of 2017, the period in which the legislation was enacted. Of this amount, \$18.0 million related to the one-time transition tax and the remaining \$1.8 million related to the revaluation of U.S. deferred tax assets and liabilities. In addition, deferred taxes have been recorded on the outside basis differences of non-U.S. subsidiaries in the amount of \$7.8 million, fully offset by foreign tax credits. Changes to applicable tax law, regulations or interpretations of the Act may require further adjustments and changes in our estimates.

The Company finalized its European reorganization during 2016. The reorganization was designed to drive optimal performance by aligning certain strategic planning and decision making into a single location enabled by a common IT platform. During the year ended December 31, 2017, the Company had a benefit due to the reduction of \$2.5 million of charges associated with exit taxes related to our European reorganization, compared to expense of \$6.5 million for the year ended December 31, 2016.

In October 2016, the FASB issued ASU 2016-16, Intra-entity Transfers of Assets Other than Inventory. This ASU states that an entity should recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. We early adopted this ASU on January 1, 2017 using the modified retrospective approach which resulted in a \$6.2 million cumulative-effect adjustment directly to retained earnings during the year ended December 31, 2017, for any previously deferred income tax effects.

In March 2016, the FASB issued ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, which we adopted effective January 1, 2017. From an income tax perspective, this ASU requires that all excess tax benefits and deficiencies that pertain to share-based payment arrangements be recognized as a component of income tax expense rather than as a component of additional paid-in-capital. We expect this to create volatility in the effective tax rate on a go-forward basis as the impact is treated as a discrete item within our quarterly tax provision. The adoption of this standard resulted in an \$8.3 million tax benefit during the year ended December 31, 2017.

Please refer to Note 1—Significant Accounting Policies of the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information regarding the two standards adopted.

Net income from continuing operations attributable to MSA Safety Incorporated. Net income from continuing operations was \$26.0 million for the year ended December 31, 2017, or \$0.67 per diluted share, compared to \$92.7 million, or \$2.44 per diluted share, for the year ended December 31, 2016, as a result of the factors described above.

Net loss from discontinued operations attributable to MSA Safety Incorporated. Net loss from discontinued operations was \$0.8 million, or \$0.02 per diluted share, for the year ended December 31, 2016. Please refer to Note 20—Discontinued Operations of the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information.

Non-GAAP Financial Information

We may provide information regarding organic constant currency changes, financial measures excluding the impact of acquisitions and related strategic transaction costs, adjusted operating income, and adjusted operating margin percentage, which are not recognized terms under U.S. GAAP and do not purport to be alternatives to net sales, selling, general and administrative expense, operating income or net income as a measure of operating performance. We believe that the use of these non-GAAP financial measures provide investors with additional useful information and provide a more complete understanding of the underlying results. Because not all companies use identical calculations, these presentations may not be comparable to similarly titled measures from other companies. For more information about these non-GAAP measures and a reconciliation to the nearest GAAP measure, please refer to the reconciliations referenced above in Management's Discussion & Analysis section and in Note 7—Segment Information of the consolidated financial statements in Part II Item 8 of this Form 10-K.

We may also provide financial information on a constant currency basis, which is a non-GAAP financial measure. These references to a constant currency basis do not include operational impacts that could result from fluctuations in foreign currency rates, which are outside of management's control. To provide information on a constant currency basis, the applicable financial results are adjusted by translating current and prior period results in local currency to a

fixed foreign exchange rate. This approach is used for countries where the functional currency is the local country currency. This information is provided so that certain financial results can be viewed without the impact of fluctuations in foreign currency rates, thereby facilitating period-to-period comparisons of business performance. Constant currency information is not recognized under U.S. GAAP and it is not intended as an alternative to U.S. GAAP measures.

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LIQUIDITY AND CAPITAL RESOURCES

Our main source of liquidity is operating cash flows, supplemented by borrowings. Our principal liquidity requirements are for working capital, capital expenditures, principal and interest payments on debt, dividend payments, and acquisitions. At December 31, 2018, approximately 32% of our long-term debt is at fixed interest rates with repayment schedules through 2031. The remainder of our long-term debt is at variable rates on an unsecured revolving credit facility that is due in 2023. At December 31, 2018, approximately 79% of our borrowings are denominated in US dollars, which limits our exposure to currency exchange rate fluctuations.

At December 31, 2018, we had cash, cash equivalents and restricted cash totaling \$140.6 million, which included \$93.6 million of cash and cash equivalents held by our foreign subsidiaries. Cash, cash equivalents and restricted cash increased \$2.7 million during the year ended December 31, 2018, compared to an increase of \$22.9 million during 2017 and an increase of \$6.6 million during 2016. During the year ended December 31, 2018, we repatriated \$96 million of cash from our foreign affiliates. While cash repatriation allows us to tap into our offshore cash more efficiently, our business continues to generate strong cash flow, and this improvement in cash flow has enabled us to continue to fund our dividend and de-lever. In July 2018, we reached a settlement on the disputed portion of our insurance receivable as discussed in Note 19—Contingencies to the consolidated financial statements in Part II Item 8 of this Form 10-K. The settlement ensured collection of the full amount of the insurance receivable that was previously subject to litigation. Payment was received in the third quarter of 2018. We plan to continue to employ a balanced capital allocation strategy that prioritizes growth investments, funding our dividend and servicing debt obligations. Our unsecured senior revolving credit facility provides for borrowings up to \$600.0 million through 2023 and is subject to certain commitment fees. This credit facility has sub-limits for the issuance of letters of credit, swingline borrowings and foreign currency denominated borrowings; and may be used for general corporate purposes, including working capital, permitted acquisitions, capital expenditures and repayment of existing indebtedness. Loans under the revolving facility will bear interest at a variable rate based on LIBOR or the federal funds rate at the Company's option. Our weighted average interest rate was 3.47% in 2018. At December 31, 2018, \$363.5 million of the \$600.0 million senior revolving credit facility was unused, including letters of credit.

The Company currently has access to approximately \$514.0 million of capital at December 31, 2018. Refer to Note 11—Short and Long-Term Debt to the consolidated financial statements in Part II Item 8 of this Form 10-K.

Operating activities. Operating activities provided cash of \$263.9 million in 2018, compared to providing cash of \$230.3 million in 2017. The increase in operating cash flows during the period was primarily attributable to higher net income and improved working capital during the period as we improved inventory management in the fourth quarter. These improvements were partially offset by decreased insurance receivable collections, net of product liability payments. We collected \$40.1 million from insurance companies, net of product liability settlements paid, in the year ended December 31, 2018, while we collected \$62.6 million from insurance companies, net of product liability settlements paid, in the same period of 2017. Historically, cumulative trauma liability payments were funded with the Company's operating cash flow, pending resolution of disputed insurance coverage. For more than a decade, we have funded product liability settlements from operating cash flow. The vast majority of the insurance receivable and notes receivable - insurance companies balances at December 31, 2018 is attributable to reimbursement believed to be due under the terms of signed agreements with insurers and are not currently subject to litigation. While the timing of cash flows for product liability and insurance receivable can and do vary from quarter to quarter, we have been successful in establishing cash flow streams that have allowed us to fund these liabilities without a material impact on our capital allocation priorities.

Operating activities provided cash of \$230.3 million in 2017, compared to providing cash of \$134.9 million in 2016. The increase in operating cash flows during the period was primarily attributable to higher insurance receivable collections. We collected \$62.6 million from insurance companies, net of product liability settlements paid, in the year ended December 31, 2017, while we paid \$27.5 million of settlements, net of collections from insurance companies, in the same period of 2016.

Subsequent to filing a Form 8-K including a Press Release dated February 20, 2019 announcing financial results for the quarter and full year ended December 31, 2018, the Company identified an adjustment to its Consolidated Statement of Cash Flows which reduced capital expenditures in investing activities and increased cash outflow from

other noncurrent assets and liabilities in operating activities by \$2.9 million.

Investing activities. Investing activities used cash of \$84.4 million for the year ended December 31, 2018, compared to using \$239.2 million in 2017. Purchase of short-term investments and capital expenditures drove cash outflows from investing activities during the year ended December 31, 2018 while the acquisition of Globe drove cash outflows from investing in the same period in 2017. During 2018 we spent \$34 million on capital expenditures and expect to spend approximately \$35 million in 2019.

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Investing activities used cash of \$239.2 million for the year ended December 31, 2017, compared to using \$25.5 million in 2016. The acquisition of Globe drove cash outflows from investing activities during 2017. Refer to Note 13—Acquisitions to the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information on the Globe acquisition. The sale of our South African personal protective equipment distribution business and its Zambian operations offset by capital expenditures and the acquisition of Senscient drove cash outflows from investing activities during 2016. Refer to Note 20—Discontinued Operations to the consolidated financial statements in Part II Item 8 of this Form 10-K for a discussion of discontinued operations.

Financing activities. Financing activities used cash of \$163.3 million for the year ended December 31, 2018, compared to providing cash of \$25.6 million in 2017. During 2018, we had net payments on long-term debt of \$107.7 million. This compared to net proceeds of \$77.2 million in the same period in 2017 to finance the acquisition of Globe.

We made dividend payments of \$57.2 million during 2018, compared to \$52.5 million during 2017. Dividends paid on our common stock during 2018 were \$1.49 per share. Dividends paid on our common stock in 2017 and 2016 were \$1.38 and \$1.31 per share, respectively.

In August 2018, we repaid our 5.41% 2006 Senior Notes in the amount of \$28.0 million, which included \$1.5 million related to a make-whole provision and accrued interest through the date of repayment.

Restricted cash balances were \$0.5 million at December 31, 2018 compared to \$3.6 million at December 31, 2017 and were primarily used to support letter of credit balances.

The MSA Board of Directors has authorized the Company to repurchase up to \$100.0 million in shares of MSA common stock. There were no share repurchases in 2018 or 2016 and \$11.8 million in repurchases made in 2017. The program seeks to offset equity dilution associated with employee stock compensation. The Board of Directors did not set a time limitation on the repurchase program.

Financing activities provided cash of \$25.6 million for the year ended December 31, 2017, compared to using cash of \$99.3 million in 2016. During 2017, we had net proceeds from long-term debt of \$77.2 million to finance the acquisition of Globe. This compared to net payments of \$60.9 million in the same period in 2016.

CUMULATIVE TRANSLATION ADJUSTMENTS

The year-end position of the U.S. dollar relative to international currencies resulted in a translation loss of \$29.8 million being recorded to cumulative translation adjustments for the year ended December 31, 2018. This compares to gains of \$38.4 million in 2017 and losses of \$25.9 million in 2016. The translation loss in 2018 was primarily related to the strengthening of the U.S. dollar relative to the euro and British pound. The translation gain in 2017 was primarily related to the weakening of the U.S. dollar against the euro, British pound and Mexican peso. The translation loss in 2016 was primarily related to the strengthening of the U.S. dollar against the British pound, Mexican peso, Argentine peso, euro, and Brazilian real.

Table of Contents**COMMITMENTS AND CONTINGENCIES**

We are obligated to make future payments under various contracts, including debt and lease agreements. Our significant cash obligations as of December 31, 2018 are as follows:

(In millions)	Total	2019	2020	2021	2022	2023	Thereafter
Long-term debt	\$363.2	\$20.0	\$20.0	\$20.0	\$	-\$241.2	\$ 62.0
Operating leases	33.6	11.2	7.9	6.1	3.8	2.6	2.0
Transition tax	6.7	—	0.1	0.8	1.5	1.9	2.4
Totals	403.5	31.2	28.0	26.9	5.3	245.7	66.4

The significant obligations table does not include obligations to taxing authorities due to uncertainty surrounding the ultimate settlement of amounts and timing of these obligations.

We expect to meet our 2019 and 2020 debt service obligations through cash provided by operations. Approximately \$233.5 million of debt payable in 2023 relates to our unsecured senior revolving credit facility. We expect to generate sufficient operating cash flow to make payments against this amount each year. To the extent that a balance remains when the facility matures in 2023, we expect to refinance the remaining balance through new borrowing facilities.

Interest expense on fixed rate debt over the next five years is expected to be approximately \$4.8 million in 2019, \$4.0 million in 2020, \$3.2 million in 2021, \$2.5 million in 2022, and \$2.3 million in 2023.

The Company had outstanding bank guarantees and standby letters of credit with banks as of December 31, 2018 totaling \$11.4 million, of which \$3.1 million relate to the senior revolving credit facility. These letters of credit serve to cover customer requirements in connection with certain sales orders and insurance companies. No amounts were drawn on these arrangements at December 31, 2018. The Company is also required to provide cash collateral in connection with certain arrangements. At December 31, 2018, the Company has \$0.5 million of restricted cash in support of these arrangements.

We expect to make net contributions of \$7.1 million to our pension plans in 2019 which are primarily associated with our International segment. We have not been required to make contributions to our U.S. based qualified defined benefit pension plan in many years.

We have purchase commitments for materials, supplies, services and property, plant and equipment as part of our ordinary conduct of business.

Please refer to Note 19 to the consolidated financial statements in Part II Item 8 of this Form 10-K for further discussion on the Company's product liabilities.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

We prepare our consolidated financial statements in accordance with U.S. generally accepted accounting principles (GAAP). The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and the related disclosures. We evaluate these estimates and judgments on an on-going basis based on historical experience and various assumptions that we believe to be reasonable under the circumstances. However, different amounts could be reported if we had used different assumptions and in light of different facts and circumstances. Actual amounts could differ from the estimates and judgments reflected in our consolidated financial statements. A summary of the Company's significant accounting policies is included in Note 1—Significant Accounting Policies to the consolidated financial statements in Part II, Item 8 of this Form 10-K.

We believe that the following are the more critical judgments and estimates used in the preparation of our consolidated financial statements.

Accounting for contingencies. We accrue for contingencies when we believe that it is probable that a liability or loss has been incurred and the amount can be reasonably estimated. Contingencies relate to uncertainties that require our judgment both in assessing whether a liability or loss has been incurred and in estimating the amount of the probable loss. Significant contingencies affecting our consolidated financial statements include pending or threatened litigation, including product liability claims and product warranties.

Product liability. We face an inherent business risk of exposure to product liability claims arising from the alleged failure of our products to prevent the types of personal injury or death against which they are designed to protect.

Product liability claims are categorized as either single incident or cumulative trauma.

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Single incident product liability claims involve incidents of short duration that are typically known when they occur and involve observable injuries, which provide an objective basis for quantifying damages. The Company estimates its liability for single incident product liability claims based on expected settlement costs for asserted single incident product liability claims and an estimate of costs for single incident product liability claims incurred but not reported ("IBNR"). Single incident product liability exposures are evaluated on an annual basis, or more frequently if changing circumstances warrant. Adjustments are made to the reserve as appropriate.

Cumulative trauma product liability claims involve exposures to harmful substances (e.g., silica, asbestos and coal dust) that occurred years ago and may have developed over long periods of time into diseases such as silicosis, asbestosis, mesothelioma, or coal worker's pneumoconiosis. MSA LLC's combined cumulative trauma product liability reserve consists of its liability for asserted cumulative trauma product liability claims not yet resolved and for IBNR cumulative trauma product liability claims. Management works with outside legal counsel quarterly to review and assess MSA LLC's exposure to asserted cumulative trauma product liability claims not yet resolved. In addition, in connection with finalizing and reporting the Company's results of operations, management works annually (unless significant changes in trends or new developments warrant an earlier review) with an outside valuation consultant and outside legal counsel to review MSA LLC's exposure to asserted cumulative trauma product liability claims not yet resolved and IBNR cumulative trauma product liability claims. The review process for asserted cumulative trauma product liability claims not yet resolved takes into account available facts for those claims including the number and composition of such claims, outcomes of matters resolved during current and prior periods, and variances associated with different groups of claims, plaintiffs' counsel, and venues, as well as any other relevant information. The review process for IBNR claims involves a number of key judgments and assumptions, including as to the number and types of claims that may be asserted, the period in which claims may be asserted and resolved, the percentage of claims that may be dismissed without payment, the average cost to resolve claims on which a payment is made, the manner in which MSA LLC will defend claims, and the medical and legal environments that will be applicable to the assertion, evaluation, and resolution of claims in the future.

Additional information respecting MSA LLC's product liability claims and the accounting for such claims in the Company's Consolidated Financial Statements, including estimated liabilities accrued on account of such claims, is contained in Note 19—Contingencies to the consolidated financial statements in Part II Item 8 of this Form 10-K. Insurance receivable. In the normal course of business, the Company makes payments to settle product liability claims and for related defense costs and records receivables for the estimated amounts that are covered by insurance. Various factors could affect the timing and amount of recovery of the insurance receivable balances, including the terms of the settlement agreements reached with the insurers, assumptions regarding various aspects of the composition of future claims (which are relevant to calculating reimbursement under the terms of certain Coverage-In-Place Agreements), the financial ability of the insurance carriers to pay the claims, and the advice of MSA LLC's outside legal counsel. As a result, MSA LLC is now largely self-insured for costs associated with cumulative trauma product liability claims. Most of MSA LLC's cumulative trauma product liability costs are now expensed without the expectation of insurance reimbursement.

Income taxes. We recognize deferred tax assets and liabilities using enacted tax rates to record the tax effect of temporary differences between the book and tax basis of recorded assets and liabilities. We record valuation allowances to reduce deferred tax assets to the amounts that we estimate are probable to be realized. When assessing the need for valuation allowances, we consider projected future taxable income and prudent and feasible tax planning strategies. Should a change in circumstances lead to a change in our judgments about the realizability of deferred tax assets in future years, we adjust the related valuation allowances in the period that the change in circumstances occurs. We had valuation allowances of \$5.0 million and \$4.6 million at December 31, 2018 and 2017, respectively. We record an estimated income tax liability based on our best judgment of the amounts likely to be paid in the various tax jurisdictions in which we operate. We record tax benefits related to uncertain tax positions taken or expected to be taken on a tax return when such benefits meet a more likely than not threshold. We recognize interest related to unrecognized tax benefits in interest expense and penalties in operating expenses. The tax liabilities ultimately paid are dependent on a number of factors, including the resolution of tax audits, and may differ from the amounts recorded. Tax liabilities are adjusted through income when it becomes probable that the actual liability differs from

the amount recorded.

The Company elected to treat Global Intangible Low Taxed Income (“GILTI”), which was effective in 2018 for the Company, as a period cost.

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The Tax Cuts and Jobs Act of 2017 (“the Act”), which was signed into law on December 22, 2017 has resulted in significant changes to the U.S. corporate income tax system. In accordance with SAB 118, the Company calculated its best estimate of the impact of the Act and recorded income tax expense of \$19.8 million during the fourth quarter of 2017. At December 31, 2018, the Company has now completed its accounting for all of the enactment-date income tax effects of the Act. Accordingly, we reduced our estimate for the one-time transition tax by \$2.0 million and increased our estimate for the revaluation of U.S. deferred tax assets and liabilities by \$2.5 million and a \$2.0 million increase associated with prepaid taxes.

Please refer to Note 9—Income Taxes to the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information on the Act.

Pensions and other post-retirement benefits. We sponsor certain pension and other post-retirement benefit plans. Accounting for the net periodic benefit costs and credits for these plans requires us to estimate the cost of benefits to be provided well into the future and to attribute these costs over the expected work life of the employees participating in these plans. These estimates require our judgment about discount rates used to determine these obligations, expected returns on plan assets, rates of future compensation increases, rates of increase in future health care costs, participant withdrawal and mortality rates and participant retirement ages. Differences between our estimates and actual results may significantly affect the cost of our obligations under these plans and could cause net periodic benefit costs and credits to change materially from year-to-year. Discount rates and plan asset valuations are point-in-time measures. The discount rate assumptions used in determining projected benefit obligations for a majority of our U.S. and foreign plans were based on the spot rate method at December 31, 2018. The remaining plans' discount rate assumptions are based on published long-term bond indices or a company-specific yield curve model. We recognize, as of a measurement date, any unrecognized actuarial net gains or losses that exceed 10% of the larger of the projected benefit obligations or the plan assets, defined as the "corridor." Amounts inside the corridor are amortized over the plan participants' life expectancy. Expected returns on plan assets are based on our historical returns by asset class.

Please refer to Note 14 to the consolidated financial statements in Part II Item 8 of this Form 10-K for additional information on the spot rate method and further details on the funded status of our pension and post-retirement benefit plans.

The following table summarizes the impact of changes in significant actuarial assumptions on our December 31, 2018 actuarial valuations.

	Impact of Changes in Actuarial Assumptions					
	Change in Discount Rate	Change in Expected Return	Change in Expected Return	Change in Expected Return	Change in Market Value of Assets	Change in Market Value of Assets
(In thousands)	1%	(1)%	1%	(1)%	5%	(5)%
(Decrease) increase in net benefit cost	\$(6,954)	\$8,897	\$(4,612)	\$4,612	\$(1,026)	\$986
(Decrease) increase in projected benefit obligation	(63,870)	78,469	—	—	—	—
Increase (decrease) in funded status	63,870	(78,469)	—	—	22,156	(22,156)

Stock Compensation. We sponsor both a Management and a Non-Employee Directors' Equity Incentive plan which provide for grants of stock options, restricted stock and other equity-based vehicles such as restricted stock units and performance stock units; all of which are recognized as compensation expense based on grant date fair value. Except for retirement-eligible participants, for whom there is no requisite service period, this expense is recognized ratably over the requisite service periods following the date of grant. For retirement-eligible participants, all expense is recognized at the grant date. Stock options are valued using the Black-Scholes option pricing model. Performance stock units that have a market condition are valued on the grant date using a Monte Carlo simulation valuation model. We believe these valuation models are appropriate for use based on the nature of the awards and are consistent with models used by our peer companies. Please refer to Note 10—Stock Plans to the consolidated financial statements in Part II Item 8 of this Form 10-K for further details on the assumptions used in these valuation models.

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Revenue Recognition. We generate revenue primarily from manufacturing and selling a comprehensive line of safety products to protect the health and safety of workers and facility infrastructures around the world in the oil, gas and petrochemical, fire service, construction, utilities and mining industries. Our core safety products include fixed gas and flame detection instruments, breathing apparatus where SCBA is the principal product, portable gas detection instruments, industrial head protection products, firefighter helmets & protective apparel and fall protection devices. Our customers generally fall into two categories: distributors and industrial or military end-users. In our Americas segment, approximately 75% to 85% of our sales are made through distributors. In our International segment, approximately 55% to 65% of our sales are made through distributors. The underlying principles of revenue recognition are identical for both categories of customers and revenue is generally recognized at a point in time as described below.

Revenue from the sale of products is recognized when there is persuasive evidence of an arrangement and control passes to the customer, which generally occurs either when product is shipped to the customer or, in the case of most U.S. distributor customers, when product is delivered to the distributor's delivery site. We establish our shipping terms according to local practice and market characteristics. We do not ship product unless we have an order or other documentation authorizing shipment to our customers. Our payment terms vary by the type and location of our customer and the products offered. The term between invoicing and when payment is due is not significant.

Refer to Note 7—Segment Information to the consolidated financial statements in Part II Item 8 of this Form 10-K for disaggregation of revenue by segment and product group, as we believe this best depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors.

Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services. Amounts billed and due from our customers are classified as receivables on the consolidated balance sheet. We make appropriate provisions for uncollectible accounts receivable which have historically been insignificant in relation to our net sales. Certain contracts with customers, primarily distributor customers, have an element of variable consideration that is estimated when revenue is recognized under the contract to the extent that it is material to the individual contract. Variable consideration includes volume incentive rebates, performance guarantees, price concessions and returns. Rebates are based on achieving a certain level of purchases and other performance criteria that are documented in established distributor programs. These rebates are estimated based on projected sales to the customer and accrued as a reduction of net sales as they are earned by the customer. The rebate accrual is reviewed monthly and adjustments are made as the estimate of projected sales changes. Product returns, including an adjustment for restocking fees if it is material, are estimated based on historical return experience and revenue is adjusted. Sales, value add and other taxes collected with revenue-producing activities and remitted to governmental authorities are excluded from revenue.

Depending on the terms of the arrangement, we may defer revenue for which we have a future obligation, including training and extended warranty and technical services, until such time that the obligation has been satisfied. We use an observable price, or a cost plus margin approach when one is not available, to determine the stand-alone selling price for separate performance obligations. We have elected to recognize the cost for shipping and handling as an expense when control of the product has passed to the customer. These costs are included within the Cost of Products Sold line on the Consolidated Statement of Income. Amounts billed to customers for shipping and handling are included in net sales.

We typically receive interim milestone payments under certain contracts, including our fixed gas and flame detection projects, as work progresses. For some of these contracts, we may be entitled to receive an advance payment. Revenue for these contracts is generally recognized as control passes to the customer, which is a point in time upon shipment of the product, and if applicable, acceptance by the customer. We recognize a liability for these advance payments in excess of revenue recognized and present it as contract liabilities on the Consolidated Balance Sheet. The advance payment is typically not considered a significant financing component because it is used to meet working capital

demands that can be higher in the early stages of a contract and to protect us from the other party failing to adequately complete some or all of its obligations under the contract. In some cases, the customer retains a small portion of the contract price, typically 10%, until completion of the contract, which we present as contract assets on the Consolidated Balance Sheet. Accordingly, during the period of contract performance, billings and costs are accumulated on the Consolidated Balance Sheet as contract assets or contract liabilities, but no income is recognized until completion of the project and control has passed to the customer. As of December 31, 2018, there were no material contract assets or contract liabilities recorded on the Consolidated Balance Sheet.

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Practical Expedients and Exemptions

We do not disclose the value of unsatisfied performance obligations for (i) contracts with an original expected length of one year or less and (ii) contracts for which we recognize revenue at the amount to which we have the right to invoice for services performed.

We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the customer and the transfer of the promised goods or services to the customer will be one year or less.

We generally expense sales commissions when incurred because the amortization period would have been one year or less. These costs are recorded within selling, general and administrative expenses in our Condensed Consolidated Statement of Income.

Goodwill and Indefinite-lived Intangible Assets. On October 1st of each year, or more frequently if indicators of impairment exist or if a decision is made to sell a business, we evaluate goodwill for impairment. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include a decline in expected cash flows, a significant adverse change in the business climate, unanticipated competition, slower growth rates, or negative developments in equity and credit markets, among others. All goodwill is assigned to and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. For goodwill impairment testing purposes, we consider our operating segments to be our reporting units. The evaluation of impairment involves using either a qualitative or quantitative approach as outlined in Accounting Standards Codification (ASC) Topic 350. The qualitative evaluation is an assessment of factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying value, including goodwill. Factors considered as part of the qualitative assessment include entity-specific industry, market and general economic conditions. In 2018, we elected to bypass the qualitative evaluation for all of our reporting units and performed a two-step quantitative test at October 1, 2018. Quantitative testing involves comparing the estimated fair value of each reporting unit to its carrying value. We estimate reporting unit fair value using a weighted average of fair values determined by discounted cash flow (DCF) and market approach methodologies, as we believe both are equally important indicators of fair value. A number of significant assumptions and estimates are involved in the application of the DCF model, including sales volumes and prices, costs to produce, tax rates, capital spending, discount rates, and working capital changes. Cash flow forecasts are generally based on approved business unit operating plans for the early years and historical relationships in later years. The betas used in calculating the individual reporting units' weighted average cost of capital (WACC) rate are estimated for each reporting unit based on peer data. The market approach methodology measures value through an analysis of peer companies. The analysis entails measuring the multiples of EBITDA at which peer companies are trading. In the event the estimated fair value of a reporting unit per the weighted average of the DCF and market approach models is less than the carrying value, additional analysis would be required. The additional analysis would compare the carrying amount of the reporting unit's goodwill with the implied fair value of that goodwill, which may involve the use of valuation experts. The implied fair value of goodwill is the excess of the fair value of the reporting unit over the fair value amounts assigned to all of the assets and liabilities of that unit as if the reporting unit had been acquired in a business combination and the fair value of the reporting unit represented the purchase price. If the carrying value of goodwill exceeds its implied fair value, an impairment loss equal to such excess would be recognized, which could materially and adversely affect reported consolidated results of operations and shareholders' equity. At October 1, 2018, based on our quantitative test, the fair values of all of our reporting units exceeded their carrying value by at least 89%.

Intangible assets with indefinite lives are also subject to impairment testing on October 1st of each year, or more frequently if indicators of impairment exist. The impairment test compares the fair value of the intangible assets with their carrying amounts. We performed a quantitative assessment of the indefinite lived trade name intangible asset as

outlined in ASC 350 by comparing the estimated fair value of the trade name intangible asset to its carrying value. We estimate the fair value using the relief from royalty income approach. A number of significant assumptions and estimates are involved in the application of the relief from royalty model, including sales volumes and prices, royalty rates and tax rates. Forecasts are based on sales generated by the underlying trade name assets and are generally based on approved business unit operating plans for the early years and historical relationships in later years. At October 1, 2018, based on our quantitative test, the fair value of the trade name assets exceeded their carrying value by approximately 20%.

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In May 2014, the FASB issued ASU 2014-09, Revenue with Contracts from Customers. This ASU establishes a single revenue recognition model for all contracts with customers based on recognizing revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services, eliminates industry specific requirements and expands disclosure requirements. We adopted ASU 2014-09 using the modified retrospective method as of January 1, 2018. The majority of our revenue transactions consist of a single performance obligation to transfer promised goods or services. The adoption of this new standard did not impact the Company's consolidated statement of income or balance sheet and there was no cumulative effect of initially applying the standard to the opening balance of retained earnings. See Note 1—Significant Accounting Policies to the consolidated financial statements in Part II Item 8 of this Form 10-K for further information on our updated revenue recognition policy.

In February 2016, the FASB issued ASU 2016-02, Leases. This ASU requires lessees to record a right of use asset and a liability for virtually all leases. This ASU will be effective beginning January 1, 2019. The Company has developed a transition plan and continues to evaluate the impact that the adoption of ASU 2016-02 will have on the consolidated financial statements. During 2017, we conducted a survey to identify all leases across the organization and are currently working to obtain all lease contracts to accumulate the necessary information for adoption. We identified that a majority of our leases fall into one of three categories: office equipment, real estate and vehicles. We also identified that most office equipment and vehicle leases utilize standard master leasing contracts that have similar terms. During 2018, we selected a service provider to help us inventory and account for our leases and gathered the majority of the data necessary to prepare the transition accounting. We are finalizing the data upload to the system and accumulating information for leases entered into at the end of 2018. We estimate that total assets and total liabilities will increase within the range of \$52 million and \$58 million on January 1, 2019 when the ASU is adopted. In July 2018, the FASB issued ASU 2018-10, Codification Improvements to Topic 842, Leases. ASU 2018-10 includes certain clarifications to address potential narrow-scope implementation issues which the Company is incorporating into its assessment and adoption of ASU 2016-02. Additionally, in July 2018, the FASB issued ASU 2018-11, Targeted Improvements to Topic 842, Leases. ASU 2018-11 which provides an additional transition method to adopt ASU 2016-02 identified as comparative reporting at adoption. We expect to use this new transition approach and the comparative periods presented in our consolidated financial statements will continue to be reported in accordance with ASC 840, Leases. We anticipate that we will elect the package of practical expedients allowed in the standard, which among other things, allows us to carry forward our historical lease classification. All of our leases have historically been classified as operating leases. We also anticipate that we will make an accounting policy election to use the practical expedient allowed in the standard to not separate lease and non-lease components for new leases entered into after January 1, 2019 when calculating the lease liability under ASU 2016-02.

In March 2016, the FASB issued ASU 2016-09, Improvements to Employee Share-Based Payment Accounting. This ASU simplifies the accounting for many aspects associated with share-based payment accounting, including income taxes and the use of forfeiture rates. This ASU was adopted on January 1, 2017. The provisions of this ASU which impacted us included a requirement that all excess tax benefits and deficiencies that pertain to share-based payment arrangements be recognized as a component of income tax expense rather than as a component of shareholders' equity. The Company expects this to create volatility in its effective tax rate on a go-forward basis as the impact is treated as a discrete item within our quarterly tax provision. The extent of excess tax benefits/deficiencies is subject to variation in our stock price and timing/extent of stock-based compensation share vestings and employee stock option exercises. This ASU also removes the impact of the excess tax benefits and deficiencies from the calculation of diluted earnings per share and no longer requires a presentation of excess tax benefits and deficiencies related to the vesting and exercise of share-based compensation as both an operating outflow and financing inflow on the statement of cash flows. We have applied all of these changes on a prospective basis and therefore, prior years were not adjusted. Additionally, this ASU allows for an accounting policy election to estimate the number of awards that are expected to vest or account for forfeitures when they occur. We elected to maintain our current forfeitures policy and will continue to include an estimate of those forfeitures when recognizing stock-based compensation expense. This ASU also requires cash payments to tax authorities when an employer uses a net-settlement feature to withhold shares to meet

statutory tax withholding provisions to be presented as a financing activity (eliminating previous diversity in practice). Adoption of this ASU resulted in an additional discrete tax benefit of approximately \$2.5 million and \$8.3 million during years ended December 31, 2018 and 2017, respectively.

In June 2016, the FASB issued ASU 2016-13, Allowance for Loan and Lease Losses. This ASU introduces an approach based on expected losses to estimate credit losses on certain types of financial instruments, including loans, held-to-maturity debt securities, loan commitments, financial guarantees and net investments in leases, as well as reinsurance and trade receivables. This ASU will be effective beginning in 2020. Based on a review of its portfolio of financial instruments, the Company does not believe the adoption of this ASU will have a material impact on the consolidated financial statements, but does expect the adoption to result in additional disclosures.

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In August 2016, the FASB issued ASU 2016-15, Classification of Certain Cash Payments and Cash Receipts. This ASU clarifies how certain cash receipts and cash payments are presented and classified in the statement of cash flows. The Company's adoption of this ASU on January 1, 2018 did not have a material impact on our presentation of the consolidated statement of cash flows.

In October 2016, the FASB issued ASU 2016-16, Intra-entity Transfers of Assets Other than Inventory. This ASU states that an entity should recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. This ASU was early adopted on January 1, 2017 using the modified retrospective approach which resulted in a \$6.2 million cumulative-effective adjustment directly to retained earnings for any previously deferred income tax effects during the year ended December 31, 2017.

In November 2016, the FASB issued ASU 2016-18, Restricted Cash. This ASU requires that amounts generally described as restricted cash and restricted cash equivalents are included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. We adopted this ASU on January 1, 2018 using the retrospective method. The adoption of ASU 2016-18 had an impact on our financial statement presentation within the Consolidated Statement of Cash Flows, as amounts generally described as restricted cash and restricted cash equivalents are now included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows and transfers of these amounts between balance sheet line items are no longer presented as an operating, investing or financing cash flow. For the years ended December 31, 2017 and 2016, cash flow from financing activities increased by \$2.5 million and cash flow used in financing activities increased by \$1.5 million, respectively as a result of the adoption of this ASU. Furthermore, adoption of ASU 2016-18 resulted in additional disclosures.

In January 2017, the FASB issued ASU 2017-01, Business Combinations - Clarifying the Definition of a Business. This ASU provides further guidance for identifying whether a set of assets and activities is a business by providing a screen outlining that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. This ASU was adopted beginning in 2018 and was applied prospectively. The adoption of this ASU may have a material effect on our consolidated financial statements in the event that we have an acquisition or disposal that falls within this screen.

In January 2017, the FASB issued ASU 2017-04, Simplifying the Test for Goodwill Impairment. This ASU simplifies the accounting for goodwill impairments under Step 2 by eliminating the requirement to perform procedures to determine the fair value of the assets and liabilities of the reporting unit, including previously unrecognized assets and liabilities, in order to determine the fair value of the goodwill and any impairment charge to be recognized. Under this ASU, the impairment charge to be recognized should be the amount by which the reporting unit's carrying value exceeds the reporting unit's fair value as calculated under Step 1 provided that the loss recognized should not exceed the total amount of goodwill allocated to the reporting unit. This ASU is effective beginning in 2019 and early adoption is permitted for interim or annual goodwill impairment tests performed after January 1, 2017. The Company will adopt ASU 2017-04 effective January 1, 2019 and adoption of this ASU may have a material effect on our consolidated financial statements in the event that we determine that goodwill for any of our reporting units is impaired.

In March 2017, the FASB issued ASU 2017-07, Improving the Presentation of Net Periodic Pension Cost and Net Periodic Post-retirement Benefit Cost, to improve the presentation of net periodic pension and net periodic post-retirement benefit cost. This ASU requires companies to present the service cost component of net periodic benefit cost in the same income statement line item as other compensation costs arising from services rendered during the period. Only the service cost component will be eligible for capitalization in assets. Additionally, this ASU requires that companies present the other components of the net periodic benefit cost separately from the line item that includes the service cost and outside of any subtotal of income from operations, if one is presented. This ASU is effective for annual periods beginning after December 15, 2017, and early adoption is permitted. The amendments in this ASU are to be applied retrospectively for presentation in the Consolidated Statement of Income and prospectively for the capitalization of the service cost component of net periodic pension cost and net periodic post-retirement benefit in assets. A practical expedient allows the Company to use the amount disclosed in its pension and other

post-retirement benefit plan note for the prior comparative periods as the estimation basis for applying the retrospective presentation requirements. The Company adopted ASU 2017-07 on January 1, 2018, using the retrospective method and elected to use the practical expedient. The adoption of this ASU resulted in a \$4.1 million, \$3.8 million and \$3.5 million decrease in operating income for the years ended December 31, 2018, 2017 and 2016, respectively. The Company does not capitalize costs in assets so there is no impact from that provision of ASU 2017-07.

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In May 2017, the FASB issued ASU 2017-09, Stock Compensation - Scope of Modification Accounting, which amends the scope of modification accounting for share-based payment arrangements. This ASU provides guidance on the types of changes to the terms or conditions of share-based payment awards to which an entity would be required to apply modification accounting. Specifically, an entity would not apply modification accounting if the fair value, vesting conditions, and classification of the awards are the same immediately before and after the modification. This ASU is effective for periods beginning after December 31, 2017. The Company's adoption of ASU 2017-09 on January 1, 2018, did not have a material effect on our consolidated financial statements.

In January 2018, the FASB issued ASU 2018-02, Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, which gives entities the option to reclassify to retained earnings the tax effects resulting from the new tax reform legislation commonly known as the Tax Cuts and Jobs Act ("the Act") related to items in AOCI that the FASB refers to as having been stranded in AOCI. The new guidance may be applied retrospectively to each period in which the effect of the Act is recognized in the period of adoption. The Company must adopt this guidance for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted for periods for which financial statements have not yet been issued or made available for issuance, including the period the Act was enacted. The guidance, when adopted, will require new disclosures regarding a company's accounting policy for releasing the tax effects in AOCI and permit a company the option to reclassify to retained earnings the tax effects resulting from the Act that are stranded in AOCI. The Company will adopt ASU 2018-02 effective January 1, 2019 and this adoption will result in a reclassification between retained earnings and AOCI. The Company estimates that the impact from ASU 2018-02 will increase retained earnings by approximately \$4.0 million, with an offsetting increase to accumulated other comprehensive loss for the same amount.

In August 2018, the FASB issued ASU 2018-13, Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement, which improves fair value disclosure requirements by removing disclosures that are not cost beneficial, clarifying disclosures' specific requirements and adding relevant disclosure requirements. This ASU is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The amendments on changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements, and the narrative description of measurement uncertainty should be applied prospectively for only the most recent interim or annual period presented in the initial fiscal year of adoption. All other amendments should be applied retrospectively to all periods presented upon their effective date. Early adoption is permitted and an entity can choose to early adopt any removed or modified disclosures upon issuance of this ASU and delay adoption of the additional disclosures until their effective date. The Company is still evaluating the impact that the adoption of ASU 2018-13 will have on the consolidated financial statements and has not yet decided whether to early adopt the amendments.

In August 2018, the FASB issued ASU 2018-14, Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans, which improves defined benefit disclosure requirements by removing disclosures that are not cost beneficial, clarifying disclosures' specific requirements and adding relevant disclosure requirements. This ASU is effective for fiscal years ending after December 15, 2020 and early adoption is permitted. The amendments in this ASU are required to be applied on a retrospective basis to all periods presented. The Company is still evaluating the impact that the adoption of ASU 2018-14 will have on the consolidated financial statements and has not yet decided whether to early adopt the amendments.

In August 2018, the FASB issued ASU 2018-15, Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract, which will now allow all cloud computing arrangements classified as service contracts to capitalize certain implementation costs in accordance with ASC 350-40, Intangibles - Goodwill and Other - Internal-Use Software, depending on the project stage within which the costs were incurred. This ASU is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal periods. Early adoption of the amendments in this ASU is permitted, including adoption in any interim period and the amendments can be applied either retrospectively or prospectively. The Company has adopted this ASU prospectively for all implementation costs incurred related to cloud computing arrangements and the implementation did not have a material impact on our consolidated financial statements.

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Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Market risk represents the risk of adverse changes in the value of a financial instrument caused by changes in currency exchange rates, interest rates and equity prices. We are exposed to market risks related to currency exchange rates and interest rates.

Currency exchange rates. We are subject to the effects of fluctuations in currency exchange rates on various transactions and on the translation of the reported financial position and operating results of our non-U.S. companies from local currencies to U.S. dollars. A hypothetical 10% strengthening or weakening of the U.S. dollar would increase or decrease our reported sales and net income for the year ended December 31, 2018 by approximately \$63.6 million and \$6.4 million, or 4.7% and 5.1%, respectively.

When appropriate, we may attempt to limit our transactional exposure to changes in currency exchange rates through forward contracts or other actions intended to reduce existing exposures by creating offsetting currency exposures. At December 31, 2018, we had open foreign currency forward contracts with a U.S. dollar notional value of \$72.4 million. A hypothetical 10% increase in December 31, 2018 forward exchange rates would result in a \$7.2 million increase in the fair value of these contracts.

Interest rates. We are exposed to changes in interest rates primarily as a result of borrowing and investing activities used to maintain liquidity and fund business operations. Because of the relatively short maturities of temporary investments and the variable rate nature of our revolving credit facility, these financial instruments are reported at carrying values which approximate fair values.

At December 31, 2018, we had \$129.8 million of fixed rate debt which matures at various dates through 2031. The incremental increase in the fair value of fixed rate long-term debt resulting from a hypothetical 10% decrease in interest rates would be approximately \$11.0 million. However, our sensitivity to interest rate declines and the corresponding increase in the fair value of our debt portfolio would unfavorably affect earnings and cash flows only to the extent that we elected to repurchase or retire all or a portion of our fixed rate debt portfolio at prices above carrying values.

At December 31, 2018, we had \$233.4 million of variable rate borrowings under our revolving credit facility. A 100 basis point increase or decrease in interest rates could have an impact on future earnings under our current capital structure.

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Item 8. Financial Statements and Supplementary Data

Management's Reports to Shareholders

Management's Report on Responsibility for Financial Reporting

Management of MSA Safety Incorporated (the Company) is responsible for the preparation of the consolidated financial statements included in this annual report. The consolidated financial statements were prepared in accordance with accounting principles generally accepted in the United States of America and include amounts that are based on the best estimates and judgments of management. The other financial information contained in this annual report is consistent with the consolidated financial statements.

Management's Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting. The 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.

The Company's internal control over financial reporting includes policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect transactions and dispositions of assets; (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 are being made only in accordance with authorizations of management and the 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 our 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.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control-Integrated Framework (2013). Based on our assessment and those criteria, management has concluded that the Company maintained effective internal control over financial reporting as of December 31, 2018.

The Company's independent registered public accounting firm that audited the consolidated financial statements included in this annual report issued an attestation report on the Company's internal control over financial reporting.

/s/ NISHAN J. VARTANIAN

Nishan J. Vartanian

President and Chief Executive Officer

/s/ KENNETH D. KRAUSE

Kenneth D. Krause

Sr. Vice President, Chief Financial Officer and Treasurer

February 22, 2019

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Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of MSA Safety Incorporated

Opinion on Internal Control over Financial Reporting

We have audited MSA Safety Incorporated's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, MSA Safety Incorporated (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, 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 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, cash flows, and changes in retained earnings and accumulated other comprehensive loss for each of the three years in the period ended December 31, 2018, and the related notes and the financial statement schedule listed in the index at Item 15(a) and our report dated February 22, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

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

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ Ernst & Young LLP
Pittsburgh, Pennsylvania
February 22, 2019

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Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of MSA Safety Incorporated

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of MSA Safety Incorporated (the Company) as of December 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, cash flows, and changes in retained earnings and accumulated other comprehensive loss for each of the three years in the period ended December 31, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with 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 31, 2018, based on criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 22, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company’s auditor since 2014.
Pittsburgh, Pennsylvania
February 22, 2019

Table of ContentsMSA SAFETY INCORPORATED
CONSOLIDATED STATEMENT OF INCOME

(In thousands, except per share amounts)	Year ended December 31,		
	2018	2017	2016
Net sales	\$1,358,104	\$1,196,809	\$1,149,530
Cost of products sold	746,241	657,918	627,283
Gross profit	611,863	538,891	522,247
Selling, general and administrative	324,784	300,062	308,238
Research and development	52,696	50,061	46,847
Restructuring charges (Note 2)	13,247	17,632	5,694
Currency exchange losses, net	2,330	5,127	766
Other operating expense (Note 19)	45,327	126,432	—
Operating income	173,479	39,577	160,702
Interest expense	18,881	15,360	16,411
Loss on extinguishment of debt (Note 11)	1,494	—	—
Other income, net (Note 15)	(9,231)	) (5,558	) (7,620
Total other expense, net	11,144	9,802	8,791
Income from continuing operations before income taxes	162,335	29,775	151,911
Provision for income taxes (Note 9)	37,220	2,819	57,804
Income from continuing operations	125,115	26,956	94,107
Loss from discontinued operations (Note 20)	—	—	(245)
Net income	125,115	26,956	93,862
Net income attributable to noncontrolling interests	\$(965)	) \$(929)	) \$(1,926)
Net income attributable to MSA Safety Incorporated	\$124,150	\$26,027	\$91,936
Amounts attributable to MSA Safety Incorporated common shareholders:			
Income from continuing operations	124,150	26,027	92,691
Loss from discontinued operations (Note 20)	—	—	(755)
Net income	\$124,150	\$26,027	\$91,936
Earnings per share attributable to MSA Safety Incorporated common shareholders:			
Basic			
Income from continuing operations	\$3.23	\$0.68	\$2.47
Loss from discontinued operations (Note 20)	\$—	\$—	\$(0.02)
Net income	\$3.23	\$0.68	\$2.45
Diluted			
Income from continuing operations	\$3.18	\$0.67	\$2.44
Loss from discontinued operations (Note 20)	\$—	\$—	\$(0.02)
Net income	\$3.18	\$0.67	\$2.42
Dividends per common share	\$1.49	\$1.38	\$1.31

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

Table of ContentsMSA SAFETY INCORPORATED
CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

(In thousands)	Year ended December 31,		
	2018	2017	2016
Net income	\$125,115	\$26,956	\$93,862
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments (Note 5)	(30,103)	41,129	(24,986)
Pension and post-retirement plan actuarial (losses) gains, net of tax (Note 5)	(17,569)	20,120	1,321
Unrealized losses on available-for-sale securities (Note 5)	(572)	—	—
Reclassification from accumulated other comprehensive (loss) into net income (Note 5)	774	—	3,270
Total other comprehensive (loss) income, net of tax	(47,470)	61,249	(20,395)
Comprehensive income	77,645	88,205	73,467
Comprehensive income attributable to noncontrolling interests	(660)	(3,694)	(3,578)
Comprehensive income attributable to MSA Safety Incorporated	\$76,985	\$84,511	\$69,889

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

Table of ContentsMSA SAFETY INCORPORATED
CONSOLIDATED BALANCE SHEET

	December 31,	
	2018	2017
(In thousands, except share amounts)		
Assets		
Cash and cash equivalents	\$ 140,095	\$ 134,244
Trade receivables, less allowance for doubtful accounts of \$5,369 and \$5,540	245,032	244,198
Inventories (Note 3)	156,602	153,739
Investments, short-term (Note 18)	55,106	—
Prepaid income taxes	10,769	31,448
Notes receivable, insurance companies (Note 19)	3,555	17,333
Prepaid expenses and other current assets	45,464	41,335
Total current assets	656,623	622,297
Property, plant, and equipment, net (Note 4)	157,940	157,014
Prepaid pension cost (Note 14)	57,568	83,060
Deferred tax assets (Note 9)	32,522	25,825
Goodwill (Note 12)	413,640	422,185
Intangible assets, net (Note 12)	169,515	183,088
Notes receivable, insurance companies, noncurrent (Note 19)	56,012	59,567
Insurance receivable (Note 19) and other noncurrent assets	64,192	131,790
Total assets	\$ 1,608,012	\$ 1,684,826
Liabilities		
Notes payable and current portion of long-term debt (Note 11)	\$ 20,063	\$ 26,680
Accounts payable	78,367	87,061
Employees' compensation	51,386	39,377
Insurance and product liability (Note 19)	48,688	59,116
Warranty reserve (Note 19) and other current liabilities	83,556	77,045
Total current liabilities	282,060	289,279
Long-term debt, net (Note 11)	341,311	447,832
Pensions and other employee benefits (Note 14)	166,101	170,773
Deferred tax liabilities (Note 9)	7,164	9,341
Product liability (Note 19) and other noncurrent liabilities	171,857	165,023
Total liabilities	\$ 968,493	\$ 1,082,248
Commitments and contingencies (Note 19)		
Shareholders' Equity		
Preferred stock, 4 1/2% cumulative, \$50 par value (Note 6)	3,569	3,569
Common stock, no par value (180,000,000 shares authorized; 62,081,391 shares issued; 38,526,523 and 38,222,928 shares outstanding at December 31, 2018 and 2017, respectively)	211,806	194,953
Treasury shares, at cost (Note 6)	(298,143)	(297,834)
Accumulated other comprehensive loss	(218,927)	(171,762)
Retained earnings	935,577	868,675
Total MSA Safety Incorporated shareholders' equity	633,882	597,601
Noncontrolling interests	5,637	4,977
Total shareholders' equity	639,519	602,578

Total liabilities and shareholders' equity	\$1,608,012	\$1,684,826
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The accompanying notes are an integral part of the consolidated financial statements.

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CONSOLIDATED STATEMENT OF CASH FLOWS

(In thousands)	Year ended December 31,		
	2018	2017	2016
Operating Activities			
Net income	\$125,115	\$26,956	\$93,862
Depreciation and amortization	37,852	37,877	35,273
Restructuring charges (Note 2)	—	11,384	—
Stock-based compensation (Note 10)	12,239	11,758	9,211
Pension expense (Note 14)	5,901	7,142	6,332
Deferred income tax (benefit) provision (Note 9)	(4,065)	(31,320)	14,393
Loss (gain) on asset dispositions, net	484	557	(1,453)
Pension contributions (Note 14)	(4,718)	(4,094)	(3,878)
Currency exchange losses, net	2,330	5,127	785
Other operating expense (Note 19)	45,327	126,432	—
Collections on insurance receivable and notes receivable, insurance companies	101,552	111,969	42,046
Product liability payments	(61,500)	(49,381)	(69,546)
Loss on extinguishment of debt	1,494	—	—
Changes in:			
Trade receivables	(10,075)	(6,384)	13,239
Inventories (Note 3)	(11,122)	(30,363)	14,394
Income taxes receivable, prepaid expenses and other current assets	10,866	(13,661)	(14,419)
Accounts payable and accrued liabilities	17,985	17,870	(7,603)
Other noncurrent assets and liabilities	(5,778)	8,467	2,258
Cash Flow From Operating Activities	263,887	230,336	134,894
Investing Activities			
Capital expenditures	(33,960)	(23,725)	(25,523)
Purchase of short-term investments (Note 18)	(73,022)	—	—
Proceeds from maturities of short-term investments (Note 18)	18,000	—	—
Acquisition, net of cash acquired (Note 13)	—	(216,308)	(18,156)
Property disposals and other investing	4,587	832	18,214
Cash Flow (Used In) Investing Activities	(84,395)	(239,201)	(25,465)
Financing Activities			
Proceeds from short-term debt, net (Note 11)	51	13	—
Payments on long-term debt (Note 11)	(570,167)	(559,767)	(443,572)
Proceeds from long-term debt (Note 11)	462,500	637,000	382,664
Debt issuance costs	(1,216)	—	—
Cash dividends paid	(57,248)	(52,537)	(49,074)
Company stock purchases (Note 6)	(4,824)	(17,513)	(1,881)
Exercise of stock options (Note 6)	8,573	18,465	12,476
Employee stock purchase plan (Note 6)	556	532	571
Other, net	(1,494)	(590)	(530)
Cash Flow (Used In) From Financing Activities	(163,269)	25,603	(99,346)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(13,508)	6,189	(3,479)
Increase in cash, cash equivalents and restricted cash	2,715	22,927	6,604
Beginning cash, cash equivalents and restricted cash	137,889	114,962	108,358
Ending cash, cash equivalents and restricted cash	\$140,604	\$137,889	\$114,962

Supplemental cash flow information:

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Cash and cash equivalents	\$ 140,095	134,244	113,759
Restricted cash included in prepaid expenses and other current assets	509	3,645	1,203
Total cash, cash equivalents and restricted cash	\$ 140,604	137,889	114,962
Interest paid in cash	\$ 20,408	\$ 15,504	\$ 15,861
Income tax paid in cash	40,587	40,376	57,551

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

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MSA SAFETY INCORPORATED
CONSOLIDATED STATEMENT OF CHANGES IN RETAINED EARNINGS AND
ACCUMULATED OTHER COMPREHENSIVE LOSS

(In thousands)	Retained Earnings	Accumulated Other Comprehensive (Loss)
Balances January 1, 2016	\$858,553	\$ (208,199)
Net income	93,862	—
Foreign currency translation adjustments	—	(24,986)
Pension and post-retirement plan adjustments, net of tax of (\$1,140)	—	1,321
Reclassification from accumulated other comprehensive (loss) into net income	—	3,270
Income attributable to noncontrolling interests	(1,926)	(1,652)
Common dividends	(49,032)	—
Preferred dividends	(42)	—
Balances December 31, 2016	901,415	(230,246)
Net income	26,956	—
Foreign currency translation adjustments	—	41,129
Pension and post-retirement plan adjustments, net of tax of \$10,417	—	20,120
Income attributable to noncontrolling interests	(929)	(2,765)
Common dividends	(52,495)	—
Preferred dividends	(42)	—
Cumulative effect of the adoption of ASU 2016-16 (Note 1)	(6,230)	—
Balances December 31, 2017	868,675	(171,762)
Net income	125,115	—
Foreign currency translation adjustments	—	(30,103)
Pension and post-retirement plan adjustments, net of tax of (\$6,325)	—	(17,569)
Unrecognized net losses on available-for-sale securities (Note 18)	—	(572)
Reclassification from accumulated other comprehensive (loss) into net income	—	774
(Income) loss attributable to noncontrolling interests	(965)	305
Common dividends	(57,206)	—
Preferred dividends	(42)	—
Balances December 31, 2018	\$935,577	\$ (218,927)

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

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MSA SAFETY INCORPORATED

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Note 1—Significant Accounting Policies

Basis of Presentation—The Consolidated Financial Statements of MSA Safety Incorporated ("MSA" or "the Company") are prepared in conformity with accounting principles generally accepted in the United States of America (GAAP) and require management to make certain judgments, estimates, and assumptions. These may affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the consolidated financial statements. They also may affect the reported amounts of revenues and expenses during the period. Actual results could differ from those estimates upon subsequent resolution of identified matters.

Principles of Consolidation—The consolidated financial statements include the accounts of the Company and all subsidiaries. Intercompany accounts and transactions are eliminated.

Noncontrolling Interests—Noncontrolling interests reflect noncontrolling shareholders' investments in certain consolidated subsidiaries and their proportionate share of the income and accumulated other comprehensive income (loss) of those subsidiaries.

Currency Translation—The functional currency of all significant non-U.S. subsidiaries is the local currency. Assets and liabilities of these operations are translated at year-end exchange rates. Income statement accounts are translated using the average exchange rates for the reporting period. Translation adjustments for these companies are reported as a component of shareholders' equity and are not included in income. Foreign currency transaction gains and losses are included in net income for the reporting period.

Cash Equivalents—Cash equivalents include temporary deposits with financial institutions and highly liquid investments with original maturities of 90 days or less. Other highly liquid investments consist of \$11.4 million in money market funds that are valued at net asset value ("NAV"). The money market funds are required to price and transact at a NAV per share that fluctuates based upon the pricing of the underlying portfolio of securities and this requirement may impact the value of those fund shares.

Restricted Cash—Restricted cash, which is designated for use other than current operations, is included in prepaid expenses and other current assets in the Consolidated Balance Sheet. Restricted cash balances were \$0.5 million and \$3.6 million at December 31, 2018 and 2017, respectively. These balances were used to support letter of credit balances.

Inventories—Inventories are stated at the lower of cost or net realizable value. The majority of U.S. inventories are valued on the last-in, first-out (LIFO) cost method which is used since this method provides better matching of costs and revenues. Other inventories are valued at actual costs, at standard costs which approximate actual costs or in very rare occasions, on the average cost method. It is the Company's general policy to write-down any inventory identified as obsolete. Additionally, it will write-down any inventory balance in excess of the last twenty-four months of consumption.

Investment securities—The Company's investment securities, primarily fixed income, are classified as available for sale. The securities are recorded at fair market value and reported in "Investments, short-term" in the accompanying Consolidated Balance Sheet with changes in fair market value recorded in other comprehensive income, net of tax. The purchases and sales of these investments are classified as investing activities in the Consolidated Statement of Cash Flows.

Property and Depreciation—Property is recorded at cost. Depreciation is computed using straight-line and accelerated methods over the estimated useful lives of the assets, generally as follows: buildings 20 to 40 years and machinery and equipment 3 to 10 years. Expenditures for significant renewals and improvements are capitalized. Ordinary repairs and maintenance are expensed as incurred. Gains or losses on property dispositions are included in other income and the cost and related depreciation are removed from the accounts. Depreciation expense for the years ended December 31, 2018, 2017 and 2016 was \$26.9 million, \$28.0 million and \$27.0 million, respectively. Properties, plants, and equipment are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Recoverability of assets is determined by comparing the estimated undiscounted net cash flows of the operations related to the assets to their carrying amount. An impairment

loss would be recognized when the carrying amount of the assets exceeds the estimated undiscounted net cash flows. The amount of the impairment loss to be recorded is calculated as the excess of the carrying value of the assets over their fair value, with fair value determined using the best information available, which generally is a discounted cash flow model.

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Software Development Costs—Software development costs consist primarily of costs incurred in software development and related personnel compensation to create, enhance and deploy the Company’s broad range of wireless technology and cloud-based computing safety services. Software development costs, other than software development costs qualifying for capitalization, are expensed as incurred. Costs of computer software developed or obtained for internal use that are incurred in the preliminary project and post implementation stages are expensed as incurred. Certain costs incurred during the application and development stage, which primarily include compensation and related expenses, are capitalized. Additionally, costs of upgrades and enhancements are capitalized when it is probable that the upgrades and enhancements will result in added functionality. The estimated useful life of costs capitalized is three years. Capitalized costs are amortized using the straight-line method over the estimated useful life, beginning in the period in which the software is ready for its intended use or when the upgrade or enhancement is deployed. During 2018, there was approximately \$1.6 million of software development costs capitalized. During 2017, there was no software development costs capitalized.

Goodwill and Other Intangible Assets—Intangible assets with a finite useful life are amortized on a straight-line basis over their useful lives. Indefinite lived intangible assets are assessed for possible impairment annually on October 1st or whenever circumstances change such that the recorded value of the asset may not be recoverable. We performed a quantitative assessment of the indefinite lived trade name intangible asset as outlined in ASC 350 by comparing the estimated fair value of the trade name intangible asset to their carrying value. We estimate the fair value using the relief from royalty income approach. A number of significant assumptions and estimates are involved in the application of the relief from royalty model, including sales volumes and prices, royalty rates and tax rates. Forecasts are based on sales generated by the underlying trade name assets and are generally based on approved business unit operating plans for the early years and historical relationships in later years. Based on this assessment, there was no indication of impairment for 2018.

Goodwill is not amortized, but is subject to impairment assessments. On October 1st of each year, or more frequently if indicators of impairment exist or if a decision is made to sell a business, we evaluate goodwill and indefinite lived intangible assets for impairment. A significant amount of judgment is involved in determining if an indicator of impairment has occurred. Such indicators may include a decline in expected cash flows, a significant adverse change in the business climate, unanticipated competition, slower growth rates, or negative developments in equity and credit markets, among others.

All goodwill is assigned to and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. For goodwill impairment testing purposes, we consider our operating segments to be our reporting units. The evaluation of impairment involves using either a qualitative or quantitative approach as outlined in Accounting Standards Codification (ASC) Topic 350. The qualitative evaluation is an assessment of factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying value, including goodwill. Factors considered as part of the qualitative assessment include entity-specific industry, market and general economic conditions. In 2018, we elected to bypass the qualitative evaluation for all of our reporting units, and performed a two-step quantitative test at October 1, 2018. Step 1 of the quantitative testing involves comparing the estimated fair value of each reporting unit to its carrying value. We estimate reporting unit fair value using a weighted average of fair values determined by discounted cash flow (DCF) and market approach methodologies, as we believe both are equally important indicators of fair value. A number of significant assumptions and estimates are involved in the application of the DCF model, including sales volumes and prices, costs to produce, tax rates, capital spending, discount rates, and working capital changes. Cash flow forecasts are generally based on approved reporting unit operating plans for the early years and historical relationships in later years. The betas used in calculating the individual reporting units’ weighted average cost of capital (WACC) rate are estimated for each reporting unit based on peer data. The market approach methodology measures value through an analysis of peer companies. The analysis entails measuring the multiples of EBITDA at which peer companies are trading.

In the event the estimated fair value of a reporting unit per the weighted average of the DCF and market approach models is less than the carrying value, Step 2 of the analysis would be required. The additional analysis would compare the carrying amount of the reporting unit’s goodwill with the implied fair value of that goodwill, which may

involve the use of valuation specialist. The implied fair value of goodwill is the excess of the fair value of the reporting unit over the fair value amounts assigned to all of the assets and liabilities of that unit as if the reporting unit had been acquired in a business combination and the fair value of the reporting unit represented the purchase price. If the carrying value of goodwill exceeds its implied fair value, an impairment loss equal to such excess would be recognized, which could materially and adversely affect reported consolidated results of operations and shareholders' equity. There has been no impairment of our goodwill as of December 31, 2018, 2017 or 2016.

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Revenue Recognition—We generate revenue primarily from manufacturing and selling a comprehensive line of safety products to protect the health and safety of workers and facility infrastructures around the world in the oil, gas and petrochemical, fire service, construction, utilities and mining industries. Our core safety products include fixed gas and flame detection instruments, breathing apparatus where SCBA is the principal product, portable gas detection instruments, industrial head protection products, firefighter helmets & protective apparel and fall protection devices. Our customers generally fall into two categories: distributors and industrial or military end-users. In our Americas segment, approximately 75% to 85% of our sales are made through distributors. In our International segment, approximately 55% to 65% of our sales are made through distributors. The underlying principles of revenue recognition are identical for both categories of customers and revenue is generally recognized at a point in time as described below.

We account for revenue in accordance with ASC Topic 606, Revenue from Contracts with Customers, which we adopted on January 1, 2018, using the modified retrospective method. Revenue from the sale of products is recognized when there is persuasive evidence of an arrangement and control passes to the customer, which generally occurs either when product is shipped to the customer or, in the case of most U.S. distributor customers, when product is delivered to the distributor's delivery site. We establish our shipping terms according to local practice and market characteristics. We do not ship product unless we have an order or other documentation authorizing shipment to our customers. Our payment terms vary by the type and location of our customer and the products offered. The term between invoicing and when payment is due is not significant.

Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services. Amounts billed and due from our customers are classified as receivables on the consolidated balance sheet. We make appropriate provisions for uncollectible accounts receivable which have historically been insignificant in relation to our net sales. Certain contracts with customers, primarily distributor customers, have an element of variable consideration that is estimated when revenue is recognized under the contract to the extent that it is material to the individual contract. Variable consideration includes volume incentive rebates, performance guarantees, price concessions and returns. Rebates are based on achieving a certain level of purchases and other performance criteria that are documented in established distributor programs. These rebates are estimated based on projected sales to the customer and accrued as a reduction of net sales as they are earned by the customer. The rebate accrual is reviewed monthly and adjustments are made as the estimate of projected sales changes. Product returns, including an adjustment for restocking fees if it is material, are estimated based on historical return experience and revenue is adjusted. Sales, value add and other taxes collected with revenue-producing activities and remitted to governmental authorities are excluded from revenue.

Refer to Note 7—Segment Information for disaggregation of revenue by segment and product group, as we believe this best depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors.

Depending on the terms of the arrangement, we may defer revenue for which we have a future obligation, including training and extended warranty and technical services, until such time that the obligation has been satisfied. We use an observable price, or a cost plus margin approach when one is not available, to determine the stand-alone selling price for separate performance obligations. We have elected to recognize the cost for shipping and handling as an expense when control of the product has passed to the customer. These costs are included within the Cost of Products Sold line on the Consolidated Statement of Income. Amounts billed to customers for shipping and handling are included in net sales.

We typically receive interim milestone payments under certain contracts, including our fixed gas and flame detection projects, as work progresses. For some of these contracts, we may be entitled to receive an advance payment. Revenue for these contracts is generally recognized as control passes to the customer, which is a point in time upon shipment of the product, and if applicable, acceptance by the customer. We recognize a liability for these advance payments in excess of revenue recognized and present it as contract liabilities on the Consolidated Balance Sheet. The advance

payment is typically not considered a significant financing component because it is used to meet working capital demands that can be higher in the early stages of a contract and to protect us from the other party failing to adequately complete some or all of its obligations under the contract. In some cases, the customer retains a small portion of the contract price, typically 10%, until completion of the contract, which we present as contract assets on the Consolidated Balance Sheet. Accordingly, during the period of contract performance, billings and costs are accumulated on the Consolidated Balance Sheet as contract assets or contract liabilities, but no income is recognized until completion of the project and control has passed to the customer. As of December 31, 2018, there were no material contract assets or contract liabilities recorded on the Consolidated Balance Sheet.

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Practical Expedients and Exemptions

We do not disclose the value of unsatisfied performance obligations for (i) contracts with an original expected length of one year or less and (ii) contracts for which we recognize revenue at the amount to which we have the right to invoice for services performed.

We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the customer and the transfer of the promised goods or services to the customer will be one year or less.

We generally expense sales commissions when incurred because the amortization period would have been one year or less. These costs are recorded within selling, general and administrative expenses in our Condensed Consolidated Statement of Income.

Product Warranties—Estimated expenses related to product warranties and additional service actions are charged to cost of products sold in the period in which the related revenue is recognized or when significant product quality issues are identified.

Research and Development—Research and development costs are expensed as incurred.

Income Taxes—Deferred income taxes are recognized for temporary differences between financial and tax reporting. Deferred tax assets and liabilities are measured using enacted tax rates in effect for the year in which those temporary differences are expected to be recovered or settled. If it is more likely than not that some portion or all of a deferred tax asset will not be realized, a valuation allowance is recognized. We record tax benefits related to uncertain tax positions taken or expected to be taken on a tax return when such benefits meet a more likely than not threshold. We recognize interest related to unrecognized tax benefits in interest expense and penalties in operating expenses.

Deferred taxes are booked for available cash in excess of working capital for non-U.S. subsidiaries as these earnings are no longer considered to be permanently reinvested.

Stock-Based Compensation—We recognize compensation expense for employee and non-employee director stock-based compensation based on the grant date fair value. Except for retirement-eligible participants, for whom there is no requisite service period, this expense is recognized ratably over the requisite service periods following the date of grant. For retirement-eligible participants, this expense is recognized at the grant date.

Derivative Instruments—We may use derivative instruments to minimize the effects of changes in currency exchange rates. We do not enter into derivative transactions for speculative purposes and do not hold derivative instruments for trading purposes. Changes in the fair value of derivative instruments designated as fair value hedges are recorded in the balance sheet as adjustments to the underlying hedged asset or liability. Changes in the fair value of derivative instruments that do not qualify for hedge accounting treatment are recognized in the consolidated statement of income as currency exchange losses, net in the current period.

Commitments and Contingencies—For asserted claims and assessments, liabilities are recorded when a loss is deemed to be probable and the amount of the loss is reasonably estimable. Management assesses the probability of an unfavorable outcome with respect to asserted claims or assessments based on many factors such as the nature of the matter, available defenses and case strategy, progress of the matter, views and opinions of legal counsel and other advisors, applicability and success of appeals processes, and the outcome of similar historical matters, among others. Once an unfavorable outcome is assessed to be probable, management evaluates estimates of the potential loss, and the most reasonable loss estimate is recorded (or, if the estimate of the loss is a range, and no amount within the range is considered to be a better estimate than any other amount, the minimum amount in the range is recorded). If a loss is deemed to be reasonably possible but less than probable and/or such loss cannot be reasonably estimated, then the matter is disclosed and no liability is recorded.

With respect to unasserted claims or assessments, management first determines whether it is probable that a claim or assessment may be asserted and then, if so, the degree of probability of an unfavorable outcome. If an unfavorable outcome is probable, management assesses whether the amount of potential loss can be reasonably estimated and, if so, accrues the most reasonable estimate of the loss (or, if the estimate of the loss is a range, and not amount within

the range is considered to be a better estimate than any other amount, the minimum amount in the range is recorded). If an unfavorable outcome is reasonably possible but less than probable, or the amount of loss cannot be reasonably estimated, then the matter is disclosed and no liability is recorded. Legal matters are reviewed on a continuous basis to determine if there has been a change in management's judgment regarding the likelihood and/or estimate of a potential loss. Please refer to Note 19 for further details on product liability related matters.

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Discontinued Operations and Assets Held For Sale—For those businesses where management has committed to a plan to divest, each business is valued at the lower of its carrying amount or estimated fair value less cost to sell. If the carrying amount of the business exceeds its estimated fair value, an impairment loss is recognized. Fair value is estimated using accepted valuation techniques such as a discounted cash flow model, valuations performed by third parties, earnings multiples, or indicative bids, when available. A number of significant estimates and assumptions are involved in the application of these techniques, including the forecasting of markets and market share, sales volumes and prices, costs and expenses, and multiple other factors. Management considers historical experience and all available information at the time the estimates are made; however, the fair value that is ultimately realized upon the divestiture of a business may differ from the estimated fair value reflected in the Consolidated Financial Statements. Depreciation and amortization expense is not recorded on assets of a business to be divested once they are classified as held for sale.

For businesses classified as discontinued operations, the results of operations are reclassified from their historical presentation to discontinued operations on the Consolidated Statement of Income, for all periods presented. The gains or losses associated with these divested businesses are recorded in discontinued operations on the Consolidated Statement of Income. Additionally, segment information does not include the operating results of businesses classified as discontinued operations for all periods presented. Management does not expect any continuing involvement with these businesses following their divestiture, and these businesses are expected to be disposed of within one year. Concentration of credit and business risks - We are exposed to credit risk in the event of nonpayment by customers, principally in the oil, gas and petrochemical, fire service, construction, utilities, and mining industries. Changes in these industries may significantly affect our financial performance and management's estimates. We mitigate our exposure to credit risk by performing ongoing credit evaluations and, when deemed necessary, requiring letters of credit, credit insurance, prepayments, guarantees or other collateral. No individual customer represented more than 10% of our sales.

Reclassifications - Certain reclassifications of prior years' data have been made to conform to the current year presentation. These reclassifications relate to (1) additional captions disclosed within the operating section of the Consolidated Statement of Cash Flows but do not change the overall cash flow from operating activities for the prior years as previously reported, and (2) additional captions disclosed for product warranty activity within the table that reconciles the changes in the Company's accrued warranty reserve (Note 19).

Recently Adopted and Recently Issued Accounting Standards—In May 2014, the FASB issued ASU 2014-09, Revenue with Contracts from Customers. This ASU establishes a single revenue recognition model for all contracts with customers based on recognizing revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services, eliminates industry specific requirements and expands disclosure requirements. We adopted ASU 2014-09 using the modified retrospective method as of January 1, 2018. The majority of our revenue transactions consist of a single performance obligation to transfer promised goods or services. The adoption of this new standard did not impact the Company's consolidated statement of income or balance sheet and there was no cumulative effect of initially applying the standard to the opening balance of retained earnings. See Revenue Recognition section above for further information on our updated revenue recognition policy.

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In February 2016, the FASB issued ASU 2016-02, Leases. This ASU requires lessees to record a right of use asset and a liability for virtually all leases. This ASU will be effective beginning January 1, 2019. The Company has developed a transition plan and continues to evaluate the impact that the adoption of ASU 2016-02 will have on the consolidated financial statements. During 2017, we conducted a survey to identify all leases across the organization and are currently working to obtain all lease contracts to accumulate the necessary information for adoption. We identified that a majority of our leases fall into one of three categories: office equipment, real estate and vehicles. We also identified that most office equipment and vehicle leases utilize standard master leasing contracts that have similar terms. During 2018, we selected a service provider to help us inventory and account for our leases and gathered the majority of the data necessary to prepare the transition accounting. We are finalizing the data upload to the system and accumulating information for leases entered into at the end of 2018. We estimate that total assets and total liabilities will increase within the range of \$52 million and \$58 million on January 1, 2019 when the ASU is adopted. In July 2018, the FASB issued ASU 2018-10, Codification Improvements to Topic 842, Leases. ASU 2018-10 includes certain clarifications to address potential narrow-scope implementation issues which the Company is incorporating into its assessment and adoption of ASU 2016-02. Additionally, in July 2018, the FASB issued ASU 2018-11, Targeted Improvements to Topic 842, Leases. ASU 2018-11 which provides an additional transition method to adopt ASU 2016-02 identified as comparative reporting at adoption. We expect to use this new transition approach and the comparative periods presented in our consolidated financial statements will continue to be reported in accordance with ASC 840, Leases. We anticipate that we will elect the package of practical expedients allowed in the standard, which among other things, allows us to carry forward our historical lease classification. All of our leases have historically been classified as operating leases. We also anticipate that we will make an accounting policy election to use the practical expedient allowed in the standard to not separate lease and non-lease components for new leases entered into after January 1, 2019 when calculating the lease liability under ASU 2016-02.

In March 2016, the FASB issued ASU 2016-09, Improvements to Employee Share-Based Payment Accounting. This ASU simplifies the accounting for many aspects associated with share-based payment accounting, including income taxes and the use of forfeiture rates. This ASU was adopted on January 1, 2017. The provisions of this ASU which impacted us included a requirement that all excess tax benefits and deficiencies that pertain to share-based payment arrangements be recognized as a component of income tax expense rather than as a component of shareholders' equity. The Company expects this to create volatility in its effective tax rate on a go-forward basis as the impact is treated as a discrete item within our quarterly tax provision. The extent of excess tax benefits/deficiencies is subject to variation in our stock price and timing/extent of stock-based compensation share vestings and employee stock option exercises. This ASU also removes the impact of the excess tax benefits and deficiencies from the calculation of diluted earnings per share and no longer requires a presentation of excess tax benefits and deficiencies related to the vesting and exercise of share-based compensation as both an operating outflow and financing inflow on the statement of cash flows. We have applied all of these changes on a prospective basis and therefore, prior years were not adjusted. Additionally, this ASU allows for an accounting policy election to estimate the number of awards that are expected to vest or account for forfeitures when they occur. We elected to maintain our current forfeitures policy and will continue to include an estimate of those forfeitures when recognizing stock-based compensation expense. This ASU also requires cash payments to tax authorities when an employer uses a net-settlement feature to withhold shares to meet statutory tax withholding provisions to be presented as a financing activity (eliminating previous diversity in practice). Adoption of this ASU resulted in an additional discrete tax benefit of approximately \$2.5 million and \$8.3 million during years ended December 31, 2018 and 2017, respectively.

In June 2016, the FASB issued ASU 2016-13, Allowance for Loan and Lease Losses. This ASU introduces an approach based on expected losses to estimate credit losses on certain types of financial instruments, including loans, held-to-maturity debt securities, loan commitments, financial guarantees and net investments in leases, as well as reinsurance and trade receivables. This ASU will be effective beginning in 2020. Based on a review of its portfolio of financial instruments, the Company does not believe the adoption of this ASU will have a material impact on the consolidated financial statements, but does expect the adoption to result in additional disclosures.

In August 2016, the FASB issued ASU 2016-15, Classification of Certain Cash Payments and Cash Receipts. This ASU clarifies how certain cash receipts and cash payments are presented and classified in the statement of cash flows.

The Company's adoption of this ASU on January 1, 2018 did not have a material impact on our presentation of the consolidated statement of cash flows.

In October 2016, the FASB issued ASU 2016-16, Intra-entity Transfers of Assets Other than Inventory. This ASU states that an entity should recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. This ASU was early adopted on January 1, 2017 using the modified retrospective approach which resulted in a \$6.2 million cumulative-effective adjustment directly to retained earnings for any previously deferred income tax effects during the year ended December 31, 2017.

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In November 2016, the FASB issued ASU 2016-18, Restricted Cash. This ASU requires that amounts generally described as restricted cash and restricted cash equivalents are included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. We adopted this ASU on January 1, 2018 using the retrospective method. The adoption of ASU 2016-18 had an impact on our financial statement presentation within the Consolidated Statement of Cash Flows, as amounts generally described as restricted cash and restricted cash equivalents are now included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows and transfers of these amounts between balance sheet line items are no longer presented as an operating, investing or financing cash flow. For the years ended December 31, 2017 and 2016, cash flow from financing activities increased by \$2.5 million and cash flow used in financing activities increased by \$1.5 million, respectively as a result of the adoption of this ASU. Furthermore, adoption of ASU 2016-18 resulted in additional disclosures.

In January 2017, the FASB issued ASU 2017-01, Business Combinations - Clarifying the Definition of a Business. This ASU provides further guidance for identifying whether a set of assets and activities is a business by providing a screen outlining that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. This ASU was adopted beginning in 2018 and was applied prospectively. The adoption of this ASU may have a material effect on our consolidated financial statements in the event that we have an acquisition or disposal that falls within this screen.

In January 2017, the FASB issued ASU 2017-04, Simplifying the Test for Goodwill Impairment. This ASU simplifies the accounting for goodwill impairments under Step 2 by eliminating the requirement to perform procedures to determine the fair value of the assets and liabilities of the reporting unit, including previously unrecognized assets and liabilities, in order to determine the fair value of the goodwill and any impairment charge to be recognized. Under this ASU, the impairment charge to be recognized should be the amount by which the reporting unit's carrying value exceeds the reporting unit's fair value as calculated under Step 1 provided that the loss recognized should not exceed the total amount of goodwill allocated to the reporting unit. This ASU is effective beginning in 2019 and early adoption is permitted for interim or annual goodwill impairment tests performed after January 1, 2017. The Company will adopt ASU 2017-04 effective January 1, 2019 and adoption of this ASU may have a material effect on our consolidated financial statements in the event that we determine that goodwill for any of our reporting units is impaired.

In March 2017, the FASB issued ASU 2017-07, Improving the Presentation of Net Periodic Pension Cost and Net Periodic Post-retirement Benefit Cost, to improve the presentation of net periodic pension and net periodic post-retirement benefit cost. This ASU requires companies to present the service cost component of net periodic benefit cost in the same income statement line item as other compensation costs arising from services rendered during the period. Only the service cost component will be eligible for capitalization in assets. Additionally, this ASU requires that companies present the other components of the net periodic benefit cost separately from the line item that includes the service cost and outside of any subtotal of income from operations, if one is presented. This ASU is effective for annual periods beginning after December 15, 2017, and early adoption is permitted. The amendments in this ASU are to be applied retrospectively for presentation in the Consolidated Statement of Income and prospectively for the capitalization of the service cost component of net periodic pension cost and net periodic post-retirement benefit in assets. A practical expedient allows the Company to use the amount disclosed in its pension and other post-retirement benefit plan note for the prior comparative periods as the estimation basis for applying the retrospective presentation requirements. The Company adopted ASU 2017-07 on January 1, 2018, using the retrospective method and elected to use the practical expedient. The adoption of this ASU resulted in a \$4.1 million, \$3.8 million and \$3.5 million decrease in operating income for the years ended December 31, 2018, 2017 and 2016, respectively. The Company does not capitalize costs in assets so there is no impact from that provision of ASU 2017-07.

In May 2017, the FASB issued ASU 2017-09, Stock Compensation - Scope of Modification Accounting, which amends the scope of modification accounting for share-based payment arrangements. This ASU provides guidance on the types of changes to the terms or conditions of share-based payment awards to which an entity would be required to

apply modification accounting. Specifically, an entity would not apply modification accounting if the fair value, vesting conditions, and classification of the awards are the same immediately before and after the modification. This ASU is effective for periods beginning after December 31, 2017. The Company's adoption of ASU 2017-09 on January 1, 2018, did not have a material effect on our consolidated financial statements.

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In January 2018, the FASB issued ASU 2018-02, Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, which gives entities the option to reclassify to retained earnings the tax effects resulting from the new tax reform legislation commonly known as the Tax Cuts and Jobs Act ("the Act") related to items in AOCI that the FASB refers to as having been stranded in AOCI. The new guidance may be applied retrospectively to each period in which the effect of the Act is recognized in the period of adoption. The Company must adopt this guidance for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted for periods for which financial statements have not yet been issued or made available for issuance, including the period the Act was enacted. The guidance, when adopted, will require new disclosures regarding a company's accounting policy for releasing the tax effects in AOCI and permit a company the option to reclassify to retained earnings the tax effects resulting from the Act that are stranded in AOCI. The Company will adopt ASU 2018-02 effective January 1, 2019 and this adoption will result in a reclassification between retained earnings and AOCI. The Company estimates that the impact from ASU 2018-02 will increase retained earnings by approximately \$4.0 million, with an offsetting increase to accumulated other comprehensive loss for the same amount.

In August 2018, the FASB issued ASU 2018-13, Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement, which improves fair value disclosure requirements by removing disclosures that are not cost beneficial, clarifying disclosures' specific requirements and adding relevant disclosure requirements. This ASU is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The amendments on changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements, and the narrative description of measurement uncertainty should be applied prospectively for only the most recent interim or annual period presented in the initial fiscal year of adoption. All other amendments should be applied retrospectively to all periods presented upon their effective date. Early adoption is permitted and an entity can choose to early adopt any removed or modified disclosures upon issuance of this ASU and delay adoption of the additional disclosures until their effective date. The Company is still evaluating the impact that the adoption of ASU 2018-13 will have on the consolidated financial statements and has not yet decided whether to early adopt the amendments.

In August 2018, the FASB issued ASU 2018-14, Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans, which improves defined benefit disclosure requirements by removing disclosures that are not cost beneficial, clarifying disclosures' specific requirements and adding relevant disclosure requirements. This ASU is effective for fiscal years ending after December 15, 2020 and early adoption is permitted. The amendments in this ASU are required to be applied on a retrospective basis to all periods presented. The Company is still evaluating the impact that the adoption of ASU 2018-14 will have on the consolidated financial statements and has not yet decided whether to early adopt the amendments.

In August 2018, the FASB issued ASU 2018-15, Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract, which will now allow all cloud computing arrangements classified as service contracts to capitalize certain implementation costs in accordance with ASC 350-40, Intangibles - Goodwill and Other - Internal-Use Software, depending on the project stage within which the costs were incurred. This ASU is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal periods. Early adoption of the amendments in this ASU is permitted, including adoption in any interim period and the amendments can be applied either retrospectively or prospectively. The Company has adopted this ASU prospectively for all implementation costs incurred related to cloud computing arrangements and the implementation did not have a material impact on our consolidated financial statements.

Note 2—Restructuring Charges

During the years ended December 31, 2018, 2017 and 2016, we recorded restructuring charges, net of adjustments, of \$13.2 million, \$17.6 million and \$5.7 million, respectively. These charges were primarily related to our ongoing initiatives to drive profitable growth and right size our operations.

Americas segment restructuring charges of \$2.3 million during the year ended December 31, 2018, were related to severance costs for staff reductions in our Northern North America and Latin America Regions. International segment restructuring charges of \$5.6 million during the year ended December 31, 2018, were primarily related to severance

costs for staff reductions associated with our ongoing initiatives to drive profitable growth in Europe. Corporate segment restructuring charges of \$5.3 million during the year ended December 31, 2018, related primarily to legal and operational realignment of our U.S. and Canadian operations.

A total of 45 positions were eliminated in 2018. There were 8 positions eliminated in the Americas segment, 34 in the International segment and 3 in the Corporate segment.

Americas segment restructuring charges of \$13.0 million during the year ended December 31, 2017, related primarily to a non-cash special termination benefit expense of \$11.4 million for a voluntary retirement incentive package ("VRIP") as well as severance from staff reductions in Brazil. All benefits were paid from our over funded North America pension plan.

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International segment restructuring charges of \$4.9 million during the year ended December 31, 2017, related to severance costs for staff reductions associated with our ongoing initiatives to drive profitable growth in Europe and right size our operations in Africa. Favorable adjustments for changes in estimates on employee restructuring reserves of \$0.3 million were recorded during the year ended December 31, 2017.

Approximately 155 positions were eliminated in 2017. There were 90 positions eliminated in the Americas segment and approximately 65 in the International segment.

International segment restructuring charges of \$5.3 million during the year ended December 31, 2016, were related to severance costs for staff reductions associated with ongoing initiatives to right size our operations in Europe and Japan. Americas segment restructuring charges of \$1.8 million during the year ended December 31, 2016, related primarily to severance from staff reductions in Brazil and North America. Corporate segment restructuring charges were \$0.2 million during the year ended December 31, 2016. Favorable adjustments for changes in estimates on employee restructuring reserves of \$1.6 million were recorded during the year ended December 31, 2016.

A total of 179 positions were eliminated in 2016. There were 103 positions were eliminated in the Americas segment, 75 in the International segment and one in the Corporate segment.

Activity and reserve balances for restructuring charges by segment were as follows:

(in millions)	Americas	International	Corporate	Total
Reserve balances at January 1, 2016	\$ 1.6	\$ 5.4	\$ 1.1	\$8.1
Restructuring charges	1.8	5.3	0.2	7.3
Currency translation and other adjustments	(0.5)	(0.6)	(0.5)	(1.6)
Cash payments	(2.0)	(7.3)	(0.5)	(9.8)
Reserve balances at December 31, 2016	\$ 0.9	\$ 2.8	\$ 0.3	\$4.0
Restructuring charges	13.0	4.9	—	17.9
Currency translation and other adjustments	(0.2)	(0.1)	—	(0.3)
Cash payments / utilization	(13.2)	(4.0)	(0.3)	(17.5)
Reserve balances at December 31, 2017	\$ 0.5	\$ 3.6	\$ —	\$4.1
Restructuring charges	2.3	5.6	5.3	13.2
Currency translation and other adjustments	(0.3)	(0.3)	—	(0.6)
Cash payments	(2.0)	(4.9)	(5.3)	(12.2)
Reserve balances at December 31, 2018	\$ 0.5	\$ 4.0	\$ —	\$4.5

Note 3—Inventories

The following table sets forth the components of inventory:

(In thousands)	December 31,	
	2018	2017
Finished products	\$65,965	\$66,064
Work in process	6,169	10,141
Raw materials and supplies	124,554	117,388
Inventories at current cost	196,688	193,593
Less: LIFO valuation	(40,086)	(39,854)
Total inventories	\$156,602	\$153,739

Inventories stated on the LIFO basis represent 39% of total inventories at both December 31, 2018 and 2017.

Reductions in certain inventory quantities during the year ended December 31, 2016 resulted in liquidations of LIFO inventories carried at lower costs prevailing in prior years. The effect of LIFO liquidations during 2016 reduced cost of sales by \$0.3 million and increased net income by \$0.2 million. We did not have any LIFO liquidations during the years ended December 31, 2018 and 2017.

Note 4—Property, Plant, and Equipment

The following table sets forth the components of property, plant and equipment:

(In thousands)	December 31,	
	2018	2017
Land	\$3,188	\$3,312
Buildings	117,910	119,970
Machinery and equipment	386,690	379,747
Construction in progress	24,044	12,036
Total	531,832	515,065
Less accumulated depreciation	(373,892)	(358,051)
Property, plant, and equipment, net	\$157,940	\$157,014

Note 5—Reclassifications Out of Accumulated Other Comprehensive Loss

(In thousands)	MSA Safety Incorporated			Noncontrolling Interests		
	2018	2017	2016	2018	2017	2016
Pension and other post-retirement benefits						
Balance at beginning of period	\$(97,948)	\$(118,068)	\$(119,389)	\$—	\$—	\$—
Unrecognized net actuarial (losses) gains	(37,977)	17,659	(12,473)	—	—	—
Unrecognized prior service credit	—	—	1,092	—	—	—
Tax benefit (expense)	9,936	(6,124)	5,033	—	—	—
Total other comprehensive (loss) income before reclassifications, net of tax	(28,041)	11,535	(6,348)	—	—	—
Amounts reclassified from accumulated other comprehensive loss:						
Amortization of prior service credit ^(a)	(424)	(176)	(427)	—	—	—
Recognized net actuarial losses ^(a)	14,507	13,054	11,989	—	—	—
Tax benefit	(3,611)	(4,293)	(3,893)	—	—	—
Total amount reclassified from accumulated other comprehensive loss, net of tax	10,472	8,585	7,669	—	—	—
Total other comprehensive (loss) income	(17,569)	20,120	1,321			
Balance at end of period	\$(115,517)	\$(97,948)	\$(118,068)	\$—	\$—	\$—
Available-for-sale securities						
Balance at beginning of period	\$—	\$—	\$—	\$—	\$—	\$—
Unrealized losses on available-for-sale securities (Note 18)	(572)	—	—	—	—	—
Balance at end of period	\$(572)	—	—	—	—	—
Foreign currency translation						
Balance at beginning of period	\$(73,814)	\$(112,178)	\$(88,810)	\$801	\$(1,964)	\$(3,616)
Reclassification into net income	774 ^(b)	—	2,500 ^(c)	—	—	770 ^(d)
Foreign currency translation adjustments	(29,798)	38,364	(25,868)	(305)	2,765	882
Balance at end of period	\$(102,838)	\$(73,814)	\$(112,178)	\$496	\$801	\$(1,964)

^(a)Included in the computation of net periodic pension and other post-retirement benefit costs (refer to Note 14).

^(b)Included in Currency exchange losses, net on the Consolidated Statement of Income.

^(c)Of the \$2.5 million reclassified into net income, \$3.4 million is included in (Loss) income from discontinued operations (refer to Note 20) on the Consolidated Statement of Income offset by a gain of \$0.9 million included in Currency exchange losses, net.

^(d)Included in Loss from discontinued operations (refer to Note 20) and Net income attributable to noncontrolling interests on the Consolidated Statement of Income.

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Note 6—Capital Stock

Preferred Stock - The Company has authorized 100,000 shares of \$50 par value 4.5% cumulative preferred nonvoting stock which is callable at \$52.50. There are 71,340 shares issued and 52,878 shares held in treasury at December 31, 2018. The Treasury shares at cost line of the Consolidated Balance Sheet includes \$1.8 million related to preferred stock. There were no treasury purchases of preferred stock during the years ended December 31, 2018, 2017 or 2016. The Company has also authorized 1,000,000 shares of \$10 par value second cumulative preferred voting stock. No shares have been issued as of December 31, 2018 or 2017.

Common Stock - The Company has authorized 180,000,000 shares of no par value common stock. There were 62,081,391 shares issued as of both December 31, 2018 and December 31, 2017. There were 38,526,523 and 38,222,928 shares outstanding at December 31, 2018 and 2017, respectively.

Treasury Shares - The Company's stock repurchase program authorizes up to \$100.0 million to repurchase MSA common stock in the open market and in private transactions. The share repurchase program has no expiration date. The maximum number of shares that may be purchased is calculated based on the dollars remaining under the program and the respective month-end closing share price. There were 168,941 shares repurchased during 2017. No shares were repurchased during 2018 or 2016. We do not have any other share repurchase programs. There were 23,554,868 and 23,858,463 Treasury Shares at December 31, 2018 and 2017, respectively.

The Company issues Treasury Shares for all share based benefit plans. Shares are issued from Treasury at the average Treasury Share cost on the date of the transaction. There were 357,510 and 648,164 Treasury Shares issued for these purposes during the years ended December 31, 2018 and 2017, respectively.

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Common stock activity is summarized as follows:

(Dollars in thousands)	Shares		Dollars	
	Issued	Treasury	Common Stock	Treasury Cost
Balances January 1, 2016	62,081,391	(24,708,917)	\$157,643	\$(293,318)
Restricted stock awards	—	29,836	(355)	) 355
Restricted stock expense	—	—	3,604	—
Restricted stock forfeitures	—	(2,800)	) (148)) —
Stock options exercised	—	341,063	5,617	6,859
Stock option expense	—	—	2,484	—
Stock option forfeitures	—	—	(25)) —
Performance stock issued	—	31,093	(371)	) 371
Performance stock expense	—	—	3,324	—
Performance stock forfeitures	—	—	(28)) —
Employee stock purchase plan	—	9,500	458	113
Tax benefit related to stock plans	—	—	478	—
Treasury shares purchased for stock compensation programs	—	(44,588)	) —	(1,881)
Balances December 31, 2016	62,081,391	(24,344,813)	\$172,681	\$(287,501)
Restricted stock awards	—	34,798	(422)	) 422
Restricted stock expense	—	—	4,746	—
Restricted stock forfeitures	—	(690)	) (49)	) (6)
Stock options exercised	—	620,646	10,901	7,564
Stock option expense	—	—	380	—
Performance stock issued	—	72,504	(866)	) 866
Performance stock expense	—	—	6,687	—
Employee stock purchase plan	—	7,127	445	87
Treasury shares purchased for stock compensation programs	—	(79,094)	) —	(5,732)
Stock Repurchase program	—	(168,941)	) —	(11,781)
Acquisition of noncontrolling interest	—	—	450	—
Balances December 31, 2017	62,081,391	(23,858,463)	\$194,953	\$(296,081)
Restricted stock awards	—	92,401	(1,079)	) 1,079
Restricted stock expense	—	—	6,504	—
Restricted stock forfeitures	—	—	(283)) —
Stock options exercised	—	215,724	5,738	2,835
Stock option expense	—	—	272	—
Stock option forfeitures	—	—	(55)) —
Performance stock issued	—	41,660	(523)	) 523
Performance stock expense	—	—	6,186	—
Performance stock forfeitures	—	—	(385)) —
Employee stock purchase plan	—	7,725	478	78
Treasury shares purchased for stock compensation programs	—	(53,915)) —	(4,824)
Balances December 31, 2018	62,081,391	(23,554,868)	\$211,806	\$(296,390)

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Note 7—Segment Information

We are organized into six geographic operating segments based on management responsibilities. The operating segments have been aggregated (based on economic similarities, the nature of their products, end-user markets and methods of distribution) into three reportable segments: Americas, International and Corporate.

The Americas segment is comprised of our operations in North America and Latin America geographies. The International segment is comprised of our operations in all geographies outside of the Americas. Certain global expenses are allocated to each segment in a manner consistent with where the benefits from the expenses are derived. The Company's sales are allocated to each country based primarily on the destination of the end-customer.

Adjusted operating income (loss) and adjusted operating margin are the measures used by the chief operating decision maker to evaluate segment performance and allocate resources. Adjusted operating income (loss) is defined as operating income from continuing operations excluding restructuring charges, currency exchange gains (losses), other operating expense and strategic transaction costs. Adjusted operating margin is defined as adjusted operating income (loss) divided by segment sales to external customers. Adjusted operating income (loss) and adjusted operating margin are not recognized terms under U.S. GAAP, and therefore, do not purport to be alternatives to operating income or operating margin from continuing operations as a measure of operating performance. Further, the Company's measure of adjusted operating income (loss) and adjusted operating margin may not be comparable to similarly titled measures of other companies. Adjusted operating income (loss) on a consolidated basis is presented in the following table to reconcile the segment operating performance measure to operating income as presented on the Consolidated Statement of Income.

The accounting principles applied at the operating segment level in determining operating income (loss) are generally the same as those applied at the consolidated financial statement level. Sales and transfers between operating segments are accounted for at market-based transaction prices and are eliminated in consolidation.

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Reportable segment information is presented in the following table:

(In thousands)	Americas	International	Corporate	Reconciling Items ⁽¹⁾	Consolidated Totals
2018					
Sales to external customers	\$854,287	\$503,817	\$ —	\$ —	\$ 1,358,104
Intercompany sales	136,534	336,361	—	(472,895)	—
Operating income					173,479
Restructuring and other charges (Note 2)					13,247
Currency exchange losses, net					2,330
Other operating expense (Note 19)					45,327
Strategic transaction costs (Note 13)					421
Adjusted operating income (loss)	206,839	59,866	(31,901)	—	234,804
Adjusted operating margin %	24.2	% 11.9	%		
Noncash items:					
Depreciation and amortization	24,143	13,303	406	—	37,852
Pension (income) expense	(1,201)	7,102	—	—	5,901
Total Assets	1,077,938	522,042	10,842	(2,810)	1,608,012
Capital expenditures	25,001	8,959	—	—	33,960
2017					
Sales to external customers	\$736,847	\$459,962	\$ —	\$ —	\$ 1,196,809
Intercompany sales	124,886	304,376	—	(429,262)	—
Operating income					39,577
Restructuring and other charges (Note 2)					17,632
Currency exchange losses, net					5,127
Other operating expense (Note 19)					126,432
Strategic transaction costs (Note 13)					4,225
Adjusted operating income (loss)	175,589	50,391	(32,987)	—	192,993
Adjusted operating margin %	23.8	% 11.0	%		
Noncash items:					
Depreciation and amortization	23,207	14,265	405	—	37,877
Pension (income) expense	246	6,896	—	—	7,142
Total Assets	1,110,698	563,480	12,099	(1,451)	1,684,826
Capital expenditures	16,910	6,815	—	—	23,725
2016					
Sales to external customers	\$678,433	\$471,097	\$ —	\$ —	\$ 1,149,530
Intercompany sales	113,273	275,640	—	(388,915)	—
Operating income					160,702
Restructuring and other charges (Note 2)					5,694
Currency exchange losses, net					766
Other operating expense (Note 19)					—
Strategic transaction costs (Note 13)					2,531
Adjusted operating income (loss)	154,298	51,490	(36,095)	—	169,693
Adjusted operating margin %	22.7	% 10.9	%		
Noncash items:					
Depreciation and amortization	21,046	13,821	406	—	35,273
Pension (income) expense	(544)	6,876	—	—	6,332
Total Assets	836,243	505,278	10,903	1,496	1,353,920
Capital expenditures	16,306	9,217	—	—	25,523

⁽¹⁾Reconciling items consist primarily of intercompany eliminations and items not directly attributable to operating segments.

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Geographic information on sales to external customers, based on country of origin:

(In thousands)	2018	2017	2016
United States	\$734,033	\$622,276	\$580,724
Other	624,071	574,533	568,806
Total	\$1,358,104	\$1,196,809	\$1,149,530

Geographic information on long-lived assets, based on country of origin:

(In thousands)	2018	2017	2016
United States	\$92,511	\$91,730	\$84,674
Other	65,429	65,284	64,004
Total	\$157,940	\$157,014	\$148,678

Total sales by product group was as follows:

2018 (In thousands)	Consolidated		Americas		International	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Breathing Apparatus	\$324,672	24%	\$205,100	24%	\$119,572	24%
Fixed Gas & Flame Detection	262,432	19%	135,922	16%	126,510	25%
Firefighter Helmets & Protective Apparel	169,679	13%	136,794	16%	32,885	6%
Portable Gas Detection	163,716	12%	109,401	13%	54,315	11%
Industrial Head Protection	146,388	11%	114,465	13%	31,923	6%
Fall Protection	109,472	8%	61,289	7%	48,183	10%
Other	181,745	13%	91,316	11%	90,429	18%
Total	\$1,358,104	100%	\$854,287	100%	\$503,817	100%

2017 (In thousands)	Consolidated		Americas		International	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Breathing Apparatus	\$292,448	24%	\$191,457	26%	\$100,991	22%
Fixed Gas & Flame Detection	248,047	21%	123,414	17%	124,633	27%
Firefighter Helmets & Protective Apparel	103,441	9%	69,767	9%	33,674	7%
Portable Gas Detection	149,063	12%	98,580	13%	50,483	11%
Industrial Head Protection	133,180	11%	105,514	14%	27,666	6%
Fall Protection	98,929	8%	54,468	7%	44,461	10%
Other	171,701	15%	93,647	14%	78,054	17%
Total	\$1,196,809	100%	\$736,847	100%	\$459,962	100%

2016 (In thousands)	Consolidated		Americas		International	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Breathing Apparatus	\$303,364	26%	\$199,252	29%	\$104,112	22%
Fixed Gas & Flame Detection	239,601	21%	125,697	19%	113,904	24%
Firefighter Helmets & Protective Apparel	52,577	5%	21,880	3%	30,697	6%
Portable Gas Detection	142,784	12%	91,200	13%	51,584	11%
Industrial Head Protection	118,197	10%	94,750	14%	23,447	5%
Fall Protection	97,021	8%	44,571	7%	52,450	11%
Other	195,986	18%	101,083	15%	94,903	21%
Total	\$1,149,530	100%	\$678,433	100%	\$471,097	100%

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Note 8—Earnings per Share

Basic earnings per share is computed by dividing net income, after the deduction of preferred stock dividends and undistributed earnings allocated to participating securities, by the weighted average number of common shares outstanding during the period. Diluted earnings per share assumes the issuance of common stock for all potentially dilutive share equivalents outstanding not classified as participating securities. Participating securities are defined as unvested stock-based payment awards that contain nonforfeitable rights to dividends.

(In thousands, except per share amounts)	2018	2017	2016
Net income attributable to continuing operations	\$ 124,150	\$ 26,027	\$ 92,691
Preferred stock dividends	(42)	(42)	(42)
Income from continuing operations available to common equity	124,108	25,985	92,649
Dividends and undistributed earnings allocated to participating securities	(117)	(62)	(144)
Income from continuing operations available to common shareholders	123,991	25,923	92,505
Net loss attributable to discontinued operations	\$—	\$—	\$(755)
Preferred stock dividends	—	—	—
Loss from discontinued operations available to common equity	—	—	(755)
Dividends and undistributed earnings allocated to participating securities	—	—	1
Loss from discontinued operations available to common shareholders	—	—	(754)
Basic weighted-average shares outstanding	38,362	37,997	37,456
Stock options and other stock compensation	599	700	530
Diluted weighted-average shares outstanding	38,961	38,697	37,986
Antidilutive stock options	—	—	—
Earnings per share attributable to continuing operations:			
Basic	\$3.23	\$0.68	\$2.47
Diluted	\$3.18	\$0.67	\$2.44
Loss per share attributable to discontinued operations:			
Basic	\$—	\$—	\$(0.02)
Diluted	\$—	\$—	\$(0.02)

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Note 9—Income Taxes

(In thousands)	2018	2017	2016
Components of income (loss) before income taxes*			
U.S. income (loss)	\$85,234	\$(20,555)	\$100,382
Non-U.S. income	77,101	50,330	51,529
Income before income taxes	162,335	29,775	151,911
Provision for income taxes*			
Current			
Federal	\$13,574	\$22,272	\$19,968
State	4,265	813	2,231
Non-U.S.	23,446	11,054	21,188
Total current provision	41,285	34,139	43,387
Deferred			
Federal	\$291	\$(26,931)	\$11,580
State	(1,604)	(3,630)	1,977
Non-U.S.	(2,752)	(759)	860
Total deferred (benefit) provision	(4,065)	(31,320)	14,417
Provision for income taxes	\$37,220	\$2,819	\$57,804

*The components of income before income taxes and the provision for income taxes relate to continuing operations.

The Company elected to treat Global Intangible Low Taxed Income (“GILTI”), which was effective in 2018 for the Company, as a period cost.

The Tax Cuts and Jobs Act of 2017 (“the Act”), which was signed into law on December 22, 2017, has resulted in significant changes to the U.S. corporate income tax system including reducing the U.S. corporate rate to 21% starting in 2018. The Act also creates a territorial tax system with a one-time mandatory tax on previously deferred foreign earnings of U.S. subsidiaries.

On December 22, 2017, SAB 118 was issued to address the application of US GAAP in situations when a registrant does not have the necessary information available, prepared or analyzed in reasonable detail to complete the accounting for certain income tax effects of the Act. In accordance with SAB 118, the Company calculated its best estimate of the impact of the Act and recorded income tax expense of \$19.8 million during the fourth quarter of 2017, the period in which the legislation was enacted. Of this amount, \$18.0 million related to the one-time transition tax and the remaining \$1.8 million was related to the revaluation of U.S. deferred tax assets and liabilities. The company previously considered the earnings in non-U.S. subsidiaries to be indefinitely reinvested and, accordingly, recorded no deferred income taxes. As a result of the Act, among other things, the Company determined it will repatriate earnings for all non-U.S. subsidiaries with cash in excess of working capital needs. The Company has estimated the associated tax to be \$1.9 million, offset partially by \$0.7 million of foreign tax credits. At December 31, 2018, the Company has now completed its accounting for all of the enactment-date income tax effects of the Act. Accordingly, we reduced our estimate for the one-time transition tax by \$2.0 million and increased our estimate for the revaluation of U.S. deferred tax assets and liabilities by \$2.5 million and a \$2.0 million increase associated with prepaid taxes for updated regulations related to the Act.

MSA finalized its European reorganization during 2016. The reorganization is designed to drive optimal performance by aligning certain strategic planning and decision making into a single location enabled by a common IT platform. During 2017, the Company recognized a benefit of \$2.5 million associated with the reduction of exit taxes related to our European reorganization compared to incurring charges of \$6.5 million in 2016 related to the European reorganization.

During 2018, the Company recorded \$1.8 million of foreign income tax reserves related to the legal and operational realignment of our U.S., Canadian and European operations.

Included in discontinued operations is tax expense of \$0.3 million in 2016. There were no discontinued operations in 2018 or 2017.

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Reconciliation of the U.S. federal income tax rates for continuing operations to our effective tax rate:

	2018	2017	2016
U.S. federal income tax rate	21.0 %	35.0 %	35.0 %
U.S. tax reform	1.6 %	66.6 %	— %
State income taxes—U.S.	1.3 %	(6.2)%	1.8 %
Taxes on non-U.S. income - U.S., Canadian & European reorganization	1.1 %	(8.4)%	4.3 %
Valuation allowances	0.5 %	(3.3)%	1.5 %
Taxes on non-U.S. income	0.4 %	(24.6)%	(2.5)%
Employee share-based payments	(1.6)%	(28.0)%	— %
Manufacturing deduction credit	(1.0)%	(15.3)%	(1.3)%
Research and development credit	(0.9)%	(4.7)%	(0.6)%
Other	0.5 %	(1.6)%	(0.1)%
Effective income tax rate	22.9 %	9.5 %	38.1 %

Components of deferred tax assets and liabilities:

	December 31,	
(In thousands)	2018	2017
Deferred tax assets		
Product liability	\$31,169	\$28,481
Capitalized research and development	10,938	2,442
Employee benefits	9,641	6,401
Net operating losses and tax credit carryforwards	7,845	10,013
Share-based compensation	5,561	6,444
Accrued expenses and other reserves	4,385	4,237
Other	4,056	2,691
Total deferred tax assets	73,595	60,709
Valuation allowances	(5,039)	(4,559)
Net deferred tax assets	68,556	56,150
Deferred tax liabilities		
Goodwill and intangibles	(31,290)	(30,368)
Property, plant and equipment	(9,555)	(8,056)
Other	(2,353)	(1,242)
Total deferred tax liabilities	(43,198)	(39,666)
Net deferred taxes	\$25,358	\$16,484

At December 31, 2018, we had net operating loss carryforwards of approximately \$29.5 million, all of which are in non-U.S. tax jurisdictions. All net operating loss carryforwards without a valuation allowance may be carried forward for a period of at least six years. The change in valuation allowance for the year of \$0.5 million is primarily due to our inability to recognize deferred tax assets on certain foreign entities that continue to generate losses partially offset by the release of a valuation allowance on certain losses.

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A reconciliation of the change in the tax liability for unrecognized tax benefits for the years ended December 31, 2018 and 2017 is as follows:

(In thousands)	2018	2017
Beginning balance	\$15,055	\$14,393
Adjustments for tax positions related to the current year	1,869	1,921
Adjustments for tax positions related to prior years	(32)	(766)
Statute expiration	(737)	(493)
Ending balance	\$16,155	\$15,055

The total amount of unrecognized tax benefits, if recognized, would reduce our future effective tax rate. We have recognized tax benefits associated with these liabilities in the amount of \$5.2 million and \$5.5 million at December 31, 2018 and 2017, respectively.

We recognize interest related to unrecognized tax benefits in interest expense and penalties in operating expenses. Our liability for accrued interest and penalties related to uncertain tax positions was \$3.3 million and \$2.2 million at December 31, 2018 and 2017, respectively.

We file a U.S. federal income tax return along with various state and foreign income tax returns. Examinations of our U.S. federal returns have been completed through 2013, with the 2014 tax year closed by statute. Various state and foreign income tax returns may be subject to tax audits for periods after 2010.

Note 10—Stock Plans

The 2016 Management Equity Incentive Plan provides for various forms of stock-based compensation for eligible key employees through May 2026. Management stock-based compensation includes stock options, restricted stock, restricted stock units and performance stock units. The 2017 Non-Employee Directors' Equity Incentive Plan provides for grants of stock options and restricted stock to non-employee directors through May 2027. Stock options are granted at market prices and expire after ten years. Stock options are exercisable beginning three years after the grant date. Restricted stock and restricted stock units are granted without payment to the Company and generally vest three years after the grant date. Restricted stock and restricted stock units are valued at the market value of the stock on the grant date. Performance stock units with a market condition are valued at an estimated fair value using the Monte Carlo model. The final number of shares to be issued for performance stock units may range from zero to 200% of the target award based on achieving the specified performance targets over the performance period. In general, unvested stock options, restricted stock and performance stock units are forfeited if the participant's employment with the Company terminates for any reason other than retirement, death or disability. We issue Treasury shares for stock option exercises and grants of restricted stock and performance stock. Please refer to Note 6 for further information regarding stock compensation share issuance. As of December 31, 2018, there were 1,054,730 and 114,878 shares, respectively, reserved for future grants under the management and non-employee directors' equity incentive plans. Stock-based compensation expense was as follows:

(In thousands)	2018	2017	2016
Restricted stock	\$6,221	\$4,691	\$3,456
Stock options	217	380	2,459
Performance stock	5,801	6,687	3,296
Total compensation expense before income taxes	12,239	11,758	9,211
Income tax benefit	2,974	4,440	3,375
Total compensation expense, net of income tax benefit	\$9,265	\$7,318	\$5,836

We did not capitalize any stock-based compensation expense, and all expense is recorded in selling, general and administrative expense in 2018, 2017, and 2016.

Stock option expense is based on the fair value of stock option grants estimated on the grant dates using the Black-Scholes option pricing model and the following weighted average assumptions for options granted in 2016. There were no stock options granted in 2018 and 2017.

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	2016
Fair value per option	\$11.69
Risk-free interest rate	1.6 %
Expected dividend yield	2.8 %
Expected volatility	34 %
Expected life (years)	7.0

The risk-free interest rate is based on the U.S. Treasury Constant Maturity rates as of the grant date converted into an implied spot rate yield curve. Expected dividend yield is based on the most recent annualized dividend divided by the one year average closing share price. Expected volatility is based on the ten year historical volatility using daily stock prices. Expected life is based on historical stock option exercise data.

A summary of option activity follows:

	Shares	Weighted Average Exercise Price	Exercisable at Year-end
Outstanding January 1, 2016	1,694,675	\$ 36.69	
Granted	235,233	44.50	
Exercised	(341,063)	37.34	
Forfeited	(12,753)	46.11	
Outstanding December 31, 2016	1,576,092	37.63	1,098,615
Exercised	(620,646)	29.75	
Outstanding December 31, 2017	955,446	42.75	614,414
Exercised	(215,724)	39.25	
Forfeited	(4,721)	44.50	
Outstanding December 31, 2018	735,001	\$ 43.79	638,673

For various exercise price ranges, characteristics of outstanding and exercisable stock options at December 31, 2018 were as follows:

Range of Exercise Prices	Stock Options Outstanding		
	Shares	Weighted-Average Exercise Price	Remaining Life
\$17.83 – \$33.00	39,485	\$25.01	0.90
\$33.01 – \$45.00	359,713	40.39	4.32
\$45.01 – \$51.69	335,803	49.64	4.65
\$17.83 – \$51.69	735,001	\$43.79	4.28

Range of Exercise Prices	Stock Options Exercisable		
	Shares	Weighted-Average Exercise Price	Remaining Life
\$17.83 – \$33.00	39,485	\$25.01	0.90
\$33.01 – \$45.00	263,385	38.89	3.27
\$45.01 – \$51.69	335,803	49.64	4.65
\$17.83 – \$51.69	638,673	\$43.68	3.85

Cash received from the exercise of stock options was \$8.6 million, \$18.5 million and \$12.5 million for the years ended December 31, 2018, 2017 and 2016, respectively. The tax benefit we realized from these exercises was \$2.5 million, \$7.4 million and \$0.6 million for the years ended December 31, 2018, 2017 and 2016, respectively.

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Stock options become exercisable when they are vested. The aggregate intrinsic value of stock options exercisable at December 31, 2018 was \$60.2 million. The aggregate intrinsic value of all stock options outstanding at December 31, 2018 was \$69.3 million.

A summary of restricted stock and unit activity follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested January 1, 2016	217,709	\$ 49.70
Granted	107,465	50.65
Vested	(76,568)	49.12
Forfeited	(14,014)	48.23
Unvested at December 31, 2016	234,592	49.76
Granted	72,878	75.27
Vested	(76,834)	52.74
Forfeited	(3,475)	50.46
Unvested at December 31, 2017	227,161	57.50
Granted	75,430	87.36
Vested	(92,401)	58.10
Forfeited	(4,741)	59.61
Unvested at December 31, 2018	205,449	\$ 68.97

A summary of performance stock unit activity follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested at January 1, 2016	171,644	\$ 50.24
Granted	65,355	44.28
Vested	(31,093)	58.54
Performance adjustments	(15,682)	58.54
Forfeited	(3,603)	44.47
Unvested at December 31, 2016	186,621	46.18
Granted	98,886	72.73
Vested	(72,504)	57.19
Performance adjustments	29,183	57.27
Forfeited	—	—
Unvested at December 31, 2017	242,186	55.06
Granted	62,775	84.79
Vested	(41,660)	40.23
Performance adjustments	(35,756)	45.21
Forfeited	(8,659)	44.53
Unvested at December 31, 2018	218,886	\$ 68.43

The 2018 performance adjustments above relate to adjustments made relative to awards that did not meet the performance targets when vested during 2018 including the final number of shares issued for the 2015 Management Performance Units, which were 93.6% of the target award based on Total Shareholder Return during the three year

performance period, and vested in the first quarter of 2018.

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During the years ended December 31, 2018, 2017 and 2016, the total intrinsic value of stock options exercised (the difference between the market price on the date of exercise and the option price paid to exercise the option) was \$12.2 million, \$29.3 million and \$6.4 million, respectively. The fair values of restricted stock vested during the years ended December 31, 2018, 2017 and 2016 were \$5.4 million, \$4.1 million and \$3.7 million, respectively. The fair value of performance stock units vested during the years ended December 31, 2018, 2017 and 2016 was \$1.7 million, \$4.1 million and \$1.8 million, respectively.

On December 31, 2018, there was \$8.1 million of unrecognized stock-based compensation expense. The weighted average period over which this expense is expected to be recognized was approximately 1.7 years.

Note 11—Short and Long-Term Debt

Short-Term Debt

Short-term borrowings with banks, which excludes the current portion of long-term debt, was insignificant at December 31, 2018 and 2017, respectively. The average month-end balance of total short-term borrowings during 2018 was \$0.1 million. The maximum month-end balance of \$0.3 million occurred in May 2018.

Long-Term Debt

(In thousands)	December 31, 2018	2017
2006 Senior Notes payable through 2021, 5.41%, net of debt issuance costs	\$ —	\$ 26,667
2010 Senior Notes payable through 2021, 4.00%, net of debt issuance costs	60,000	80,000
2016 Senior Notes payable through 2031, 3.40%, net of debt issuance costs	69,604	74,139
Senior revolving credit facility maturing in 2023, net of debt issuance costs	231,707	293,693
Total	361,311	474,499
Amounts due within one year	20,000	26,667
Long-term debt	\$ 341,311	\$ 447,832

On September 7, 2018, the Company entered into a Third Amended and Restated Credit Agreement associated with our senior revolving credit facility which extended the term of the revolving credit facility through September 2023 and increased the capacity to \$600.0 million. Under this 2018 Amended and Restated Credit Agreement, the Company may elect either a Base rate of interest ("BASE") or an interest rate based on the London Interbank Offered Rate ("LIBOR"). The BASE is a daily fluctuating per annum rate equal to the highest of (i) 0.00%, (ii) the Prime Rate, (ii) the Federal Funds Open Rate plus one half of one percent (0.5%), (iii) the Overnight Bank Funding Rate, plus one half of one percent (0.5%), or (iv) the Daily Libor Rate plus one percent (1.00%). The Company pays a credit spread of 0 to 175 basis points based on the Company's net EBITDA leverage ratio and the elected rate (BASE or LIBOR). The Company has a weighted average revolver interest rate of 3.47% as of December 31, 2018. At December 31, 2018, \$363.5 million of the existing \$600.0 million senior revolving credit facility was unused, including letters of credit. On January 22, 2016, the Company entered into a Second Amended and Restated Multi-Currency Note Purchase and Private Shelf Agreement (the "Notes"), pursuant to which MSA issued notes in an aggregate original principal amount

of £54.9 million (approximately \$69.7 million at December 31, 2018). The Notes are repayable in annual installments of £6.1 million (approximately \$7.7 million at December 31, 2018), commencing January 22, 2023, with a final payment of any remaining amount outstanding on January 22, 2031. The interest rate on these Notes is fixed at 3.4%. On September 7, 2018, the Company entered into an amended and restated agreement associated with these Notes. Under the Second Amended and Restated Multi-Currency Note Purchase and Private Shelf Agreement, as amended ("Amended Note Purchase Agreement"), the Company may request from time to time during a three-year period ending September 7, 2021, the issuance of up to \$150 million of additional senior notes.

On January 4, 2019, the Company entered into an amended and restated agreement associated with the New York Life master note facility dated June 2, 2014. Under this Amended and Restated Master Note Facility ("Amended Note Facility"), the Company may request from time to time during a three-year period ending January 4, 2022, the issuance of up to \$150 million of additional senior promissory notes. As of the Form 10-K filing date, there are no promissory notes outstanding.

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Both the Amended Note Purchase Agreement and Amended Note Facility require MSA to comply with specified financial covenants, including a requirement to maintain a minimum fixed charges coverage ratio of not less than 1.50 to 1.00 and a consolidated net leverage ratio not to exceed 3.50 to 1.00, except during an acquisition period in which case the consolidated net leverage ratio shall not exceed 4.00 to 1.00; in each case calculated on the basis of the trailing four fiscal quarters. In addition, the Amended Note Purchase Agreement and Amended Note Facility both contain negative covenants limiting the ability of MSA and its subsidiaries to incur additional indebtedness or issue guarantees, create or incur liens, make loans and investments, make acquisitions, transfer or sell assets, enter into transactions with affiliated parties, make changes in its organizational documents that are materially adverse to lenders or modify the nature of MSA's or its subsidiaries' business. However, the covenants contained in the Amended Note Facility do not apply until promissory notes are issued.

On August 24, 2018, we repaid our 5.41% 2006 Senior Notes. In connection with the payoff of these notes, MSA recognized a loss on extinguishment of debt of \$1.5 million which was recorded in loss on extinguishment of debt on our consolidated statement of income.

Approximate maturities on our long-term debt over the next five years are \$20.0 million in 2019, \$20.0 million in 2020, \$20.0 million in 2021, none in 2022, \$241.2 million in 2023, and \$62.0 million thereafter. The revolving credit facilities require the Company to comply with specified financial covenants. In addition, the credit facilities contain negative covenants limiting the ability of the Company and its subsidiaries to enter into specified transactions. The Company was in compliance with all covenants at December 31, 2018.

The Company had outstanding bank guarantees and standby letters of credit with banks as of December 31, 2018, totaling \$11.4 million, of which \$3.1 million relate to the senior revolving credit facility. The letters of credit serve to cover customer requirements in connection with certain sales orders and insurance companies. The full amount of the letters of credit remains unused and available at December 31, 2018. The Company is also required to provide cash collateral in connection with certain arrangements. At December 31, 2018, the Company has \$0.5 million of restricted cash in support of these arrangements.

Note 12—Goodwill and Intangible Assets

Changes in goodwill during the years ended December 31, 2018 and 2017 were as follows:

(In thousands)	2018	2017
Net balance at January 1	\$422,185	\$333,276
Additions (Note 13)	—	74,453
Disposals	(525)	—
Currency translation	(8,020)	14,456
Net balance at December 31	\$413,640	\$422,185

At December 31, 2018, goodwill of \$273.2 million and \$140.4 million related to the Americas and International reporting segments, respectively.

Changes in intangible assets, net of accumulated amortization, during the years ended December 31, 2018 and 2017 were as follows:

(In thousands)	2018	2017
Net balance at January 1	\$183,088	\$77,015
Additions (Note 13)	—	110,680
Amortization expense	(10,509)	(9,434)
Currency translation	(3,064)	4,827
Net balance at December 31	\$169,515	\$183,088

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(In millions)	Weighted Average Useful Life (years)	December 31, 2018			December 31, 2017		
		Gross Carrying Amount	Accumulated Amortization and Reserves	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization and Reserves	Net Carrying Amount
Customer relationships	14	\$46.7	\$ (10.6)	\$ 36.1	\$49.6	\$ (7.6)	\$ 42.0
Distribution agreements	20	66.1	(14.1)	52.0	66.3	(10.9)	55.4
Technology related assets	8	28.3	(15.5)	12.8	28.7	(13.0)	15.7
Patents, trademarks and copyrights	12	18.7	(10.4)	8.3	19.2	(9.7)	9.5
License agreements	5	5.3	(5.3)	—	5.3	(5.3)	—
Other	2	2.9	(2.6)	0.3	2.9	(2.5)	0.4
Total	15	\$168.0	\$ (58.5)	\$ 109.5	\$172.0	\$ (49.0)	\$ 123.0

During 2017, we acquired a trade name with an indefinite life totaling \$60.0 million. This intangible asset is tested for impairment on October 1st of each year, or more frequently if indicators of impairment exist.

Intangible asset amortization expense over the next five years is expected to be approximately \$10 million in 2019 through 2021, \$9 million in 2022, and \$8 million in 2023.

Note 13—Acquisitions

Acquisition of Globe Holding Company, LLC

On July 31, 2017, we acquired 100% of the common stock in Globe Holding Company, LLC ("Globe") in an all-cash transaction valued at \$215 million plus a working capital adjustment of \$1.4 million. There is no contingent consideration.

Based in Pittsfield, NH, Globe is a leading innovator and provider of firefighter protective clothing and boots. This acquisition aligns with our corporate strategy in that it strengthens our leading position in the North American fire service market. The transaction was funded through borrowings on our unsecured senior revolving credit facility. Globe operating results are included in our consolidated financial statements from the acquisition date as part of the Americas reportable segment. The acquisition qualifies as a business combination and was accounted for using the acquisition method of accounting.

We finalized the purchase price allocation as of June 30, 2018. The following table summarizes the fair values of the Globe assets acquired and liabilities assumed at the date of acquisition:

(In millions)	July 31, 2017
Current assets (including cash of \$58 thousand)	\$28.6
Property, plant and equipment	8.3
Trade name	60.0
Distributor relationships	40.2
Acquired technology and other intangible assets	10.5
Goodwill	74.5
Total assets acquired	222.1
Total liabilities assumed	5.7
Net assets acquired	\$216.4

Assets acquired and liabilities assumed in connection with the acquisition have been recorded at their fair values. Fair values were determined by management, based, in part on an independent valuation performed by a third party valuation specialist. The valuation methods used to determine the fair value of intangible assets included the relief from royalty method for trade name and technology related intangible assets; the excess earnings approach for distributor relationships using distributor inputs and contributory charges; and the cost method for assembled workforce which is included in goodwill. A number of significant assumptions and estimates were involved in the

application of these valuation methods, including sales volumes and prices, royalty rates, costs to produce, tax rates, capital spending, discount rates, and working capital changes. Cash flow forecasts were generally based on Globe pre-acquisition forecasts coupled with estimated MSA sales synergies.

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Identifiable intangible assets with finite lives are subject to amortization over their estimated useful lives. The distributor relationships acquired in the Globe transaction will be amortized over a period of 20 years and the remaining identifiable assets will be amortized over 5 years. The trade name was determined to have an indefinite useful life. We will perform an impairment assessment annually on October 1st on the trade name, or sooner if there is a triggering event. Additionally, as part of each impairment assessment, we will reassess whether the asset continues to have an indefinite life or whether it should be reassessed with a finite life. Estimated future amortization expense related to the identifiable intangible assets is approximately \$4.1 million in each of the next three years, \$3.2 million in year four, and \$2.0 million in year five. Estimated future depreciation expense related to Globe property, plant and equipment is approximately \$1.0 million in each of the next five years.

Acquisition of Senscient, Inc.

On September 19, 2016, we acquired 100% of the common stock of Senscient, Inc. ("Senscient") for \$19.1 million in cash. There is no contingent consideration. Senscient, which is headquartered in the UK, is a leader in laser-based gas detection technology. The acquisition of Senscient expands and enhances MSA's technology offerings in the global market for fixed gas and flame detection systems, as the Company continues to execute its core product growth strategy. The acquisition was funded through borrowings on our unsecured senior revolving credit facility.

We finalized the purchase price allocation as of September 30, 2017. The following table summarizes the fair values of the Senscient assets acquired and liabilities assumed at the date of acquisition:

(In millions)	September 19, 2016
Current assets (including cash of \$0.7 million)	\$ 5.9
Property, plant and equipment and other noncurrent assets	0.3
Acquired technology	1.6
Customer-related intangibles	2.8
Goodwill	10.5
Total assets acquired	21.1
Total liabilities assumed	2.0
Net assets acquired	\$ 19.1

Assets acquired and liabilities assumed in connection with both acquisitions have been recorded at their fair values. Fair values were determined by management, based, in part on an independent valuation performed by a third party valuation specialist. The valuation methods used to determine the fair value of intangible assets included the excess earnings approach for all customer relationships and Latchways technology related intangible assets; the relief from royalty method for the Latchways trade name and Senscient technology related intangible assets; and the cost method for assembled workforce which is included in goodwill for both acquisitions. A number of significant assumptions and estimates were involved in the application of these valuation methods, including sales volumes and prices, costs to produce, tax rates, capital spending, discount rates, and working capital changes. Cash flow forecasts were generally based on Senscient pre-acquisition forecasts coupled with estimated MSA sales synergies. Identifiable intangible assets with finite lives are subject to amortization over their estimated useful lives. The identifiable intangible assets for Senscient include technology and customer-related intangibles which will be amortized over ten and five years, respectively. Estimated future amortization expense related to Senscient identifiable intangible assets is approximately \$0.7 million in years one and two, \$0.5 million in year three and \$0.2 million in years four and five.

Goodwill is calculated as the excess of the purchase price over the fair value of net assets acquired and represents the future economic benefits arising from other assets acquired that could not be individually identified and separately recognized. Among the factors that contributed to a purchase price in excess of the fair value of the net tangible and intangible assets acquired were the acquisition of an assembled workforce, the expected synergies and other benefits that we believe will result from combining the operations of Globe, Latchways and Senscient with our operations.

Goodwill of \$74.5 million related to the Globe acquisition has been recorded in the Americas reportable segment and is expected to be tax deductible. Goodwill of \$10.5 million related to the Senscient acquisition was recorded in the International reportable segment and is expected to be tax deductible.

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Our results for the year ended December 31, 2018 include strategic transaction costs of \$0.4 million, including an immaterial amount of integration costs of related to the Globe acquisition. Our results for the year ended December 31, 2017 include strategic transaction costs of \$4.2 million, including transaction and integration costs of \$1.8 million related to the Globe acquisition as well as integration costs of \$0.4 million related to the Senscient acquisition. Our results for the year ended December 31, 2016, include strategic transaction costs of \$2.5 million including transaction and integration costs of \$0.8 million related to the Senscient acquisition. These costs are all reported in selling, general and administrative expenses.

The operating results of both acquisitions have been included in our consolidated financial statements from the acquisition date. Our results for the year ended December 31, 2018 include Globe sales of \$113.9 million and net income of \$13.3 million. These results include depreciation expense of \$1.0 million and amortization expense of \$4.1 million. Excluding transaction and integration costs, Globe provided \$13.6 million of net income for the year ended December 31, 2018. Our results for the year ended December 31, 2017 include Globe sales of \$46.1 million and net income of \$3.7 million. These results include depreciation expense of \$0.5 million and amortization expense of \$1.7 million. Excluding transaction and integration costs, Globe provided \$4.9 million of net income for the year ended December 31, 2017. Our results for the year ended December 31, 2016 include Senscient sales of \$2.7 million and a net loss of \$1.1 million which includes amortization, primarily related to intangible assets, of \$0.2 million.

The following unaudited pro forma information presents our combined results as if both acquisitions had occurred at the beginning of 2016. The unaudited pro forma financial information was prepared to give effect to events that are (1) directly attributable to the acquisition; (2) factually supportable; and (3) expected to have a continuing impact on the combined company's results. There were no material transactions between MSA and Senscient or Globe during the periods presented that are required to be eliminated. Intercompany transactions between Senscient companies and Globe companies during the periods presented have been eliminated in the unaudited pro forma combined financial information. The unaudited pro forma financial information does not reflect any cost savings, operating synergies or revenue enhancements that the combined companies may achieve as a result of the acquisitions or the costs to integrate the operations or the costs necessary to achieve cost savings, operating synergies or revenue enhancements. Pro forma financial information (Unaudited)

(In millions, except per share amounts)	2017	2016
Net sales	\$1,261	\$1,263
Income from continuing operations	35	105
Basic earnings per share from continuing operations	0.93	2.81
Diluted earnings per share from continuing operations	0.92	2.78

The unaudited pro forma combined financial information is presented for information purposes only and is not intended to represent or be indicative of the combined results of operations or financial position that we would have reported had the acquisitions been completed as of the date and for the periods presented, and should not be taken as representative of our consolidated results of operations or financial condition following the acquisitions. In addition, the unaudited pro forma combined financial information is not intended to project the future financial position or results of operations of the combined company.

The unaudited pro forma financial information was prepared using the acquisition method of accounting for both acquisitions under existing U.S. GAAP. MSA has been treated as the acquirer.

Note 14—Pensions and Other Post-retirement Benefits

We maintain various defined benefit and defined contribution plans covering the majority of our employees. Our principal U.S. plan is funded in compliance with the Employee Retirement Income Security Act (ERISA). It is our general policy to fund current costs for the international plans, except in Germany and Mexico, where it is common practice and permissible under tax laws to accrue book reserves.

We provide health care benefits and limited life insurance for certain retired employees who are covered by our principal U.S. defined benefit pension plan until they become Medicare-eligible.

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Information pertaining to defined benefit pension plans and other post-retirement benefits plans is provided in the following table:

(In thousands)	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Change in Benefit Obligations				
Benefit obligations at January 1	\$560,385	\$503,997	\$22,027	\$23,680
Service cost	11,125	11,023	369	403
Interest cost	17,214	18,450	793	882
Participant contributions	97	100	302	264
Plan amendments	—	—	—	(1,694)
Actuarial (gains) losses	(29,181)	27,967	7,841	1,465
Benefits paid	(23,724)	(28,953)	(2,855)	(2,973)
Curtailments	(2,151)	—	—	—
Settlements	(726)	(573)	—	—
Special termination benefits	—	11,384	—	—
Currency translation	(7,519)	16,990	—	—
Benefit obligations at December 31	525,520	560,385	28,477	22,027
Change in Plan Assets				
Fair value of plan assets at January 1	492,677	433,262	—	—
Actual return on plan assets	(26,804)	81,192	—	—
Employer contributions	4,718	4,094	2,553	2,709
Participant contributions	97	100	302	264
Settlements	(726)	(573)	—	—
Benefits paid	(23,724)	(28,953)	(2,855)	(2,973)
Administrative Expenses Paid	(704)	(222)	—	—
Currency translation	(2,422)	3,777	—	—
Fair value of plan assets at December 31	443,112	492,677	—	—
Funded Status				
Funded status at December 31	(82,408)	(67,708)	(28,477)	(22,027)
Unrecognized transition losses	5	6	—	—
Unrecognized prior service credit	(687)	(764)	(1,924)	(2,328)
Unrecognized net actuarial losses	178,640	162,032	12,096	5,007
Net amount recognized	95,550	93,566	(18,305)	(19,348)
Amounts Recognized in the Balance Sheet				
Noncurrent assets	57,568	83,060	—	—
Current liabilities	(5,741)	(5,126)	(2,736)	(1,584)
Noncurrent liabilities	(134,231)	(145,642)	(25,741)	(20,443)
Net amount recognized	(82,404)	(67,708)	(28,477)	(22,027)
Amounts Recognized in Accumulated Other Comprehensive Loss				
Net actuarial losses	178,640	162,032	12,096	5,007
Prior service credit	(687)	(764)	(1,924)	(2,328)
Unrecognized net initial obligation	5	6	—	—
Total (before tax effects)	177,958	161,274	10,172	2,679
Accumulated Benefit Obligations for all Defined Benefit Plans	489,159	525,385	—	—

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(In thousands)	Pension Benefits			Other Benefits		
	2018	2017	2016	2018	2017	2016
Components of Net Periodic Benefit Cost						
Service cost	\$11,125	\$11,023	\$10,417	\$369	\$403	\$426
Interest cost	17,214	18,450	18,752	793	882	946
Expected return on plan assets	(36,352)	(35,417)	(34,751)	—	—	—
Amortization of transition amounts	1	2	2	—	—	—
Amortization of prior service credit	(21)	(19)	(14)	(405)	(307)	(419)
Recognized net actuarial losses	13,755	12,955	11,921	752	100	68
Settlement/curtailment loss (credit)	179	148	5	—	(562)	—
Special termination charge	—	11,384	(b) —	—	—	—
Net periodic benefit cost ^(a)	\$5,901	\$18,526	\$6,332	\$1,509	\$516	\$1,021

^(a) Components of net periodic benefit cost other than service cost are included in the line item "Other income, net" in the income statement.

^(b) Represents the charge for special termination benefits related to the VRIP which were paid from our over funded North

America pension plan and recorded as restructuring charges on the Consolidated Statement of Income. See further details in Note 2—Restructuring Charges.

Effective December 31, 2017, the Company changed the method it uses to estimate the service and interest cost components of net periodic benefit cost for pension and other post-retirement benefits for a majority of its U.S. and foreign plans. Historically, the service and interest cost components for these plans were estimated using a single weighted-average discount rate derived from the yield curve used to measure the projected benefit obligation at the beginning of the period. The Company has elected to utilize a spot rate approach, which discounts the individual plan specific expected cash flows underlying the service and interest cost using the applicable spot rates derived from a yield curve used in the determination of the benefit obligation to the relevant projected cash flows. The Company made this change to improve the correlation between projected benefit cash flows and the corresponding yield curve spot rates and to provide a more precise measurement of service and interest costs. This change does not affect the measurement of total benefit obligations. Service and interest cost for the pension and OPEB plans were reduced by an estimated \$1.8 million in 2018 as a result of this change. The Company has accounted for this change to the spot rate approach as a change in accounting estimate that is inseparable from a change in accounting principle, pursuant to Accounting Standards Codification (ASC) 250, Accounting Changes and Error Corrections, and accordingly, has accounted for it prospectively. For plans where the discount rate is not derived from plan specific expected cash flows, the Company will continue to employ the current approaches for measuring both the projected benefit obligations and the service and interest cost components of net periodic benefit cost for pension and other post-retirement benefits. We recognize, as of a measurement date, any unrecognized actuarial net gains or losses that exceed 10% of the larger of the projected benefit obligations or the plan assets, defined as the "corridor." Amounts inside the corridor are amortized over the plan participants' life expectancy.

Amounts included in accumulated other comprehensive income expected to be recognized in 2019 net periodic benefit costs:

(In thousands)	Pension Benefits	Other Benefits
Loss recognition	\$ 12,521	\$ 981
Prior service credit recognition	(19)	(405)
Transition obligation recognition 2	—	—

Information for pension plans with an accumulated benefit obligation in excess of plan assets:

(In thousands)	2018	2017
Aggregate accumulated benefit obligations (ABO)	\$159,545	\$169,065
Aggregate projected benefit obligations (PBO)	168,819	182,159
Aggregate fair value of plan assets	28,876	31,471

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	Pension Benefits		Other Benefits	
	2018	2017	2018	2017
Assumptions used to determine benefit obligations				
Average discount rate	3.79 %	3.34 %	4.21 %	3.57 %
Rate of compensation increase	3.00 %	3.00 %	—	—
Assumptions used to determine net periodic benefit cost				
Average discount rate	3.34 %	3.67 %	3.57 %	4.05 %
Expected return on plan assets	7.99 %	8.04 %	—	—
Rate of compensation increase	3.00 %	2.99 %	—	—

Discount rates for a majority of our U.S. and foreign plans were determined using the aforementioned spot rate methodology for 2018 and 2017. All remaining plans' discount rates were determined using various corporate bond indexes as indicators of interest rate levels and movements and by matching our projected benefit obligation payment stream to current yields on high quality bonds.

The expected return on assets for the 2018 net periodic pension cost was determined by multiplying the expected returns of each asset class (based on historical returns) by the expected percentage of the total portfolio invested in that asset class. A total return was determined by summing the expected returns over all asset classes.

	Pension Plan Assets at December 31,			
	2018		2017	
Equity securities	58	%	57	%
Fixed income securities	25		26	
Pooled investment funds	11		12	
Insurance contracts	4		3	
Cash and cash equivalents	2		2	
Total	100	%	100	%

The overall objective of our pension investment strategy is to earn a rate of return over time to satisfy the benefit obligations of the pension plans and to maintain sufficient liquidity to pay benefits and meet other cash requirements of our pension funds. Investment policies for our primary U.S. pension plan are determined by the plan's Investment Committee and set forth in the plan's investment policy. Asset managers are granted discretion for determining sector mix, selecting securities and timing transactions, subject to the guidelines of the investment policy. An aggressive, flexible management of the portfolio is permitted and encouraged, with shifts of emphasis among equities, fixed income securities and cash equivalents at the discretion of each manager. No target asset allocations are set forth in the investment policy. For our non-U.S. pension plans, our investment objective is generally met through the use of pooled investment funds and insurance contracts.

The fair values of the Company's pension plan assets are determined using net asset value (NAV) as a practical expedient, or by information categorized in the fair value hierarchy level based on the inputs used to determine fair value, as further discussed in Note 18—Fair Value Measurements. The fair values at December 31, 2018, were as follows:

(In thousands)	Total	NAV	Fair Value		
			Fair Value Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Equity securities	\$259,014	\$62,027	\$196,987	\$ —	\$ —
Fixed income securities	109,876	—	28,312	81,564	—
Pooled investment funds	49,823	49,823	—	—	—

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Insurance contracts	17,033	—	—	—	17,033
Cash and cash equivalents	7,366	6,259	1,107	—	—
Total	\$443,112	\$118,109	\$226,406	\$81,564	\$17,033

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The fair values of the Company's pension plan assets at December 31, 2017, were as follows:

(In thousands)	Total	NAV	Fair Value		
			Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Equity securities	\$278,606	\$64,840	\$213,766	\$ —	\$ —
Fixed income securities	127,128	—	40,778	86,350	—
Pooled investment funds	60,014	60,014	—	—	—
Insurance contracts	17,834	—	—	—	17,834
Cash and cash equivalents	9,095	7,974	1,121	—	—
Total	\$492,677	\$132,828	\$255,665	\$ 86,350	\$ 17,834

Equity securities consist primarily of publicly traded U.S. and non-U.S. common stocks. Equities are valued at closing prices reported on the listing stock exchange.

Fixed income securities consist primarily of U.S. government and agency bonds and U.S. corporate bonds. Fixed income securities are valued at closing prices reported in active markets or based on yields currently available on comparable securities of issuers with similar credit ratings. When quoted prices are not available for identical or similar bonds, the bond is valued under a discounted cash flow approach that maximizes observable inputs, such as current yields of similar instruments, and may include adjustments, for certain risks that may not be observable, such as credit and liquidity risks.

A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Pooled investment funds consist of mutual and collective investment funds that invest primarily in publicly traded equity and fixed income securities. Pooled investment funds are valued using the net asset value (NAV) provided by the administrator of the fund. The NAV is based on the value of the underlying assets owned by the fund, minus its liabilities, divided by the number of shares outstanding. The underlying securities are generally valued at closing prices reported in active markets, quoted prices of similar securities, or discounted cash flows approach that maximizes observable inputs such as current value measurement at the reporting date. These investments are not classified in the fair value hierarchy in accordance with guidance in ASU 2015-07.

Insurance contracts are valued in accordance with the terms of the applicable collective pension contract. The fair value of the plan assets equals the discounted value of the expected cash flows of the accrued pensions which are guaranteed by the counterparty insurer.

Cash equivalents consist primarily of money market and similar temporary investment funds. Cash equivalents are valued at closing prices reported in active markets.

The preceding methods may produce fair value measurements that are not indicative of net realizable value or reflective of future fair values. Although we believe the valuation methods are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different fair value measurement at the reporting date.

The following table presents a reconciliation of Level 3 assets:

(In thousands)	Insurance Contracts
Balance January 1, 2017	\$ 14,948
Net realized and unrealized gains	2,741
Net purchases, issuances and settlements	145
Balance December 31, 2017	17,834
Net realized and unrealized losses	(957)
Net purchases, issuances and settlements	156

Balance December 31, 2018

\$17,033

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We expect to make net contributions of \$7.1 million to our pension plans in 2019, which are primarily associated with our International segment.

For the 2018 beginning of the year measurement purposes (net periodic benefit expense), a 6.5% increase in the costs of covered health care benefits was assumed, decreasing by 0.5% for each successive year to 4.5% in 2022 and thereafter. For the 2018 end of the year measurement purposes (benefit obligation), a 6.5% increase in the costs of covered health care benefits was assumed, decreasing by 0.5% for each successive year to 4.5% in 2023 and thereafter. A one-percentage-point change in assumed health care cost trend rates would have increased or decreased the other post-retirement benefit obligations and current year plan expense by approximately \$1.0 million and \$0.1 million, respectively.

Expense for defined contribution pension plans was \$9.0 million in 2018, \$8.1 million in 2017 and \$5.1 million in 2016.

Estimated pension benefits to be paid under our defined benefit pension plans during the next five years are \$29.8 million in 2019, \$24.8 million in 2020, \$25.7 million in 2021, \$26.4 million in 2022 and \$27.3 million in 2023, and an aggregated \$145.1 million for the five years thereafter. Estimated other post-retirement benefits to be paid during the next five years are \$2.8 million in 2019, \$2.7 million in 2020, \$2.8 million in 2021, \$2.6 million in 2022, \$2.3 million in 2023, and an aggregated \$10.3 million for the five years thereafter.

Note 15—Other Income, Net

(In thousands)	2018	2017	2016
Interest income	\$4,588	\$3,596	\$2,827
Components of net periodic benefit cost other than service cost (Note 14)	4,641	3,768	3,490
Gain (Loss) on asset dispositions, net	646	(557)	593
Other, net	(644)	(1,249)	710
Total other income, net	\$9,231	\$5,558	\$7,620

During the years ended December 31, 2018, 2017 and 2016, we recognized \$4.6 million, \$3.6 million and \$2.8 million of income, respectively, related to interest earned on cash balances, short-term investments and notes receivable from insurance companies. Please refer to Note 19—Contingencies for further discussion on the Company's notes receivable from insurance companies.

Note 16—Leases

We lease office space, manufacturing and warehouse facilities, automobiles and other equipment under operating lease arrangements. Rent expense was \$12.5 million in 2018, \$13.7 million in 2017 and \$12.6 million in 2016.

Minimum rent commitments under noncancellable leases are \$11.2 million in 2019, \$7.9 million in 2020, \$6.1 million in 2021, \$3.8 million in 2022, \$2.6 million in 2023 and \$2.0 million thereafter.

Note 17—Derivative Financial Instruments

As part of our currency exchange rate risk management strategy, we enter into certain derivative foreign currency forward contracts that do not meet the U.S. GAAP criteria for hedge accounting, but have the impact of partially offsetting certain foreign currency exposures. We account for these forward contracts at fair value and report the related gains or losses in currency exchange losses, net, in the Consolidated Statement of Income. At December 31, 2018, the notional amount of open forward contracts was \$72.4 million and the unrealized gain on these contracts was \$0.5 million. All open forward contracts will mature during the first quarter of 2019.

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The following table presents the Consolidated Balance Sheet location and fair value of assets and liabilities associated with derivative financial instruments:

(In thousands)	December 31,	
	2018	2017
Derivatives not designated as hedging instruments:		
Foreign exchange contracts: other current liabilities	\$ 12	\$ 314
Foreign exchange contracts: other current assets	488	840

The following table presents the Consolidated Statement of Income location and impact of derivative financial instruments:

(In thousands)	Income Statement Location	Loss (Gain)	
		Recognized in Income	
		Year ended	
		December 31,	
		2018	2017
Derivatives not designated as hedging instruments:			
Foreign exchange contracts	Currency exchange losses, net	\$ 2,428	\$ (5,124)

Note 18—Fair Value Measurements

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value hierarchy consists of three broad levels, which gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). The three levels of the fair value hierarchy are:

Level 1—Observable inputs that reflect unadjusted quoted prices for identical assets or liabilities in active markets.

Level 2—Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.

Level 3—Unobservable inputs for the asset or liability.

The valuation methodologies we used to measure financial assets and liabilities were limited to the pension plan assets described in Note 14 and the derivative financial instruments described in Note 17. See Note 14 for the fair value hierarchy classification of pension plan assets. We estimate the fair value of the derivative financial instruments, consisting of foreign currency forward contracts, based upon valuation models with inputs that generally can be verified by observable market conditions and do not involve significant management judgment. Accordingly, the fair values of the derivative financial instruments are classified within Level 2 of the fair value hierarchy. With the exception of our investments in marketable securities and fixed rate long-term debt both as disclosed below, we believe that the reported carrying amounts of our remaining financial assets and liabilities approximate their fair values.

We value our investments in marketable securities, primarily fixed income, at fair value using quoted market prices for similar securities or pricing models. Accordingly, the fair values of the investments are classified within Level 2 of the fair value hierarchy. The amortized cost basis of our investments was \$55.4 million as of December 31, 2018 and the fair value was \$55.1 million which was reported in "Investments, short-term" in the accompanying Consolidated Balance Sheet. The change in fair value is recorded in other comprehensive income, net of tax. The Company does not intend to sell, nor is it more likely than not that we will be required to sell, these securities prior to recovery of their cost, as such, management believes that any unrealized gains or losses are temporary; therefore, no impairment gains or losses relating to these securities have been recognized. The Company did not hold any investment securities as of December 31, 2017. All investments in marketable securities have maturities of one year or less and are currently in an unrealized loss position as of December 31, 2018.

The reported carrying amount of fixed rate long-term debt (including the current portion) was \$130 million and \$181 million at December 31, 2018 and 2017, respectively. The fair value of this debt was \$139 million and \$200 million at December 31, 2018 and 2017, respectively. The fair value of this debt was determined using Level 2 inputs by evaluating like rated companies with publicly traded bonds where available or current borrowing rates available for financings with similar terms and maturities.

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Note 19—Contingencies

Product liability

We face an inherent business risk of exposure to product liability claims arising from the alleged failure of our products to prevent the types of personal injury or death against which they are designed to protect. Product liability claims are categorized as either single incident or cumulative trauma.

Single incident product liability claims. Single incident product liability claims involve incidents of short duration that are typically known when they occur and involve observable injuries, which provide an objective basis for quantifying damages. The Company estimates its liability for single incident product liability claims based on expected settlement costs for asserted single incident product liability claims, and an estimate of costs for single incident product liability claims incurred but not reported ("IBNR"). The estimate for IBNR claims is based on experience, sales volumes, and other relevant information. The reserve for single incident product liability claims, which includes asserted single incident product liability claims and IBNR single incident product liability claims, was \$3.6 million at December 31, 2018 and \$5.4 million at December 31, 2017. Single incident product liability expense was \$2.0 million, \$2.4 million and \$0.8 million for the years ended December 31, 2018, 2017 and 2016, respectively. Single incident product liability exposures are evaluated on an annual basis, or more frequently if changing circumstances warrant. Adjustments are made to the reserve as appropriate.

Cumulative trauma product liability claims. Cumulative trauma product liability claims involve exposures to harmful substances (e.g., silica, asbestos and coal dust) that occurred years ago and may have developed over long periods of time into diseases such as silicosis, asbestosis, mesothelioma, or coal worker's pneumoconiosis. One of the Company's affiliates Mine Safety Appliances Company, LLC ("MSA LLC") was named as a defendant in 1,481 lawsuits comprised of 2,355 claims as of December 31, 2018. These lawsuits mainly involve respiratory protection products allegedly manufactured and sold by MSA LLC or its predecessors. The products at issue were manufactured many years ago and are not currently offered by MSA LLC.

A summary of cumulative trauma product liability lawsuits and asserted cumulative trauma product liability claims activity is as follows:

	2018	2017	2016
Open lawsuits, beginning of period	1,420	1,794	1,988
New lawsuits	369	398	379
Settled and dismissed lawsuits	(308)	(772)	(573)
Open lawsuits, end of period	1,481	1,420	1,794
	2018	2017	2016
Asserted claims, beginning of period	2,242	3,023	3,779
New claims	479	455	843
Settled and dismissed claims	(366)	(1,236)	(1,599)
Asserted claims, end of period	2,355	2,242	3,023

More than half of the open lawsuits at December 31, 2018 have had a de minimis level of activity over the last 5 years. It is possible that these cases could become active again at any time due to changes in circumstances.

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Cumulative trauma product liability litigation is inherently unpredictable and MSA LLC's expense with respect to cumulative trauma product liability claims could vary significantly in future periods. Factors that limit MSA LLC's ability to estimate potential liability for cumulative trauma product liability claims include low volumes in the number of claims asserted and resolved (both in general and with respect to particular plaintiffs' counsel, as claims experience can vary significantly among different counsel), inconsistency of claims composition, uncertainty as to if and over what time periods claims might be asserted in the future, and other factors. With respect to the risk associated with any particular case that is filed against MSA LLC, it has typically not been until very late in the legal process that it can be reasonably determined whether it is probable that such a case will ultimately result in a liability. This uncertainty is caused by many factors, including consideration of the applicable statute of limitations, the sufficiency of product identification and other defenses. The complaints initially filed generally have not provided information sufficient to determine if a lawsuit will develop into an actively litigated case. Even when a case is actively litigated, it is often difficult to determine if the lawsuit will be dismissed or otherwise resolved until late in the lawsuit. Moreover, even if it is probable that such a lawsuit will result in a loss, it is often difficult to estimate the amount of actual loss that will be incurred. These actual loss amounts are highly variable and turn on a case-by-case analysis of the relevant facts, including the nature of the injury, the jurisdiction in which the claim is filed, the counsel for the plaintiff and the number of parties in the lawsuit. In addition, there are uncertainties concerning the impact of bankruptcies of other companies that are co-defendants with respect to particular claims and uncertainties surrounding the litigation process in different jurisdictions and from case to case within a particular jurisdiction.

Management works with outside legal counsel quarterly to review and assess MSA LLC's exposure to asserted cumulative trauma product liability claims not yet resolved. In addition, in connection with finalizing and reporting its results of operations, management works annually (unless significant changes in trends or new developments warrant an earlier review) with an outside valuation consultant and outside legal counsel to review MSA LLC's exposure to all cumulative trauma product liability claims. The review process for asserted cumulative trauma product liability claims not yet resolved takes into account available facts for those claims, including their number and composition, outcomes of matters resolved during current and prior periods, and variances associated with different groups of claims, plaintiffs' counsel, claims filing trends, and venues, as well as any other relevant information.

In August 2017, MSA LLC obtained additional detailed information about a significant number of claims that were then pending against it, including the nature and extent of the alleged injuries, product identification and other factors. MSA LLC subsequently agreed to resolve a substantial number of these claims, for \$75.2 million, a portion of which was insured. Amounts in excess of estimated insurance recoveries were reflected within Other operating expense in the Consolidated Statement of Income. MSA LLC paid a total of \$28.6 million and \$25.2 million during 2018 and 2017, respectively, related to these settlements. MSA LLC expects to pay \$7.1 million ratably over each of the next three quarters ending in the third quarter of 2019.

In the fourth quarter of 2017, MSA LLC, in consultation with an outside valuation consultant and outside legal counsel, performed a review for IBNR cumulative trauma product liability claims. Based on that review process, which concluded in early 2018, it was determined that a reasonable estimate for the liability of MSA LLC's IBNR claims was \$111.1 million. Accordingly, the cumulative trauma product liability reserve was increased by \$111.1 million for estimated IBNR cumulative trauma product liability claims.

The ability to make a reasonable estimate of the potential liability for IBNR cumulative trauma product liability claims in 2017 resulted from recent developments affecting asbestos claims, recent developments affecting silica claims, and recent developments affecting coal dust claims. Significant changes in MSA LLC's claims experience over the last few years have resulted in stabilization of a number of factors important to the estimation process and enabled greater predictability of IBNR claims. These developments occurred as a result of changes in defense strategy implemented in recent years, increased experience in defending, negotiating, and resolving key groups of claims, and resolutions of a substantial number of cumulative trauma product liability claims in the last few years. These changes collectively resulted in MSA LLC having a more stable recent claims history that could be extrapolated into the future and greater certainty as to the number of claims that might be asserted against MSA LLC in the future, the percentage

of those claims that might be resolved without payment, and the potential settlement value of those claims that are not resolved without payment. All of these factors were considered by MSA LLC's valuation consultant in estimating the IBNR cumulative trauma product liability claims. MSA LLC, taking into account the analysis and estimates developed by its consultant, concluded that reasonable estimates for its IBNR asbestos, silica and coal dust claims could be made and that the liability described above was accrued.

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There remains considerable uncertainty in numerous aspects of MSA LLC's potential future claims experience, such as with respect to the number of claims that might be asserted, the alleged severity of those claims and the average settlement values of those claims, and that uncertainty may cause actual claims experience in the future to vary from the current estimate. Numerous uncertainties also exist with respect to factors not specific to MSA LLC's claims experience, including potential legislative or judicial changes at the federal level or in key states concerning claims adjudication, future bankruptcy proceedings involving key co-defendants, payments from trusts established to compensate claimants, and/or changes in medical science relating to the diagnosis and treatment of cumulative trauma product liability claims. If future estimates of asserted cumulative trauma product liability claims not yet resolved and/or IBNR cumulative trauma product liability claims are materially higher (lower) than the accrued liability, we will record an appropriate charge (credit) to the Consolidated Statement of Income to increase (decrease) the accrued liability.

Certain significant assumptions underlying the material components of the accrual for IBNR cumulative trauma product liability claims include MSA LLC's experience related to the following:

- The types of illnesses alleged by claimants to give rise to their claims;
- The number of claims asserted against MSA LLC;
- The propensity of claimants and their counsel asserting cumulative trauma product liability claims to name MSA LLC as a defendant;
- The percentage of cumulative trauma product liability claims asserted against MSA LLC that are dismissed without payment;
- The average value of settlements paid to claimants; and
- The jurisdiction in which claims are asserted.

Additional assumptions include the following:

- MSA LLC will continue to evaluate and handle cumulative trauma product liability claims in accordance with its existing defense strategy;
- The number and effect of co-defendant bankruptcies will not materially change in the future;
- No material changes in medical science occur with respect to cumulative trauma product liability claims; and
- No material changes in law occur with respect to cumulative trauma product liability claims including, in particular, no material state or federal tort reform actions affecting such claims.

Total cumulative trauma product liability reserve was \$187.3 million, including \$24.5 million for claims settled but not yet paid and related defense costs, as of December 31, 2018 and \$181.1 million, including \$54.5 million for claims settled but not yet paid and related defense costs, as of December 31, 2017. This reserve includes estimated amounts for asserted claims not yet resolved and IBNR claims. Those estimated amounts reflect asbestos, silica, and coal dust claims expected to be asserted through the year 2069 and are not discounted to present value. The Company revised its estimates of MSA LLC's potential liability for cumulative trauma product liability claims for the current year as a result of its annual review process described above. The revisions to the Company's estimates of potential liability for cumulative trauma product liability claims are based on an assessment of trends in the tort system generally and

changes in MSA LLC's claims experience over the past year, including the number of claims asserted, average value of settlements paid to claimants, the number and percentage of claims resolved with payment, the jurisdiction in which claims are asserted, and the counsel asserting such claims. The reserve does not include amounts which will be spent to defend the claims covered by the reserve. Defense costs are recognized in the Consolidated Statement of Income as incurred.

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At December 31, 2018, \$38.8 million of the total reserve for cumulative trauma product liability claims is recorded in the Insurance and product liability line within other current liabilities in the Consolidated Balance Sheet and the remainder, \$148.5 million, is recorded in the Product liability and other noncurrent liabilities line. At December 31, 2017, \$48.6 million of the total reserve for cumulative trauma product liability claims is recorded in the Insurance and product liability line within other current liabilities in the Consolidated Balance Sheet and the remainder, \$132.5 million, is recorded in the Product liability and other noncurrent liabilities line.

Because litigation is subject to inherent uncertainties, and unfavorable rulings or developments could occur, there can be no certainty that MSA LLC may not ultimately incur charges in excess of presently recorded liabilities. The reserve for liabilities relating to cumulative trauma product liability claims may be adjusted from time to time based on whether the actual number, types, and settlement value of claims differs from current projections and estimates, and other developing facts and circumstances. These adjustments may reflect changes in estimates for asserted cumulative trauma product liability claims not yet resolved and/or IBNR cumulative trauma product liability claims. These adjustments may be material and could materially impact our consolidated financial statements in future periods.

Insurance Receivable and Notes Receivable, Insurance Companies

In the normal course of business, MSA LLC makes payments to settle various claims and for related defense costs and records receivables for the estimated amounts that are covered by insurance. With respect to cumulative trauma product liability claims, MSA LLC purchased insurance policies for the policy years from 1952-1986 from over 20 different insurance carriers that, subject to some common contract exclusions, provided coverage for cumulative trauma product liability losses and, in many instances, related defense costs (the "Occurrence-Based Policies"). The Occurrence-Based Policies have significant per claim retentions and applicable exclusions for cumulative trauma product liability claims after April 1986. While we continue to pursue reimbursement under certain policies, the vast majority of these insurance policies have been exhausted, settled or converted into negotiated coverage-in-place agreements with the applicable insurers (the "Coverage-In-Place Agreements"). As a result, MSA LLC is now largely self-insured for cumulative trauma product liability claims.

Since MSA LLC is now largely self-insured for cumulative trauma product liability claims, additional amounts recorded as insurance receivables will be limited and based on calculating the amounts to be reimbursed pursuant to negotiated Coverage-In-Place Agreements. Various factors could affect the timing and amount of recovery of the insurance receivables, including assumptions regarding claims composition (which are relevant to calculating reimbursement under the terms of certain Coverage-In-Place Agreements) and the extent to which the issuing insurers may become insolvent in the future.

Insurance receivables at December 31, 2018 totaled \$71.7 million, of which \$14.8 million is reported in Prepaid expenses and other current assets in the Consolidated Balance Sheet and \$56.9 million is reported in Insurance receivable and other noncurrent assets. Insurance receivables at December 31, 2017 totaled \$134.7 million, of which \$11.6 million was reported in Prepaid expenses and other current assets in the Consolidated Balance Sheet and \$123.1 million was reported in Insurance receivable and other noncurrent assets. The vast majority of the \$71.7 million insurance receivable balance at December 31, 2018 is attributable to reimbursement believed to be due under the terms of signed Coverage-In-Place Agreements.

A summary of Insurance receivable balances and activity related to cumulative trauma product liability losses is as follows:

(In millions)	2018	2017
Balance beginning of period	\$134.7	\$159.9
Additions	19.6	94.6
Collections, settlements converted to notes receivable and other adjustments	(82.6)	(119.8)
Balance end of period	\$71.7	\$134.7

Additions to insurance receivables in the above table represent insured cumulative trauma product liability losses and related defense costs which we believe are covered by the Occurrence-Based Policies or applicable Coverage-In-Place Agreements. Collections of the receivables primarily occur pursuant to the terms of negotiated agreements with the insurance companies, either in a lump sum, in installments over time, or to reimburse a portion of future expense once incurred (i.e. pursuant to a Coverage-In-Place Agreement).

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In some cases, payment streams due pursuant to negotiated settlement agreements were converted to formal notes receivable from insurance companies. The notes receivable were recorded as a transfer from the Insurance receivable balance to the Notes receivable, insurance companies (current and noncurrent) in the Consolidated Balance Sheet. In cases where the payment stream covers multiple years and there were no contingencies, the present value of the payments was recorded as a transfer from the insurance receivable balance to the Notes receivable, insurance companies (current and long-term) in the Consolidated Balance Sheet. Provided the remaining insurance receivable was recoverable through the insurance carriers, no gain or loss was recognized at the time of transfer from Insurance receivable to Notes receivable, insurance companies.

Notes receivable from insurance companies at December 31, 2018 totaled \$59.6 million, of which \$3.6 million is reported in Notes receivable, insurance companies, current on the Consolidated Balance Sheet and \$56.0 million is reported in Notes receivable, insurance companies, noncurrent. Notes receivable from insurance companies at December 31, 2017 totaled \$76.9 million, of which \$17.3 million was reported in Notes receivable, insurance companies, current on the Consolidated Balance Sheet and \$59.6 million was reported in Notes receivable, insurance companies, noncurrent.

A summary of Notes receivable, insurance companies balances is as follows:

	December 31,	
(In millions)	2018	2017
Balance beginning of period	\$76.9	\$67.3
Additions	1.7	35.1
Collections	(19.0)	(25.5)
Balance end of period	\$59.6	\$76.9

The collectibility of MSA LLC's insurance receivables and notes receivable is regularly evaluated and we believe that the amounts recorded are probable of collection. The determination that the recorded insurance receivables are probable of collection is based on the terms of the settlement agreements reached with the insurers, assumptions regarding various aspects of the composition of future claims (which are relevant to calculating reimbursement under the terms of certain Coverage-In-Place Agreements), the financial ability of the insurance carriers to pay the claims, and the advice of MSA LLC's outside legal counsel.

Total cumulative trauma liability losses were \$63.8 million, \$219.0 million, and \$30.5 million for the years ended December 31, 2018, 2017 and 2016, respectively. Uninsured cumulative trauma product liability losses which were included in Other operating expense on the Consolidated Statement of Income during the years ended December 31, 2018, 2017 and 2016 were \$43.8 million, \$124.5 million and \$0.3 million, respectively.

Insurance Litigation

For more than a decade, MSA LLC was engaged in coverage litigation with many of its insurance carriers that issued Occurrence-Based Policies. In July 2010, MSA LLC (as Mine Safety Appliances Company) filed a lawsuit in the Superior Court of the State of Delaware seeking declaratory and other relief concerning the future rights and obligations of MSA LLC and its excess insurance carriers under various insurance policies. During the same time period, MSA LLC was also engaged in coverage disputes with The North River Insurance Company ("North River") in various courts. Since 2010, MSA LLC reached negotiated resolutions with the vast majority of the insurance carriers once in litigation, including the July 2018 settlement with North River disclosed below.

In February 2017, MSA LLC resolved through a negotiated settlement its coverage litigation with The Hartford ("Hartford"). Additionally, in April 2017, MSA LLC resolved through negotiated settlements its coverage litigation with Travelers Insurance Company ("Travelers") and Wausau Indemnity Company ("Wausau"). Each of the settling carriers agreed to cash payments which were made in 2017 or January 2018. In addition, Travelers has agreed to pay a percentage of future cumulative trauma product liability settlements paid as incurred on a claim-by-claim basis. As part of these settlements, MSA LLC dismissed all claims against Hartford, Travelers and Wausau in the coverage litigation in the Superior Court of the State of Delaware.

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In July 2018, MSA LLC resolved through a negotiated settlement its remaining coverage litigation with North River. As part of this settlement, in October 2018, MSA LLC dismissed all claims and appeals against North River in each of the pending coverage actions. This represents a settlement with MSA LLC's last major Occurrence-Based insurance carrier. Payment under this negotiated settlement was received in the third quarter of 2018 and was accounted for as a reduction of the insurance receivable balance.

Product Warranty

The Company provides warranties on certain product sales. Product warranty reserves are established in the same period that revenue from the sale of the related products is recognized, or in the period that a specific issue arises as to the functionality of a Company's product. The determination of such reserves requires the Company to make estimates of product return rates and expected costs to repair or to replace the products under warranty.

The amounts of the reserves are based on established terms and the Company's best estimate of the amounts necessary to settle future and existing claims on products sold as of the balance sheet date. If actual return rates and/or repair and replacement costs differ significantly from estimates, adjustments to recognize additional cost of sales may be required in future periods.

The following table reconciles the changes in the Company's accrued warranty reserve:

	December 31,		
(In thousands)	2018	2017	2016
Beginning warranty reserve	\$14,753	\$11,821	\$10,296
Warranty payments	(9,955)	(10,905)	(12,524)
Warranty claims	10,585	12,471	11,574
Provision for product warranties and other adjustments	(1,169)	1,366	2,475
Ending warranty reserve	\$14,214	\$14,753	\$11,821

Warranty expense for the years ended December 31, 2018, 2017 and 2016 was \$9.4 million, \$13.8 million and \$14.0 million, respectively.

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Note 20—Discontinued Operations

On February 29, 2016, the Company sold 100% of the stock associated with its South African personal protective equipment distribution business and its Zambian operations, which were reported in the International segment. The Company received \$15.9 million from the closing of this transaction and recorded a loss of approximately \$0.3 million during the first quarter of 2016.

During the second quarter of 2016, the Company corrected its gain calculation on the disposition of the South African personal protective equipment distribution business and its Zambian operations. This resulted in a gain of approximately \$2.5 million being recorded during the second quarter in discontinued operations that should have been recorded in the first quarter of 2016. The Company evaluated materiality in accordance with SEC Staff Accounting Bulletins Topics 1.M and 1.N and considered relevant qualitative and quantitative factors. The Company concluded that this modification was not material to the first quarter of 2016 or the trend in earnings over the affected periods. The modification had no effect on cash flows or debt covenant compliance.

The operations of this business qualify as a component of an entity under FASB ASC 205-20 "Presentation of Financial Statements - Discontinued Operations", and thus, the operations have been reclassified as discontinued operations and prior periods have been reclassified to conform to this presentation.

Summarized financial information for discontinued operations is as follows:

(In thousands)	Year ended December 31, 2016
Discontinued Operations	
Net sales	\$ 5,261
Cost and expenses:	
Cost of products sold	4,819
Selling, general and administrative	937
Restructuring and other charges	—
Currency exchange losses, net	18
Other income, net	596
Income from discontinued operations before income taxes	83
Provision for income taxes	328
Loss from discontinued operations, net of tax	\$ (245)

There was no discontinued operations activity for the years ended December 31, 2018 and 2017.

The following summary provides financial information for discontinued operations related to net income related to noncontrolling interests:

(In thousands)	Year ended December 31,		
	2018	2017	2016
Net income attributable to noncontrolling interests			
Income from continuing operations	\$(965)	\$(929)	\$(1,416)
Income from discontinued operations	—	—	(510)
Net income	\$(965)	\$(929)	\$(1,926)

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Note 21—Quarterly Financial Information (Unaudited)

	2018				
	Quarters				
(In thousands, except earnings per share)	1st	2nd	3rd	4th	Year
Continuing Operations:					
Net sales	\$325,894	\$339,331	\$331,096	\$361,783	\$1,358,104
Gross profit	147,339	153,836	148,302	162,386	611,863
Net income attributable to MSA Safety Incorporated	32,371	33,179	33,717	24,883	124,150
Earnings per share ⁽¹⁾					
Basic	0.85	0.86	0.88	0.65	3.23
Diluted	0.83	0.85	0.86	0.64	3.18
	2017				
	Quarters				
(In thousands, except earnings per share)	1st	2nd	3rd	4th	Year
Continuing Operations:					
Net sales	\$265,765	\$288,775	\$296,129	\$346,140	\$1,196,809
Gross profit	119,722	132,963	132,203	154,002	538,891
Net income attributable to MSA Safety Incorporated	14,413	12,532	32,066	(32,984)	26,027
Earnings per share ⁽¹⁾					
Basic	0.38	0.33	0.84	(0.87)	0.68
Diluted	0.37	0.32	0.83	(0.87)	0.67

⁽¹⁾ Per share amounts are calculated independently for each period presented; therefore, the sum of the quarterly per share amounts may not equal the per share amounts for the year.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

(a) Evaluation of disclosure controls and procedures. Based on their evaluation as of the end of the period covered by this Form 10-K, the Company's principal executive officer and principal financial officer have concluded that the Company's disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934 (the "Exchange Act")) are effective to ensure that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act is (i) recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and forms and (ii) accumulated and communicated to our management, including the principal executive officer and principle financial officer, as appropriate to allow timely decisions regarding required disclosure.

(b) Changes in internal control. There were no changes in the Company's internal control over financial reporting that occurred during the Company's most recent fiscal quarter, that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

See Item 8. Financial Statements and Supplementary Data—"Management's Report on Internal Control Over Financial Reporting" and "Report of Independent Registered Public Accounting Firm."

Item 9B. Other Information

None.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

Item 11. Executive Compensation

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Item 13. Certain Relationships and Related Transactions, and Director Independence

Item 14. Principal Accountant Fees and Services

With respect to this Part III, incorporated by reference herein pursuant to Rule 12b—23 are (1) “Election of Directors,” (2) “Executive Compensation,” (3) “Other Information Concerning the Board of Directors,” (4) “Stock Ownership,” and (5) “Selection of Independent Registered Public Accounting Firm,” appearing in the Proxy Statement filed pursuant to Regulation 14A in connection with the registrant’s Annual Meeting of Shareholders to be held on May 15, 2019. The information appearing in such Proxy Statement under the caption “Audit Committee Report” and the other information appearing in such Proxy Statement and not specifically incorporated by reference herein is not incorporated herein. As to Item 10 above, also see the information reported in Part I of this Form 10-K, under the caption “Executive Officers of the Registrant,” which is incorporated herein by reference. As to Item 10 above, the Company has adopted a Code of Ethics applicable to its principal executive officer, principal financial officer and principal accounting officer and other Company officials. The text of the Code of Ethics is available on the Company’s website at www.MSAafety.com. Any amendment to, or waiver of, a required provision of the Code of Ethics that applies to the Company’s principal executive, financial or accounting officer will also be posted on the Company’s Internet site at that address.

As to Item 12 above, the following table sets forth information as of December 31, 2018 concerning common stock issuable under the Company’s equity compensation plans.

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)	
Equity compensation plans approved by security holders	735,001	\$ 43.79	1,169,608	*
Equity compensation plans not approved by security holders	None	—	None	
Total	735,001	43.79	1,169,608	

*Includes 1,054,730 shares available for issuance under the Amended and Restated 2016 Management Equity Incentive Plan and 114,878 shares available for issuance under the 2017 Non-Employee Directors’ Equity Incentive Plan.

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PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) 1. Financial Statements and Report of Independent Registered Public Accounting Firm (see Part II, Item 8 of this Form 10-K).

The following information is filed as part of this Form 10-K.

	Page
<u>Management's Report on Responsibility for Financial Reporting and Management's Report on Internal Control Over Financial Reporting</u>	41
<u>Report of Independent Registered Public Accounting Firm</u>	42
Consolidated Statement of Income—three years ended December 31, 2018	44
Consolidated Statement of Comprehensive Income—three years ended December 31, 2018	45
Consolidated Balance Sheet—December 31, 2018 and 2017	46
Consolidated Statement of Cash Flows—three years ended December 31, 2018	47
Consolidated Statement of Changes in Retained Earnings and Accumulated Other Comprehensive Income—three years ended December 31, 2018	48
<u>Notes to Consolidated Financial Statements</u>	49

(a) 2. The following additional financial information for the three years ended December 31, 2018 is filed with the report and should be read in conjunction with the above financial statements:

Schedule II—Valuation and Qualifying Accounts

All other schedules are omitted because they are not applicable, not material or the required information is shown in the consolidated financial statements and consolidated notes to the financial statements listed above.

(a) 3. Exhibits

Several of the following exhibits are incorporated herein by reference under Rule 12b-32 of the Securities Exchange Act of 1934, as amended, as indicated next to the name of the exhibit. Several other instruments, which would otherwise be required to be listed below, have not been so listed because those instruments do not authorize securities in an amount that exceeds 10% of the total assets of the registrant and its subsidiaries on a consolidated basis. The registrant agrees to furnish a copy of any instrument that was so omitted on that basis to the Commission upon request.

3(i) Amended and restated Articles of Incorporation, filed as Exhibit 3.1 to Form 8-K on March 7, 2014, is incorporated herein by reference.

3(ii) Amended and restated By-laws of the registrant, filed as Exhibit 3.2 to Form 8-K on March 7, 2014, is incorporated herein by reference.

4(a) First Amendment dated September 7, 2018 to the Second Amended and Restated Multi-Currency Note Purchase and Private Shelf Agreement dated January 22, 2016 by and among MSA Safety Incorporated, various Company subsidiaries, as guarantors, and the noteholders named therein, including forms of Note Guarantee and Intercompany Subordination Agreement, filed as Exhibit 4.1 to Form 8-K on September 10, 2018, is incorporated herein by reference.

4(b) Form of Amended and Restated Guarantee Agreement entered into as of March 7, 2014 by each of General Monitors, Inc., General Monitors Transnational, LLC and MSA International, Inc., in favor of the Note Purchasers under the Amended and Restated Note Purchase and Private Shelf Agreement dated as of March 7, 2014 (as confirmed and reaffirmed by such guarantors as of September 7, 2018), filed as Exhibit 4(b) to Form 10-K on February 25, 2015, is incorporated herein by reference.

4(c) Form of Guarantee Agreement entered into as of March 7, 2014 by each of Mine Safety Appliances Company, LLC, MSA Worldwide, LLC, MSA Advanced Detection, LLC, MSA Safety Development, LLC, MSA Technology, LLC, and MSA Innovation, LLC, in favor of the Note Purchasers under the Amended and Restated

Note Purchase and Private Shelf Agreement dated as of March 7, 2014 (as confirmed and reaffirmed by certain of such guarantors as of September 7, 2018), filed as Exhibit 4(c) to Form 10-K on February 25, 2015, is incorporated herein by reference.

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- 10(a)* MSA Safety Incorporated Amended and Restated 2016 Management Equity Incentive Plan, filed as Appendix A to the registrant’s definitive proxy statement dated March 31, 2016, is incorporated herein by reference.
- 10(b)* Retirement Plan for Directors, as amended effective April 1, 2001, filed as Exhibit 10(a) to Form 10-Q on May 10, 2006, is incorporated herein by reference.
- 10(c)* Supplemental Pension Plan as of May 5, 1998, filed as Exhibit 10(d) to Form 10-Q on August 12, 2003, is incorporated herein by reference.
- 10(d)* Supplemental Pension Plan as amended and restated effective January 1, 2005, filed as Exhibit 10.3 to Form 10-Q on April 30, 2009, is incorporated herein by reference.
- 10(e)* 2017 Non-Employee Directors’ Equity Incentive Plan, filed as Exhibit A to the registrant's definitive proxy statement dated April 7, 2017, is incorporated herein by reference.
- 10(f)* Executive Insurance Program as Amended and Restated as of January 1, 2006, filed as Exhibit 10(a) to Form 10-Q on August 7, 2007, is incorporated herein by reference.
- 10(g)* Annual Incentive Bonus Plan as of May 5, 1998, filed as Exhibit 10(g) to Form 10-Q on August 12, 2003, is incorporated herein by reference.
- 10(h)* Supplemental Executive Retirement Plan, effective January 1, 2008, filed as Exhibit 10.2 to Form 10-Q on April 30, 2009, is incorporated herein by reference.
- 10(i)* Form of Change-in-Control Severance Agreement between the registrant and its executive officers, filed as Exhibit 10.1 to Form 10-Q on April 30, 2009, is incorporated herein by reference.
- 10(j)* 2003 Supplemental Savings Plan, effective January 1, 2003, filed as Exhibit 10(k) to Form 10-K on February 24, 2014, is incorporated herein by reference.
- 10(k)* 2005 Supplemental Savings Plan, effective January 1, 2005, filed as Exhibit 10.4 to Form 10-Q on April 30, 2009, is incorporated herein by reference.
- 10(l)* Amended and Restated CEO Annual Incentive Award Plan filed as Appendix B to the registrant’s definitive proxy statement dated March 31, 2016, is incorporated herein by reference.
- 10(m) Third Amended and Restated Credit Agreement dated September 7, 2018 by and among MSA Safety Incorporated, MSA UK Holdings, Limited and MSA International Holdings, B.V., as borrowers, various Company subsidiaries, as guarantors, various financial institutions, as lenders, and PNC Bank, National Association, as administrative agent, including forms of Guaranty and Suretyship Agreement and Intercompany Subordination Agreement, filed as Exhibit 10.1 to Form 8 K on September 10, 2018, is incorporated herein by reference.
- 21 Affiliates of the registrant is filed herewith.
- 23 Consent of Ernst & Young LLP, independent registered public accounting firm is filed herewith.
- 31.1 Certification of Nishan J. Vartanian pursuant to Rule 13a-14(a) is filed herewith.

31.2 Certification of Kenneth D. Krause pursuant to Rule 13a-14(a) is filed herewith.

32 Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C.(S)1350 is filed herewith.

101.INS XBRL Instance Document

101.SCH XBRL Taxonomy Extension Schema Document

101.CAL XBRL Taxonomy Extension Calculation Linkbase Document

101.DEF XBRL Taxonomy Extension Definition Linkbase Document

101.LAB XBRL Taxonomy Extension Label Linkbase Document

101.PRE XBRL Taxonomy Extension Presentation Linkbase Document

*The exhibits marked by an asterisk are management contracts or compensatory plans or arrangements.

Item 16. Form 10-K Summary

None.

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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.

MSA SAFETY
INCORPORATED

February 22, 2019 By/s/ NISHAN J. VARTANIAN

(Date) Nishan J. Vartanian
President and Chief Executive Officer

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

Signature	Title	Date
/S/ NISHAN J. VARTANIAN Nishan J. Vartanian	President and Chief Executive Officer	February 22, 2019
/S/ KENNETH D. KRAUSE Kenneth D. Krause	Sr. Vice President, Chief Financial Officer and Treasurer	February 22, 2019
/S/ ROBERT A. BRUGGEWORTH Robert A. Bruggeworth	Director	February 22, 2019
/S/ ALVARO GARCIA-TUNON Alvaro Garcia-Tunon	Director	February 22, 2019
/S/ THOMAS W. GIACOMINI Thomas W. Giacomini	Director	February 22, 2019
/S/ WILLIAM M. LAMBERT William M. Lambert	Director	February 22, 2019
/S/ DIANE M. PEARSE Diane M. Pearse	Director	February 22, 2019
/S/ REBECCA B. ROBERTS Rebecca B. Roberts	Director	February 22, 2019
/S/ SANDRA PHILLIPS ROGERS Sandra Phillips Rogers	Director	February 22, 2019
/S/ JOHN T. RYAN III John T. Ryan III	Director	February 22, 2019
/S/ WILLIAM R. SPERRY William R. Sperry	Director	February 20, 2019
/S/ L. EDWARD SHAW, JR. L. Edward Shaw, Jr.	Director	February 22, 2019

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SCHEDULE II

MSA SAFETY INCORPORATED AND AFFILIATES

VALUATION AND QUALIFYING ACCOUNTS

THREE YEARS ENDED DECEMBER 31, 2018

	2018	2017	2016
	(In thousands)		
Allowance for doubtful accounts:			
Balance at beginning of year	\$5,540	\$5,610	\$8,189
Additions—			
Charged to costs and expenses (2)	375	1,649	1,471
Deductions—			
Deductions from reserves, net (1)(2)	546	1,719	4,050
Balance at end of year	5,369	5,540	5,610
Income tax valuation allowance:			
Balance at beginning of year	\$4,559	\$5,303	\$5,153
Additions—			
Charged to costs and expenses (3)	859	906	3,095
Deductions—			
Deductions from reserves (3)	379	1,650	2,945
Balance at end of year	\$5,039	\$4,559	\$5,303

(1) Bad debts written off, net of recoveries.

(2) Activity for 2018, 2017 and 2016 includes currency translation (losses) gains of \$(291), \$285 and \$(203), respectively.

(3) Activity for 2018, 2017 and 2016 includes currency translation (losses) gains of \$(367), \$248 and \$113, respectively.