UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2016

or

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

For the transition period from __________ to __________

Commission file number: 001-32598

Entegris, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**41-1941551**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**

129 Concord Road, Billerica, Massachusetts 01821
(Address of principal executive offices and zip code)

(978) 436-6500
(Registrant's telephone number, including area code)

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

Title of Class	Name of Exchange on which Registered
Common Stock, $0.01 Par Value	**The Nasdaq Global Select Market**

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

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

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

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes x No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405) is not contained herein and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of Form 10-K or any amendment to this Form 10-K. o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. (Check one):

Large Accelerated Filer	x	Accelerated Filer	o
Non-Accelerated Filer	o (Do not check if a smaller reporting company)	Smaller reporting company	o

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

The aggregate market value of voting stock held by non-affiliates of the registrant, based on the last sale price of the Common Stock on July 2, 2016, the last business day of registrant's most recently completed second fiscal quarter, was $1,819,711,619. Shares held by each officer and director of the registrant and by each person who owned 10 percent or more of the outstanding Common Stock have been excluded from this computation in that such persons may be deemed to be affiliates of the registrant. This determination of affiliate status for this purpose is not necessarily a conclusive determination for other purposes.

As of February 14, 2017, 141,220,481 shares of the registrant's Common Stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Definitive Proxy Statement for its 2017 Annual Meeting of Stockholders scheduled to be held on May 24, 2017, or the 2017 Proxy Statement, which will be filed with the Securities and Exchange Commission, or SEC, not later than 120 days after December 31, 2016, are incorporated by reference into Part III of this Annual Report on Form 10-K. With the exception of the portions of the 2017 Proxy Statement expressly incorporated into this Annual Report on Form 10-K by reference, such document shall not be deemed filed as part of this Annual Report on Form 10-K.

ENTEGRIS, INC.

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FOR THE FISCAL YEAR ENDED DECEMBER 31, 2016

PART I

Item 1. Business.

THE COMPANY

Entegris, Inc. ("Entegris", "the Company", "us", "we", or "our") is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. Entegris seeks to leverage its unique breadth of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher device performance.

To produce faster and more powerful semiconductors, manufacturing technology has been rapidly moving to smaller process nodes, adopting new device architecture, such as FinFET transistors and 3D-NAND, and utilizing new and innovative manufacturing materials. Maximizing yields in this increasingly complex manufacturing environment requires the effective development and application of these new materials, a reliable and consistent supply, contamination-free transportation, storage and delivery, seamless integration into the semiconductor manufacturing process, and even higher levels of purity and contaminant control throughout the entire process.

Entegris is uniquely positioned to deliver advanced and specialty materials, free from contamination, with optimized packaging and delivery solutions, and in-process filtration and purification to ensure that liquid chemistries and gases are free from contaminants before reaching the wafer. Our technology portfolio includes approximately 20,000 standard and customized products and solutions to achieve the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes, or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity.

Our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials (SCEM) segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Advanced Materials Handling (AMH) segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. The Microcontamination Control (MC) segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. While these segments have separate products and technical know-how, they share a single, global sales force, unified core systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise from these three segments technologies to create new and increasingly integrated solutions for its customers.

SEMICONDUCTOR INDUSTRY BACKGROUND

Semiconductors, or integrated circuits, are key components in modern electronic devices such as computers, smart phones, tablets, home appliances, digital cameras, televisions, light bulbs and automobiles. The manufacture of semiconductors requires hundreds of highly complex and sensitive manufacturing steps, during which a variety of materials are repeatedly applied to a silicon wafer to build integrated circuits on the wafer surface. We provide specialty materials and chemicals utilized in many of these process steps, offer a broad range of products to monitor, protect, transport, and deliver these critical process materials during the manufacturing process and provide systems to purify liquid chemistry and gases throughout the manufacturing process. The process steps that rely most heavily on our products are described below.

Deposition. The two main deposition processes are physical vapor deposition, where a thin film is deposited on a wafer surface in a low-pressure gas environment, and chemical vapor deposition, where a thin film is deposited on a wafer surface using a gas medium and a chemical bonding process. In addition, electro-plating technology is used for the deposition of low resistance conductive materials such as copper. Our advanced precursor materials and electro-plating chemicals are utilized to enable the composition, uniformity and thickness of deposited films and our filtration and purification products are used to remove defects and contaminants from liquids and gases used during the deposition process. These products are critical to ensuring the performance of the semiconductor circuit and, consequently, the manufacturing yield.

Chemical Mechanical Planarization (CMP). CMP is a polishing process used by semiconductor manufacturers to planarize, or flatten, many of the layers of material that have been deposited upon silicon wafers. We offer a broad range of products used by semiconductor manufacturers during and immediately following the CMP process. Our formulated cleaning chemistries remove residue from wafer surfaces after the CMP process, and prevent subsequent corrosion. Our filtration and purification systems are used to filter liquid slurries and cleaning chemistries in order to remove oversized particles and contaminants that can cause defects on a wafer's surface. Our roller brushes are used in conjunction with our cleans chemistries to clean the wafer after completion of the CMP process in order to prepare the wafer for subsequent operations and our pad conditioners are used to prepare the surface of the CMP polishing pad prior to every polishing cycle.

Photolithography. Photolithography is a process repeated many times that uses light to print, or pattern, complex circuit patterns onto the wafer. To print the projected optical pattern, the wafer is coated with a thin film of light-sensitive material, called photoresist. Light is projected to expose the photoresist, which is then developed (somewhat like photographic film) to create a stenciled image pattern. Our liquid filtration and liquid dispense systems play a vital role in assuring the pure, accurate and uniform dispense of photoresists onto the wafer so that manufacturers can achieve acceptable yields in the manufacturing process, and our gas microcontamination control systems eliminate airborne contaminants that can disrupt effective photolithography processes.

Etch and Resist Strip. During the etch process, specific areas of the film that have been deposited on the surface of a wafer are removed to leave a desired circuit pattern. After the etch process, the hardened resist needs to be completely removed. Our formulated chemical solutions remove photo resists and post-etch residues, and our gas filters and purifiers help assure the purity of the process gas streams used in the etch process. We expect an increased need for wet chemistries capable of selectively removing material at advanced technology nodes to drive demand for selective wet etch formulations.

Ion Implant. Ion implantation is a key technology for forming transistors and is used many times during semiconductor fabrication. During ion implantation, wafers are bombarded by a beam of electrically-charged ions, called dopants, which change the electrical properties of the exposed surface films. Our Safe Delivery Source® (SDS®) and VAC® (Vacuum Actuated Cylinders) gas delivery systems assure the safe, effective and efficient delivery of the toxic gases necessary for the implant process. In addition, our proprietary low temperature plasma coating processes for core components are critical elements of ion implantation equipment.

Wet Cleaning. Ultra-high purity chemicals and photoresists of precise composition are used to clean the wafers before and after several of the processes described above, to pattern circuit images and to remove photoresists after etch. The cleaning chemicals must be maintained at very high purity levels without the presence of foreign material such as particles, ions or organic contaminants in order to maintain manufacturing yields and avoid defective products. Our proprietary formulated cleaning chemistries are used in these wet cleaning processes and our liquid filters and purifiers assure the purity of these chemicals.

Transportation and Protection. Our wafer and reticle carriers are high-purity “micro-environments” that carry wafers between each of the above process steps, protecting them from damage and contamination during transportation. Front-end wafer processing can involve hundreds of steps and take several weeks. As a result, a batch of 25 fully processed wafers, the standard number of wafers that can be transported in one of our 200 mm and 300 mm products, can be worth several million dollars. It is essential that the wafer be well protected to minimize the risk of any damage. Our products enable semiconductor manufacturers to: minimize contamination (often measured in parts per trillion); protect semiconductor devices from electrostatic discharge and shock; avoid process interruptions; prevent damage or abrasion to wafers and materials during automated processing caused by contact with other materials or equipment; prevent damage due to abrasion or vibration of work-in-process and finished goods during transportation to and from customer and supplier facilities; and eliminate the dangers associated with handling toxic chemicals.

Many of the processes used to manufacture semiconductors are also used to manufacture photovoltaic cells, LEDs, flat panel displays and magnetic storage devices resulting in the need for similar filtration, purification, control and measurement capabilities. We seek to leverage our products, technologies and expertise to address these important market opportunities.

INDUSTRY TRENDS

Semiconductor manufacturing continues to increase in complexity as new materials and new process technologies have been introduced to enable future generations of higher-performing and smaller devices and to achieve productivity gains for manufacturers. At advanced technology nodes, there has been an increasing need for innovative materials and the reliable, consistent and quality-controlled supply of these materials. These critical materials must be pure during the various stages of manufacture, from delivery to the manufacturer to point-of-use on the wafer. Manufacturers are requiring a greater level of integration of these materials into the manufacturing process and fab operation. We expect these trends to continue and to increase the need and demand for our advanced materials, our products designed to monitor, protect, transport, and deliver critical materials and our purification solutions. We have been collaborating with our customers to develop new materials, to develop enhanced methods of filtration and purification and to introduce advanced materials packaging and monitoring capabilities that will address the challenges of the advanced technology nodes.

Our semiconductor customers have become increasingly focused on materials handling solutions that enable them to safely store, handle, process and transport critical materials throughout the manufacturing process to minimize the potential for damage or degradation to their materials and to protect their investment in processed wafers. We believe that these trends provide opportunities for us to utilize our unique breadth of capabilities to provide innovative materials, materials management, purification, wafer transport, and process solutions to semiconductor customers to enable them to successfully manage this growing complexity.

The market for semiconductors has grown significantly over the past few decades. This trend is expected to continue as the Internet of Things, the connectivity of a broad range of devices, such as home devices, automobiles and smart grids, grows. We believe that the Internet of Things will drive growth in the demand for semiconductors and create significant opportunities for our products.

Emerging applications relating to the autonomous car, cloud computing, machine learning and artificial intelligence, and virtual reality, along with existing applications in data processing, wireless communications, broadband infrastructure, personal computers, handheld electronic devices and other consumer electronics, are also expected to drive demand for semiconductors, and in turn, our products.

Our customers require greater capabilities from their key materials suppliers. For example, our customers require that their suppliers demonstrate a focus on sustainability, scalability, and flexible manufacturing, with increasing importance on quality control capabilities. We have responded to these demands by deploying resources to enable us to align with the requirements of our customers and drive operational excellence. We believe these trends will allow us to leverage our manufacturing and operational capabilities, along with our broad technology portfolio, to become an increasingly important strategic supplier to our customers.

The semiconductor industry is currently undergoing consolidation, with a number of major firms merging or being acquired, and we have seen our customer base within the semiconductor industry consolidate. While we continue to strengthen our relationships in the semiconductor industry, we seek to leverage our products, technologies and expertise in serving semiconductor applications to address adjacent market opportunities, including in manufacturing processes for flat panel displays, high-purity chemicals, solar cells, optical magnetic storage devices and products for life sciences.

An additional factor that could spur future industry growth is semiconductor industry development in China, which currently represents a relatively small portion of global semiconductor production. Expansion and growth of the semiconductor industry in China could increase the need and demand for our products.

OUR BUSINESS STRATEGY

Our objective is to be a leading global provider of advanced materials and material handling and contamination control solutions used in processing and manufacturing in high-technology industries. We intend to leverage our market-leading position and strengthen our core business in the semiconductor industry. We will also build upon our position as a worldwide developer, manufacturer and supplier of advanced specialty materials, filtration and purification solutions, delivery systems, and materials packaging solutions to grow our business in other high value-added manufacturing process markets. Our strategy includes the following key elements:

Technology Leadership. We continuously improve our products as our customers' needs evolve. As semiconductor devices become smaller and more powerful, and new materials and processes are deployed to produce them, we seek to expand our technological capabilities by developing advanced products that address the requirements for greater purification, protection and transport of high value-added materials and by developing advanced chemical materials for use in critical fabrication processes. For example, we have introduced sub-10 nanometer and 7 nanometer filtration products, advanced deposition materials for next generation transistor and interconnect technologies, advanced reticle pods for extreme ultra-violet or EUV photolithography applications, advanced 300 mm wafer carriers and advanced coatings to meet the rigorous demands of the advanced technology nodes faced by our customers.

Leveraging our Expertise. We leverage our broad expertise across our portfolio of advanced materials, materials handling and purification capabilities to create innovative new solutions to address unmet customer needs. For example, our industry-leading post-CMP cleaning chemistry is developed and manufactured by our SCEM segment, packaged with our ultra clean container and connector system made by our AMH segment, and delivered to the process tools through fluid handling systems also made by AMH segment. In the process tool, these chemistries may go through one or several purification systems made by our MC segment to eliminate particles and contaminants. Another example of the results of this strategy is our advanced deposition materials business, where we leverage our ability to synthesize unique molecules, our knowledge of how to purify these materials, and our capability to safely transport these materials and deliver them onto the wafer at the highest throughput. We believe our diverse expertise in areas of increasing importance to semiconductor manufacturers is a competitive advantage.

Comprehensive and Diverse Product Offerings. As semiconductor manufacturers are driving towards more advanced technology nodes, our customers are seeking suppliers who can provide a broad range of reliable, flexible and cost-effective products and materials, as well as the technological and application design expertise necessary to enhancing their productivity, quality, and yield. We believe our comprehensive offering of materials and products creates a competitive advantage as it enables us to meet a broad range of customer needs and provide a single source of flexible product offerings for semiconductor device and capital equipment manufacturers as they seek to consolidate their supplier relationships and pursue advanced technology nodes.

Global Presence. We have established a global infrastructure of design, manufacturing, distribution, service and technical support facilities to meet the needs of our global customers. We have, for example, expanded our manufacturing operations in Taiwan and South Korea to support our important customers in these regions, established new sales and service offices in China in anticipation of a growing semiconductor manufacturing base in that country, expanded our presence in Singapore to enhance our global and regional management of supply chain and manufacturing processes, and increased our investment in advanced technology centers in Taiwan and South Korea. We service our customer relationships in Asia, Europe and the Middle East predominantly via direct sales and support personnel and to a lesser extent through selected independent sales representatives and distributors.

Operational Excellence. We have established leading-edge manufacturing plants located in the United States, France, Malaysia, Japan, South Korea and Taiwan that possess the advanced manufacturing capabilities described under *Manufacturing* below. Our strategy is to develop our advanced manufacturing capabilities into a competitive advantage with our customers by focusing on the following priorities:

- use of manufacturing equipment and facilities incorporating leading-edge technology including advanced cleanroom and cleaning procedures;
- implementation of standardized manufacturing systems stressing optimization of equipment effectiveness, predictive maintenance, and direct labor productivity;
- implementation of automated quality systems that provide both process monitoring and process control throughout the manufacturing process as well as predictive quality data to mitigate against potential quality excursions;
- implementation of supply chain management systems that assure a reliable and responsive supply of high-quality raw materials;
- conduct of manufacturing operations to assure the safety of our employees and of the individuals using our products; and
- maintaining an agile manufacturing organization that is capable of rapid design and development of prototypes of new and derivative products, as well as quickly responding to customer feedback concerning prototypes and that has the ability to quickly commercialize and ramp production of prototypes accepted by our customers.

Strong Relationships with Broad Customer Base. We have strong relationships with our customers, which include leading semiconductor manufacturers, original equipment manufacturers (OEMs), and semiconductor materials suppliers. These relationships provide us with significant collaboration opportunities at the product design stage, which facilitate our ability to introduce new products and applications. For example, we work with our key customers in the development of advanced manufacturing processes to identify and respond to their requests for current and future generations of products for emerging applications requiring cleaner materials, as well as systems that maintain the integrity and stability of materials during transport through the manufacturing process. We believe that our large customer base will continue to be an important source of new product development opportunities. Due to the specialized nature of our products, manufacturing complexity, qualification requirements in customers' fabrication processes, high customer re-formulation and qualification change costs, and extensive proprietary products, we believe our supply position with our customers is strong.

Adjacent Markets. We leverage our expertise in the semiconductor industry by developing products for other industries that employ similar technologies and production processes and that utilize materials integrity management, high-purity fluids and integrated dispense systems. For example, outside of the semiconductor industry, our products are used in manufacturing processes for flat panel displays, high-purity chemicals, solar cells, optical magnetic storage devices and products for life sciences. We plan to continue to identify and develop products that address needs in adjacent markets. We believe that by utilizing our technology to provide manufacturing solutions across multiple industries, we are able to increase the total available market for our products and reduce, to an extent, our exposure to the cyclicality of any particular market.

Strategic Acquisitions, Partnerships and Related Transactions. We will continue to pursue strategic acquisitions and business partnerships that enable us to address gaps in our product offerings, secure new customers, diversify into complementary product markets, broaden our technological capabilities and product offerings and achieve benefits of increased scale. The ATMI acquisition is an example of this strategy, bringing a whole new portfolio of technologies and materials products to serve our semiconductor customers. Further, as the dynamics of the markets that we serve shift, we will reevaluate our existing businesses and in the event that we conclude that a business is not able to provide value-added solutions to its markets in a manner that contributes to achieving our financial objectives, we expect to restructure or replace that business. Finally, we are continuously evaluating opportunities for strategic alliances, such as the strategic alliance with Enthone, joint development programs and collaborative marketing efforts with key customers and other industry leaders.

OUR SEGMENTS

As discussed, our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem: Specialty Chemicals and Engineered Materials (SCEM); Advanced Materials Handling (AMH); and Microcontamination Control (MC). The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The following is a detailed description of our three segments:

SPECIALTY CHEMICALS AND ENGINEERED MATERIALS SEGMENT

The SCEM segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. Utilized in critical semiconductor manufacturing processes such as deposition, cleaning, and integration of complex materials, these products enable enhanced device performance. When used in conjunction with products from our MC and AMH segments, these materials provide unique solutions to advance semiconductor manufacturing processes.

Specialty Gas Products. Our specialty gas solutions provide advanced safety and process capabilities to semiconductor manufacturers. Our SDS cylinders store and deliver hazardous gases, such as arsine, phosphine, germanium and boron trifluoride, at sub-atmospheric pressure through the use of our proprietary carbon-based adsorbent materials. These products minimize potential leaks during transportation and use, providing significant safety and environmental improvements over traditional high-pressure cylinders, and allow more process gas to be stored in the cylinder, providing significantly higher rates of productivity than traditional methods of gas delivery. New generations of SDS products further dramatically increase the gas storage capacity, reducing tool down time and, therefore, resulting in significant cost savings for our customers. We also offer VAC, a complementary technology to SDS where select implant gases are stored under high pressure but delivered sub-atmospherically.

Specialty Materials Products. Specialty materials products are made from specialized graphite, silicon carbide and/or a variety of unique, high purity coatings and serve as critical components in semiconductor manufacturing equipment at various stages of the semiconductor manufacturing process, including dry or plasma etch, chemical vapor deposition and ion implant. Our POCO® premium graphite is used to make precision consumable electrodes for electrical discharge machining, hot glass contact materials for use in glass product manufacturing and forming, and a number of graphite consumable products for various industrial applications, including aerospace, optical, medical devices and printing. Our high-performance specialty coatings, such as our Pegasus™ coatings, provide corrosion and erosion resistance and desired conductivity, minimize particle generation and prevent contamination on critical components used in semiconductor and other high-technology manufacturing operations.

Advanced Deposition Materials Products. Our advanced deposition materials include advanced liquid, gaseous and solid precursors which are incorporated in chemical vapor deposition (CVD) and atomic layer deposition (ALD) processes by the semiconductor industry, such as our UltraPur™ 4MS and UltraPur™ TEOS products. We offer containers that allow for reliable storage and delivery of low volatility solid and liquid precursors required in ALD processes. When combined with our proprietary corrosion resistant coatings and filtration solutions from our MC segment, our advanced deposition materials enable the industry’s highest purity levels, resulting in improved device performance.

Surface Preparation and Integration Products. We offer a range of materials used to prepare and integrate the surface of a semiconductor wafer during the manufacturing process. For example, our Viaform® product (a trademark of and exclusively licensed from Enthone Inc. (Enthone), a subsidiary of Alent plc (acquired by Platform Specialty Products Corporation in late 2015)) includes inorganic and proprietary organic molecules that provide the wiring for copper interconnects and allows manufacturers to eliminate processing steps. We also offer CMP cleaning solutions for applications such as semiconductor post-etch residue removal, wafer etching, organics removal, negative resist removal, edge bead removal, and corrosion prevention. Our wet chemistries solutions, combined with filtration solutions from our MC segment and fluid handling solutions from our AMH segment, provide enhanced purity resulting in improved capability and consistency in our customers' processes. Our line of consumable PVA roller brush products are used to clean the wafer following the CMP process and our line of pad conditioners, based on our silicon carbide capabilities, offer unique preparation solutions for each distinct CMP pad application, with significant improvement in CMP pad life.

ADVANCED MATERIALS HANDLING SEGMENT

The AMH segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. These systems and products improve our customers’ yields by protecting wafers from abrasion, degradation and contamination during manufacturing and transportation and by assuring the consistent, clean and safe delivery of advanced chemicals from the chemical manufacturer to the point-of-use in the semiconductor fab. The effective management and maintenance of the entire fluidics system, from initial production of process chemistry, to transportation and dispensing onto the wafer, is critical to enhance device yield.

Wafer Solutions. We lead the market with our high-volume line of Ultrapak® and Crystalpak® products, for wafers ranging from 100 to 200 mm, which ensure the clean and secure transport of wafers. We also offer a front-opening shipping box, or FOSB, for the transportation and automated interface of 300 mm wafers.

We provide front opening unified pods, or FOUPs, wafer transport and process carriers and standard mechanical interface pods, or SMIF pods, which meet a spectrum of industry standard wafer handling needs, in sizes up to 300mm. These microenvironment products safely and accurately deliver wafers to the various process fabrication steps and are optimized with filtration products from our MC segment to ensure the purest ambient environment around the wafer.

Chemical Containers. We produce a wide range of flexible packaging and polymer containers that chemical companies use to ship process chemistries to semiconductor fabs. Our packaging ensures the purity of the chemistry during transportation to enhance yields for the fab. We optimize the compatibility and performance of these products on chemistries through close collaboration with our SCEM segment. We have a broad portfolio of packaging products, from low-volume containers to transport high-value photoresist chemistries, such as our NOWPak® products, to large intermediate bulk containers, or IBCs, for high volume chemical consumption, such as our FluoroPure® products.

Fluidics. We are a leader in high-purity fluid transfer products such as valves, fittings, tubing, pipe, custom fabricated products and associated connection systems, such as our PrimeLock® connections, for high-purity chemical applications. Our comprehensive product line provides our semiconductor manufacturers, process tool makers and chemical customers with a single-source provider for their process chemical management needs throughout the manufacturing process.

Our patented digital valve control technology improves chemical uniformity on wafers and improves ease of optimized system operation. Our IntelliGen® integrated high-precision liquid dispense systems enable the uniform application of advanced chemistries during the wafer fabrication process, integrating our valve control and filter device technologies from our MC segment, so that filtering and dispensing of photochemicals can occur at different rates, conserving high-value chemistry and reducing defects on wafers.

The AMH segment collaborates closely with the SCEM segment in developing products that are compatible with advanced chemistries to enhance yield, while integrating liquid filtration technology from our MC segment to deliver the most consistent, defect-free chemistry.

MICROCONTAMINATION CONTROL SEGMENT

The MC segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. The design and performance of our liquid chemistry and gas filtration and purification products are critical to the semiconductor manufacturing process because they directly reduce defects and improve manufacturing yield. Our proprietary filters remove chemical and nanometer-sized contaminants and bubbles from the different fluids and gases used in the manufacturing process, including photolithography, deposition, planarization and surface etching and cleaning. Our products prevent defects that could result contamination altering the physical and electrical properties of our customers' products.

Liquid Microcontamination Control Products. We offer a variety of unique products that are optimized to control contaminants in our customers' liquid processes. Our Torrento® series of filters is an example of one line of our products used in leading-edge applications for the filtration of aggressive acid and base chemistries for both semiconductor fabs as well as specialty chemical manufacturers including our SCEM segment. Our Impact® series of filters are used in point-of-use photochemical dispense applications, including those provided by our AMH segment, where the delivery of superior flow rate performance and reduced microbubble formation is critical.

Gas Microcontamination Control Products. Our metal filters, such as stainless steel and nickel filters, reduce out gassing and improve corrosion resistance. Our purifiers chemically react with and absorb contaminants, such as oxygen and water, to prevent contamination, and our vent diffusers reduce particle contamination and processing cycle times. Our GateKeeper® gas purifiers leverage technology developed from our SCEM segment and effectively remove gaseous contaminants down to part-per-trillion levels. Our Chambergard™ gas diffusers provide semiconductor equipment manufacturers with the capability to rapidly vent their tools to atmosphere without adding particles to the wafers under process.

Other products. We also offer our eVOLV™ wet chemical process to recycle electronic waste and recover precious metals and other high-value materials from discarded printed circuit boards and semiconductor chips.

OUR CUSTOMERS AND MARKETS

Our most significant customers include semiconductor device manufacturers, OEMs that provide equipment to semiconductor device manufacturers, gas and chemical manufacturing companies, leading wafer grower companies and manufacturers of high-precision electronics. We also sell our products to flat panel display OEMs, materials suppliers and manufacturers, primarily in in Japan, Korea, China and other parts of Asia.

In our other high-technology markets, our customers include manufacturers and suppliers in the solar and life science industries and, for our Poco Graphite products, electrical discharge machining customers, glass and glass container manufacturers, aerospace manufacturers and manufacturers of biomedical implantation devices.

In 2016, 2015 and 2014, net sales to our top ten customers accounted for 45%, 44% and 42%, respectively, of combined net sales. In 2016, 2015 and 2014, one customer, Taiwan Semiconductor Manufacturing Company Limited, accounted for $161.9 million, $134.1 million and $130.9 million of net sales, respectively, or approximately 14%, 12% and 14% of our net sales, respectively, including sales from each of our three reporting segments. International net sales represented 78%, 77% and 75%, respectively, of net sales in 2016, 2015 and 2014. Approximately 2,300 customers purchased products from us during 2016.

We may enter into supply agreements with our customers. These agreements generally have a term of one to three years, but do not contain any long-term purchase commitments. Instead, we work closely with our customers to develop non-binding forecasts of the future volume of orders. However, customers may cancel their orders, change production quantities from forecasted volumes or delay production for a number of reasons beyond our control.

SALES, MARKETING AND SUPPORT

We sell our products worldwide, primarily through our direct sales force and strategic independent distributors located in all major semiconductor markets. Independent distributors are also used in other semiconductor market territories and for specific market segments. As of December 31, 2016, our sales and marketing force consisted of 478 employees worldwide.

Our unique capabilities and long-standing industry relationships have provided us with the opportunity for significant collaboration with our customers at the product design stage, which has facilitated our ability to introduce new materials and new solutions that meet our customers' needs. We are constantly identifying for our customers a variety of materials, purification and process control challenges that may be addressed by our products. Our sales representatives provide our customers with worldwide support and information about our products and materials.

We believe that our technical support services are important to our sales and marketing efforts. These services include assisting in defining a customer's needs, evaluating alternative products and materials, designing a specific system to perform the desired operation, training users and assisting customers in compliance with relevant government regulations. Additionally, our field applications engineers, located in the United States and approximately ten other countries, work directly with our customers on product qualification and process improvements in their facilities. We maintain a network of service centers, applications laboratories and technology centers located in all key markets internationally and in the United States to support our products and our customers with their advanced development needs, provide local technical service and ensure fast turnaround time.

COMPETITION

The market for our products is highly competitive. While price is an important factor, we compete primarily on the basis of the following factors:

- historical customer relationships;
- technical expertise;
- product quality and performance;
- total cost of ownership;
- customer service and support;
- breadth of product line;
- breadth of geographic presence;
- advanced manufacturing capabilities; and
- after-sales service.

We believe that we compete favorably with respect to all of the factors listed above, but there are no assurances that we will continue to do so. We believe that our key competitive strengths include our broad product line, our strong research and development infrastructure and investment, our manufacturing excellence, our advanced quality control systems, the low total cost of ownership of our products, our ability to provide our customers with quick order fulfillment and our applications expertise in semiconductor manufacturing processes. However, our competitive position varies depending on the market segment and specific product areas within these segments. While we have longstanding relationships with a number of semiconductor and other electronic device manufacturers, we also face significant competition from companies that also have longstanding relationships with other semiconductor and electronic device manufacturers and, as a result, have been able to have their products specified by those customers for use in manufacturers' fabrication facilities.

The competitive landscape is varied, from multinational companies to small regional, narrow-portfolio focused companies. Overall, industry trends are indicating a shift to localized, cost-competitive and consolidated supply chains.

Because of the unique breadth of our capabilities, we believe that there are no global competitors that compete with us across the full range of our product offerings. Many of our competitors are local companies that participate in only a few products or in specific geographies. While there are other larger, broad-based materials suppliers, many are concentrated in specific product areas, such as filtration, specialty chemicals or materials handling. Key competitors include Pall Corporation (which was acquired by Danaher Corporation in 2015), Shin-Etsu Polymer Co., Ltd., Gemu Valves, Inc., Tokyo Keiso Co., Ltd., Mersen (France), Versum Materials, Inc., DuPont Electronic Technologies, Dow Chemical Company (including Rohm and Haas), Air Liquide, Praxair, Inc., SAES Pure Gas, Inc., Donaldson Company, Inc. and Parker Hannifin Corp.

ENGINEERING, RESEARCH AND DEVELOPMENT

We believe that technology is important to success in each of our businesses, and we plan to continue to devote significant resources to engineering, research and development (R&D), balancing efforts between shorter-term market needs and longer-term investments. Our aggregate engineering, research and development expenses in 2016, 2015 and 2014 were $107.0 million, $105.9 million and $87.7 million, respectively. As of December 31, 2016, we had 436 employees in engineering, research and development. We have supplemented and may continue to supplement our internal research and development efforts by licensing technology from unaffiliated third parties and/or acquiring rights with respect to products incorporating externally owned technologies. Our R&D expenses consist of personnel and other direct and indirect costs for internally funded project development, including the use of outside service providers.

We believe we have a rich pipeline of development projects. For example, our engineering, research and development efforts have been focusing on growth opportunities in areas such as bulk photochemical filtration, new boron mixtures for ion implant, new solid precursors for deposition, specialty coatings for key applications and new CMP pad conditioners. Our engineering, research and development efforts are directed toward developing and improving our technology platforms for semiconductor and advanced processing applications and identifying and developing products for new applications, often working directly with our customers to address their particular needs.

We have engineering, research and development capabilities in California, Connecticut, Minnesota, Massachusetts, Colorado, Texas, Japan, Korea, Taiwan, France, China, Singapore and Malaysia to meet the global needs of our customers. We use sophisticated methodologies to research, develop and characterize our materials and products. Our capabilities to test and characterize our materials and products are focused on continuously reducing risks and threats to the integrity of the critical materials that our customers use in their manufacturing processes.

We participate in Semiconductor Equipment and Materials International (SEMI®), an association of semiconductor equipment suppliers, and leading industry consortia, such as the Interuniversity Microelectronics Centre (imec®) and Semiconductor Manufacturing Technology (SEMATECH), including its Global 450 Consortium (G450C). For example, we have participated with SEMI to develop specifications for the next generation of wafer shipping and handling products and we have worked with a major customer to develop specific wafer handling products for 450 mm wafers.

PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

We believe that, while intellectual property is important for our business, our success also depends upon close customer contact, innovation, technological expertise, responsiveness and worldwide distribution. Additionally, while our intellectual property may delay or deter a competitor in offering a competing product, we do not believe that our portfolio functions as a barrier to entry for any of our competitors. As of December 31, 2016, our combined patent portfolio included 639 current U.S. patents, 1,364 current foreign patents, including counterparts to U.S. filings, 281 pending U.S. patent applications, 86 pending filings under the Patent Cooperation Treaty not yet nationalized and 943 pending foreign patent applications. We rely on a combination of patent, copyright, trademark and trade secret laws and license agreements to establish and protect our proprietary rights. We refresh our intellectual property on an ongoing basis through continued innovation. While we license and will continue to license technology used in the manufacture and distribution of products from third parties, we do not consider any particular patent or license to be material to our business.

We vigorously protect and defend our intellectual property. We require each of our employees, including our executive officers, to enter into standard agreements pursuant to which the employee agrees to keep confidential all of our proprietary information and to assign to us all inventions made while employed by us. We also require all outside scientific collaborators, sponsored researchers, and other advisors and consultants who are provided confidential information to execute confidentiality agreements upon the commencement of the consulting or collaboration relationship in question. These agreements generally provide that all confidential information developed or made known to the entity or individual during the course of the entity's or individual's relationship with the Company is to be kept confidential and not disclosed to third parties except in specific limited circumstances.

MANUFACTURING

Our customers rely on our products and materials to assure the integrity of the critical materials used in their manufacturing processes by providing dimensional precision and stability, purity, cleanliness and consistent performance. Our ability to meet our customers' expectations, combined with our substantial investments in worldwide manufacturing capacity, position us to respond to the increasing demands of the semiconductor industry and other industries that require yield-enhancing materials and solutions.

To meet our customer needs worldwide, we have established an extensive global manufacturing network with manufacturing and coating facilities in the United States, Japan, Taiwan, France, Malaysia and South Korea. Because we work in an industry where contamination control is paramount, we maintain Class 100 to Class 10,000 cleanrooms for manufacturing and assembly. We believe that our worldwide manufacturing operations and our advanced manufacturing capabilities are important competitive advantages. Our advanced manufacturing capabilities include:

- injection molding;
- extrusion;
- blow molding;
- rotational molding;
- compression molding;
- membrane casting;
- cartridge manufacturing;
- specialty coating capabilities;
- graphite synthesis;
- machining;
- assembly;
- tool making;
- high-purity materials packaging; and
- gas delivery systems.

We have made significant investments in systems and equipment to create innovative products and tool designs, including metrology and 3D printing capabilities for rapid analysis and production prototype of products.

In addition, we use contract manufacturers for certain of our gas microcontamination control and other electronic materials products both in the U.S. and Asia.

RAW MATERIALS

Our products are made from a wide variety of raw materials that are generally available from multiple sources of supply. However, while we seek to have several sources of supply for all of these materials, certain materials included in our products, such as certain liquid filtration membranes in our MC segment, petroleum coke in our specialty materials products in our SCEM segment and polymer resins in our microenvironment products in our AMH segment are obtained from a single source or a limited group of suppliers. Additionally, our specialty gas products in our SCEM segment use a broad range of specialty and commodity chemicals and polymers in the development of its products, including parts and sub-assemblies that are obtained from a single supplier or a limited number of suppliers, or from suppliers in a single country. We have entered into multi-year supply agreements with a number of suppliers for the purchase of raw materials in the interest of supply assurance and to control costs.

Although the Company seeks to reduce dependence on these sole and limited source suppliers, the partial or complete loss of these sources could interrupt our manufacturing operations and result in an adverse effect on the Company’s results of operations. Furthermore, a significant increase in the price of one or more of these components could also adversely affect the Company’s results of operations.

GOVERNMENTAL REGULATION

Our operations are subject to federal, state and local regulatory requirements relating to environmental, waste management and health and safety matters, including measures relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation of contaminants, hazardous substances and wastes, as well as practices and procedures applicable to the construction and operation of our plants. There can be no assurance that we will not incur material costs and liabilities or that our past or future operations will not result in exposure to injury or claims of injury by employees or the public. Although some risk of costs and liabilities related to these matters is inherent in our business, as with many similar businesses, we believe that our business is operated in substantial compliance with applicable regulations. However, new, modified or more stringent requirements or enforcement policies could be adopted, which could adversely affect us. While we expect that capital expenditures will be necessary to assure that any new manufacturing facility is in compliance with environmental and health and safety laws, we do not expect these expenditures to be material.

EMPLOYEES

As of December 31, 2016, we had 3,542 full-time employees, as well as approximately 185 temporary and part-time employees. Of our employees, 436 work in engineering, research and development and 478 work in sales and marketing. Given the variability of business cycles in the semiconductor industry and the quick response time required by our customers, it is critical that we be able to quickly adjust the size of our production staff to maximize efficiency. Therefore, we use skilled temporary labor as required.

None of our employees are represented by a labor union or covered by a collective bargaining agreement other than statutorily mandated programs in certain European countries.

FINANCIAL INFORMATION ABOUT OUR OPERATING SEGMENTS

For a discussion of revenue and segment profitability with respect to each of our reporting segments, see Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations - Segment Analysis below, which is incorporated herein by reference. See also note 15 to our consolidated financial statements. Approximately 78%, 77% and 75% of our net sales were made to customers outside North America in 2016, 2015 and 2014, respectively. Industry and geographic segment information is also discussed in note 15 to the Entegris, Inc. consolidated financial statements included in response to Item 8 below, which is incorporated herein by reference.

OUR HISTORY

The Company was incorporated in Delaware on March 17, 2005 in connection with a merger between Entegris, Inc., a Minnesota corporation, and Mykrolis Corporation, a Delaware corporation. On April 30, 2014, the Company acquired ATMI, Inc., a Delaware corporation based in Danbury, CT, referred to throughout this report as ATMI and the ATMI acquisition. In 2016, Entegris celebrated its 50th year of helping customers solve their critical materials challenges and enhance their manufacturing yields, tracing its corporate origins back to Fluoroware, Inc., which began operating in 1966.

AVAILABLE INFORMATION

Our Internet address is *www.entegris.com*. On this web site, under the "Investors-Financial Information-SEC Filings" section, we post the following filings as soon as reasonably practicable after they are electronically filed with, or furnished to, the U.S. Securities and Exchange Commission (SEC): our annual, quarterly, and current reports on Forms 10-K, 10-Q, and 8-K; our proxy statements; any amendments to those reports or statements, and Form SD. All such filings are available on our web site free of charge. The SEC also maintains a web site (*www.sec.gov*) that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The content on our website, and any other website, as referred to in this Form 10-K is not incorporated by reference into this Form 10-K unless expressly noted.

Item 1A. Risk Factors.

You should carefully consider the following risks and other information in this Annual Report on Form 10-K in evaluating us and our common stock.

Any of the following risks could materially and adversely affect our financial condition, results of operations or cash flows. Our operations could be affected by various risks, many of which are beyond our control. Based on current information, we believe that the following list identifies the most significant risk factors that could affect our financial condition, results of operations or cash flows. There may be additional risks and uncertainties that adversely affect our financial condition, results of operations or cash flows in the future that are not presently known, are not currently believed to be material, or are not identified below because they are common to all businesses. Past financial performance may not be a reliable indicator of future performance and historical trends should not be used to anticipate results or trends in future periods. For more information, see "Cautionary Statement" in Item 7 of this Annual Report on Form 10-K.

Risks Relating to our Business and Industry

THE SEMICONDUCTOR INDUSTRY HAS HISTORICALLY BEEN HIGHLY CYCLICAL AND INDUSTRY DOWNTURNS COULD REDUCE OUR NET SALES AND PROFITS.

Our business depends on the purchasing patterns of semiconductor manufacturers, which, in turn, depend on the current and anticipated demand for semiconductors and products utilizing semiconductors. The semiconductor industry has historically been highly cyclical with periodic significant downturns, which often have resulted in significantly decreased expenditures by semiconductor manufacturers. Even moderate cyclicality can cause our operating results to fluctuate significantly from one period to the next. We have in the past experienced significant revenue deterioration and incurred significant operating losses due to a severe downturn in the semiconductor industry. We are unable to predict the ultimate duration and severity of future downturns for the semiconductor industry.

Furthermore, in periods of reduced demand, we must continue to maintain a satisfactory level of engineering, research and development expenditures, continue to invest in our infrastructure and maintain the ability to respond to any significant increases in demand, if they occur. Changes in order patterns have a more immediate impact on our revenues because we typically do not have significant backlog. We expect the semiconductor industry to continue to be cyclical. During downturns our revenue is reduced and there is likely to be an increase in pricing pressure and shifts in product and customer mix, all of which may affect gross margin and net income. Such fluctuations in our results could cause our stock price to decline significantly. We believe that period-to-period comparisons of our results of operations may not be meaningful, and you should not rely upon them as indicators of our future performance.

In addition, there may not be new high-opportunity applications to drive growth in the semiconductor industry, as was the case in earlier market cycles. Accordingly, the semiconductor industry may experience lower growth rates during any recovery cycle than has historically been the case and its longer-term performance may reflect this lower growth rate.

WE MAY BE UNABLE TO MEET DEMAND IN RESPONSE TO THE SEMICONDUCTOR INDUSTRY'S RAPID DEMAND SHIFTS OR ACCURATELY FORECAST DEMAND FOR OUR PRODUCTS, WHICH COULD CAUSE A REDUCTION IN OUR MARKET SHARE AND ADVERSELY AFFECT OUR BUSINESS, FINANCIAL CONDITION AND OPERATING RESULTS.

Our ability to increase sales of our products, particularly our capital equipment products, depends in part upon our ability to ramp up our manufacturing capacity for such products in a timely manner, often in as little as a few months, and to quickly mobilize our supply chain. If we are unable to expand our manufacturing capacity on a timely basis or manage such expansion effectively, our customers could seek such products from other suppliers, and our market share could be reduced. Because demand shifts in the semiconductor industry are rapid and difficult to foresee, we may not be able to increase capacity quickly enough to respond to any such increase in demand.

We typically operate our business on a just-in-time shipment basis with a modest level of backlog and we order supplies and plan production based on internal forecasts of demand. We have, in the past, and may again in the future, fail to accurately forecast demand for our products, in terms of both volume and product type. This has led to, and may in the future lead to, delays in product shipments, disappointment of customer expectations, or, alternatively, an increased risk of excess inventory and of inventory obsolescence. If we fail to accurately forecast demand for our products, our business, financial condition and operating results could be materially and adversely affected.

IF WE ARE UNABLE TO CONTINUE OUR TECHNOLOGICAL INNOVATION AND INTRODUCTION OF NEW PRODUCTS, WE WILL NOT BE ABLE TO SUCCESSFULLY COMPETE.

The semiconductor industry is subject to rapid technological change, changing customer requirements and frequent new product introductions. As a result, the life cycle of our products is difficult to determine. We believe that our future success will depend upon our ability to continue to develop mission-critical solutions to maximize our customers' manufacturing yields and enable higher performance of end-market materials or devices. This requires that we successfully anticipate and respond to technological changes in manufacturing processes in a cost-effective and timely manner. A failure to develop new products or enhancements to our existing products or the inability to timely manufacture and ship these products or enhancements in sufficient volume could harm our business prospects and significantly reduce our sales. In addition, if new products have reliability or quality problems, we may experience reduced orders, higher manufacturing costs, delays in acceptance and payment, additional service and warranty expense, and damage to our reputation.

OUR SALES ARE CONCENTRATED ON A SMALL NUMBER OF KEY CUSTOMERS AND, THEREFORE, OUR NET SALES AND PROFITABILITY MAY MATERIALLY DECLINE IF ONE OR MORE OF OUR KEY CUSTOMERS DOES NOT CONTINUE TO PURCHASE OUR EXISTING AND NEW PRODUCTS.

We depend and expect to continue to depend on a limited number of customers for a large portion of our business, and changes in several customers' orders could have a significant impact on our operating results. Our top ten customers accounted for 45%, 44% and 42% of our net sales in 2016, 2015 and 2014, respectively. Our net sales and profitability may decline significantly if any one of our key customers decides to purchase significantly less from us or to terminate its relationship with us entirely. We could also lose our key customers or significant sales to our key customers because of factors beyond our control, such as a significant disruption in our customers' businesses generally or in a specific product line, a change in the manufacturing sourcing policies or practices of these customers or the timing of customer inventory adjustments. For example, our SCEM segment customers' and their customers' aggressive management of inventory has adversely affected its results of operations in the past and may adversely affect future results of operations. Given the generally fixed nature of our costs, if our customers delay or cancel their orders or reduce ordered quantities from forecasted volumes, we may be required to hold inventory for longer than anticipated, our profitability may be reduced, our ability to fund our operations may be restricted, our revenue may incur unanticipated reductions or be delayed and our gross margins may decline.

Our customers could stop incorporating our products into their products with limited advance notice to us and suffer little or no penalty for doing so. The semiconductor industry is currently undergoing consolidation, with a number of major firms merging or being acquired. If any of our customers merge or are acquired, we may experience lower overall sales from the merged or surviving companies. Because we develop long-term relationships with key customers in the product areas we serve, and because we have a long product design and development cycle for most new products, which are then subject to lengthy customer product qualification periods, we may be unable to quickly replace these customers, if at all.

COMPETITION FROM NEW OR EXISTING COMPANIES COULD HARM OUR FINANCIAL CONDITION, RESULTS OF OPERATIONS AND CASH FLOW.

We operate in a highly competitive industry. We compete against many domestic and foreign companies that have substantially greater manufacturing, financial, research and development and marketing resources than we do. In addition, some of our competitors may have better-established relationships with our existing customers than we do, which may enable them to have their products specified for use more frequently and more quickly by these customers. We also face competition from the manufacturing operations of our current and potential customers, who continually evaluate the benefits of internal manufacturing versus outsourcing. As more OEMs dispose of their manufacturing operations and increase the outsourcing of their products to liquid and gas delivery system and other component companies, we may face increasing competitive pressures to grow our business and portfolio of products in order to maintain our market share. If we are unable to maintain our competitive position, we could experience downward pressure on prices, fewer customer orders, reduced margins, the inability to take advantage of new business opportunities and a loss of market share, which could have a material adverse effect on our results of operations. Further, we expect that existing and new competitors will improve the design of their existing products and will introduce new products with enhanced performance characteristics. The introduction of new products or more efficient production of existing products by our competitors could diminish our market share and increase pricing pressure on our products. Further, if we do not respond to pressure from our customers to lower prices, shorten delivery times and enhance product capability, we could lose customers or orders.

IF WE ARE UNABLE TO OBTAIN FUTURE BUSINESS OPPORTUNITIES ASSOCIATED WITH NEW PRODUCT INITIATIVES AND RELATED CAPITAL INVESTMENT PROJECTS, OUR REVENUE AND PROFITABILITY MAY DECLINE.

In the semiconductor market, while the development period for a product can be very long, the first company to introduce an innovative product meeting an identified customer need will often have a significant advantage over offerings of competitive products. For this reason, we may make significant cash expenditures to engineer, research, develop and market new products and make significant capital investments in technology and manufacturing capacity in advance of future business developing and without any purchase commitment from our customers. For example, we incurred $107.0 million, $105.9 million and $87.7 million for engineering, research and development expense in 2016, 2015 and 2014, respectively.

Following development, it may take a number of years for sales of a new product to reach a substantial level, if ever. A product concept may never progress beyond the development stage or may only achieve limited acceptance in the marketplace. If this occurs, we do not receive a direct return on our expenditures, we may not realize any indirect benefits, we may lose market share and our revenue and profitability may decline. For example, while we made significant cash expenditures and capital investments to develop the capability to manufacture shippers and FOUPs for 450 mm wafers, the size and timing of the development of the market for 450 mm wafer shippers and FOUPs remains uncertain. As major semiconductor manufacturers have delayed the implementation of 450 mm manufacturing and others have announced that they would not initiate 450 mm manufacturing until after 2020, we cannot assure you that we will be able to successfully sell significant quantities of our 450 mm shipper and FOUP products or realize a return on our investment in the near term or ever.

WE MAY ACQUIRE OTHER BUSINESSES, FORM JOINT VENTURES OR DIVEST BUSINESSES THAT COULD NEGATIVELY AFFECT OUR PROFITABILITY, REQUIRE US TO INCUR DEBT AND DILUTE YOUR OWNERSHIP OF THE COMPANY.

As part of our business strategy and as we have in the past, we expect to continue to address gaps in our product offerings, diversify into complementary product markets or pursue additional technology and customers through acquisitions, joint ventures or other types of collaborations. We also expect to adjust our portfolio of businesses to meet our ongoing strategic objectives. As a result, we may enter markets in which we have no or limited prior experience and may encounter difficulties in divesting businesses that no longer meet our objectives. Competition for acquiring attractive businesses in our industry is substantial. In executing this part of our business strategy, we may experience difficulty in identifying suitable acquisition candidates or in completing selected transactions at appropriate valuations. Alternatively, we may be required to undertake multiple transactions at the same time in order to take advantage of acquisition opportunities that do arise. This could strain our ability to effectively execute and integrate these transactions. We would consider a variety of financing alternatives for each acquisition which could include borrowing funds, reducing our cash balances or issuing additional shares of our common stock to complete an acquisition. This could impair our liquidity and dilute your ownership of the Company. Further, we may not be able to successfully integrate any acquisitions that we do make into our existing business operations, and we could assume unknown or contingent liabilities or experience negative effects on our reported results of operations from dilutive results from operations and/or from future potential impairment of acquired assets, including goodwill, related to future acquisitions. We may experience difficulties in retaining key employees or customers of an acquired business, and our management's attention could be diverted from other business issues. We may not identify or complete these transactions in a timely manner, on a cost-effective basis or at all, and we may not realize the benefits of any acquisition or joint venture.

WE MAY NOT EFFECTIVELY PENETRATE NEW MARKETS.

Part of our business strategy is to leverage our expertise in our core competencies for growth in new and adjacent markets, such as photovoltaic cells, LEDs, flat panel displays, lithium ion batteries, magnetic storage devices and life sciences. Our ability to grow our business could be limited if we are unable to execute on this strategy.

WE FACE THE RISK OF PRODUCT LIABILITY CLAIMS AND, IN PARTICULAR, CERTAIN OF OUR PRODUCTS ARE USED TO TRANSPORT TOXIC GASES USED IN THE SEMICONDUCTOR MANUFACTURING PROCESS AND A LEAK COULD RESULT IN SIGNIFICANT HARM AND LIABILITY.

The manufacture and sale of our products involve the risk of product liability claims. In addition, a failure of one of our products at a customer site could interrupt the business operations of the customer. For example, while we believe that our SDS and VAC delivery systems are the safest available in the industry, as with any products involved in the transport and storage of toxic gases, if a leak were to occur during transport or during storage at our customers' location, serious damage could result including injury or death to any person exposed to those toxic gases creating significant product liability for us. There can be no assurance that our insurance will be adequate to satisfy any such liabilities and our financial results or financial condition could be adversely affected.

LOSS OF OUR KEY PERSONNEL, WHO HAVE SIGNIFICANT EXPERIENCE IN THE SEMICONDUCTOR INDUSTRY AND TECHNOLOGICAL EXPERTISE, COULD HARM OUR BUSINESS, WHILE OUR INABILITY TO ATTRACT AND RETAIN NEW QUALIFIED PERSONNEL COULD INHIBIT OUR ABILITY TO OPERATE AND GROW OUR BUSINESS SUCCESSFULLY.

Many of our key personnel have significant experience in the semiconductor industry and deep technical expertise. The loss of the services of one or several of our key employees or an inability to attract, train and retain qualified and skilled employees, specifically research and development and engineering personnel, could result in the loss of customers or otherwise inhibit our ability to operate and grow our business successfully. In the past, during downturns in the semiconductor industry, we have had to impose salary reductions on senior employees and freeze or eliminate merit increases in an effort to maintain our financial position. These actions may have an adverse effect on employee loyalty and may make it more difficult for us to attract and retain key personnel.

IF WE ARE UNABLE TO PROTECT OUR INTELLECTUAL PROPERTY AND TECHNOLOGY, IF OUR COMPETITORS WERE TO DEVELOP SIMILAR OR SUPERIOR INTELLECTUAL PROPERTY OR TECHNOLOGY, OR, IF OUR INTELLECTUAL PROPERTY OR TECHNOLOGY VIOLATE THIRD-PARTY RIGHTS, OUR BUSINESS AND PROSPECTS COULD BE HARMED.

Our future success and competitive position depend in part upon our ability to obtain and maintain proprietary technology used in our principal product families. We rely, in part, on patent, trade secret and trademark law to protect that technology. We have obtained a number of patents relating to our products and have filed applications for additional patents. We cannot assure you that any of our pending patent applications will be approved, in key jurisdictions or at all, that we will develop additional proprietary technology that is patentable, that any patents owned by or issued to us will provide us with competitive advantages or that these patents will not be challenged, invalidated, circumvented, and rendered unenforceable or otherwise compromised by third parties. In addition, if we do not obtain intellectual property protection in the international jurisdictions we serve, our competitiveness in these markets could be significantly impaired, which would limit our growth and future revenue. While we routinely enter into confidentiality agreements with our employees and with third parties to protect our proprietary information and technology, these agreements may not be enforceable or they may be breached by such employees or third parties, and we may not have adequate remedies for such breaches. Furthermore, our confidential and proprietary information and technology could be independently developed by or become otherwise known to third parties and third parties could design around our patents.

Competitors may misappropriate our intellectual property, and disputes as to ownership of intellectual property may arise. We may institute litigation in order to enforce our patents, copyrights or other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others or to defend against claims of infringement. Such litigation could result in substantial costs and diversion of resources and could negatively affect our sales, profitability and prospects regardless of whether we are able to successfully enforce our rights. For example, in January 2011, we settled multiple patent litigations with Pall Corporation (which was acquired by Danaher Corporation in 2015). We prosecuted and defended these cases vigorously and incurred substantial costs in pursuing them. It may become necessary for us to initiate other costly patent litigation against our competitors in order to protect and/or perfect our intellectual property rights. We cannot predict how any existing or future litigation will be resolved or what its impact will be on us.

Our commercial success depends, in part, on our ability to avoid infringing or misappropriating any patents or other proprietary rights owned by third parties. If we are found to infringe or misappropriate a third party's patent or other proprietary rights, we could be required to pay damages to such third party, alter our products or processes, obtain a license from the third party or cease activities utilizing such proprietary rights, including making or selling products utilizing such proprietary rights. If we are required to obtain a license from a third party, there can be no assurance that we will be able to do so on commercially favorable terms, if at all.

OUR RESULTS OF OPERATIONS COULD BE ADVERSELY AFFECTED BY CLIMATE CHANGE OR NATURAL CATASTROPHES IN THE LOCATIONS IN WHICH WE, OUR CUSTOMERS OR OUR SUPPLIERS OPERATE, SUCH AS THE MARCH 2011 EARTHQUAKE AND TSUNAMI IN JAPAN AND THE JUNE 2012 WILDFIRES IN COLORADO SPRINGS, COLORADO.

We have manufacturing and other operations in locations subject to natural events such as severe weather and earthquakes that could disrupt operations. In addition, our suppliers and customers also have operations in such locations. A natural disaster that results in a prolonged disruption to our operations, or our customers' or suppliers' operations, may adversely affect our results of operations and financial condition. Also, climate change poses both regulatory and physical risks that could harm our results of operations or affect the way we conduct our businesses. While the March 2011 earthquake and tsunami in Japan did not materially impair manufacturing operations at our Yonezawa, Japan plant and while the June 2012 wildfires did not materially impair manufacturing operations at our Colorado Springs plant, there can be no assurance that future such catastrophes will not impact our manufacturing operations or those of our supply chain partners by disrupting our ability to manufacture and deliver products to our customers, resulting in an adverse impact on our business and results of operations.

WE MAY BE SUBJECT TO INFORMATION TECHNOLOGY SYSTEM FAILURES, NETWORK DISRUPTIONS AND BREACHES IN DATA SECURITY.

Information technology system failures, network disruptions and breaches of data security from cyber-attacks, employee social media use on our computers or through failure of our internet service providers and other cloud computing service providers to successfully secure their own systems could disrupt our operations, cause customer communication and order management issues, cause the unintentional disclosure of customer, employee and proprietary information, and cause disruption in our transaction processing, which could affect our reputation and reporting of financial results. While our management has taken steps to address these concerns by implementing network security, hiring personnel and establishing internal control measures, there can be no assurance that a system failure or data security breach will not have a material adverse effect on our financial condition and operating results.

Risks Related to Our Indebtedness

WE HAVE A SUBSTANTIAL AMOUNT OF INDEBTEDNESS, WHICH COULD ADVERSELY AFFECT OUR FINANCIAL HEALTH AND OUR ABILITY TO OBTAIN FINANCING IN THE FUTURE, REACT TO CHANGES IN OUR BUSINESS AND MAKE PAYMENTS ON THE INDEBTEDNESS.

As of December 31, 2016, we have an aggregate principal amount of approximately $594 million of outstanding total indebtedness, comprised of our 6% senior unsecured notes due April 1, 2022 (“Notes”) and our senior secured term loan facility due 2021 (“Term Loan”). In addition, we have approximately $75 million of unutilized capacity under a senior secured asset-based revolving credit facility (“ABL Facility”), which is subject to a borrowing base.

Our high level of debt could have important consequences, including:

- making it more difficult for us to satisfy our obligations with respect to the Notes, the Term Loan and the ABL Facility;
- limiting our ability to obtain additional financing to fund future working capital, capital expenditures, acquisitions or other general corporate requirements;
- requiring a substantial portion of our cash flow to be dedicated to debt service payments instead of other purposes, thereby reducing the amount of cash flow available for working capital, capital expenditures, acquisitions and other general corporate purposes;
- increasing our vulnerability to adverse changes in general economic, industry and competitive conditions;
- exposing us to the risk of increased interest rates as certain of our borrowings, including borrowings under the Term Loan and the ABL Facility include variable interest rates;
- limiting our flexibility in planning for and reacting to changes in the industry in which we compete;
- preventing us from raising funds necessary to repurchase all Notes tendered to us upon the occurrence of certain changes of control, which could constitute a default under the indenture governing the Notes;
- placing us at a disadvantage compared to other, less leveraged competitors or competitors with comparable debt at more favorable interest rates; and
- increasing our cost of borrowing.

In addition, the indenture that governs the Notes and the credit agreements governing our Term Loan and our ABL Facility contain restrictive covenants that will limit our ability to engage in activities that may be in our long-term best interest. Our failure to comply with those covenants could result in an event of default which, if not cured or waived, could result in the acceleration of substantially all of our debt.

DESPITE OUR CURRENT LEVEL OF INDEBTEDNESS, WE MAY STILL BE ABLE TO INCUR SUBSTANTIALLY MORE DEBT, WHICH COULD FURTHER EXACERBATE THE RISKS TO OUR FINANCIAL CONDITION DESCRIBED ABOVE AND PREVENT US FROM FULFILLING OUR OBLIGATIONS UNDER OUR EXISTING INDEBTEDNESS.

We may incur significant additional indebtedness in the future. Although the indenture that governs the Notes and the credit agreements governing our Term Loan and our ABL Facility contain restrictions on the incurrence of additional indebtedness, these restrictions are subject to a number of qualifications and exceptions, such as indebtedness to finance working capital, capital expenditures, investments or acquisitions, or for other purposes, and the additional indebtedness incurred in compliance with these restrictions could be substantial. For example, our Term Loan provides that we have the right to request additional loans and commitments, and to the extent that the aggregate amount of such additional loans and commitments exceeds $225 million, the incurrence thereof will be subject to our secured net leverage ratio being less than a specified ratio, or in the case of unsecured loans or other unsecured debt, or loans or other debt secured by junior liens, our total net leverage ratio being less than a specified ratio. If we incur any additional indebtedness that ranks equally with the Notes, subject to collateral arrangements, the holders of that debt will be entitled to share ratably with the holders of the Notes and the lenders under the Term Loan and the ABL Facility in any proceeds distributed in connection with any insolvency, liquidation, reorganization, dissolution or other winding up of our Company. These restrictions also will not prevent us from incurring obligations that do not constitute indebtedness. If new debt is added to our current debt levels, the related risks that the Company now faces could intensify.

WE MAY NOT BE ABLE TO GENERATE SUFFICIENT CASH TO SERVICE OUR INDEBTEDNESS AND MAY BE FORCED TO TAKE OTHER ACTIONS, WHICH MAY NOT BE SUCCESSFUL, TO SATISFY OUR OBLIGATIONS UNDER OUR INDEBTEDNESS.

Our ability to make scheduled payments on or refinance our debt obligations depends on our financial condition and operating performance and the condition of the capital markets, which are subject to prevailing economic, industry and competitive conditions, as well as certain financial, business, legislative, regulatory and other factors beyond our control. We may be unable to maintain a level of cash flow from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness. If our cash flow and capital resources are insufficient to fund our debt service obligations, we could face substantial liquidity problems, be forced to reduce or delay investments and capital expenditures, dispose of material assets or operations, seek additional debt or equity capital or restructure or refinance our indebtedness, and our financial position and results of operations could be materially and adversely affected.

Any refinancing of our debt could be at higher interest rates and may require us to comply with more onerous covenants, which could further restrict our business operations. We may not be able to effect any such alternative measures on commercially reasonable terms or at all and, even if successful, those alternative actions may not allow us to meet our scheduled debt service obligations. Our ability to dispose of assets and use the proceeds from those dispositions is restricted by the agreements governing our indebtedness and we may not be able to consummate those dispositions or to obtain proceeds in an amount sufficient to meet any debt service obligations then due.

If we cannot make scheduled payments on our debt, we will be in default and holders of the Notes could declare all outstanding principal and interest to be due and payable, the lenders under the Term Loan and the ABL Facility could terminate their commitments to loan money, our secured lenders could foreclose against the assets securing their borrowings and we could be forced into bankruptcy or liquidation.

THE TERMS OF OUR CREDIT AGREEMENTS GOVERNING OUR TERM LOAN AND OUR ABL FACILITY AND THE INDENTURE GOVERNING THE NOTES RESTRICT OUR CURRENT AND FUTURE OPERATIONS, PARTICULARLY OUR ABILITY TO RESPOND TO CHANGES OR TO TAKE CERTAIN ACTIONS.

The credit agreements governing our Term Loan and our ABL Facility and the indenture that governs the Notes contain a number of restrictive covenants that impose significant operating and financial restrictions on us and may limit our ability to engage in acts that may be in our long-term best interest, including restrictions on our ability to:

- incur certain liens;
- incur additional indebtedness and guarantee indebtedness;
- pay dividends or make other distributions in respect of, or repurchase or redeem, capital stock;
- prepay, redeem or repurchase certain debt;
- make investments, loans, advances and acquisitions;
- sell or otherwise dispose of assets, including capital stock of our subsidiaries;
- enter into transactions with affiliates;
- alter the businesses we conduct;
- enter into agreements restricting our subsidiaries' ability to pay dividends; and
- consolidate, merge or sell all or substantially all of our assets.

In addition, the restrictive covenants in the credit agreement governing our ABL Facility may, at certain times, require us to maintain a fixed charge coverage ratio. Our ability to meet this financial ratio can be affected by events beyond our control.

Our failure to comply with these covenants could result in an event of default that, if not cured or waived, could result in the acceleration of some or all of our indebtedness, which could lead to bankruptcy, reorganization or insolvency.

These restrictions may affect our ability to grow in accordance with our plans and could adversely affect our ability to:

- finance our operations;
- make needed capital expenditures;
- make strategic acquisitions or investments or enter into joint ventures;
- withstand a future downturn in our business, the industry or the economy in general;
- compete effectively and engage in business activities, including future opportunities, that may be in our best interest; and
- plan for or react to market conditions or otherwise execute our business strategies.

A LOWERING OR WITHDRAWAL OF THE RATINGS ASSIGNED TO OUR DEBT SECURITIES BY RATING AGENCIES MAY INCREASE OUR FUTURE BORROWING COSTS AND REDUCE OUR ACCESS TO CAPITAL.

The Notes have been rated by Standard & Poor's and Moody's. There is no assurance that such credit ratings will remain in effect for any given period of time. Rating agencies also may lower, suspend or withdraw ratings on the Notes or our other debt in the future. Any lowering, suspension or withdrawal of such ratings may have an adverse effect on the market prices or marketability of our indebtedness and make it more difficult or more expensive for us to obtain additional debt financing.

Manufacturing Risks

OUR DEPENDENCE ON SINGLE AND LIMITED SOURCE SUPPLIERS COULD AFFECT OUR ABILITY TO MANUFACTURE OUR PRODUCTS.

We rely on single or limited source suppliers for some plastic polymers, filtration membranes, petroleum coke and certain other materials, such as chemicals and gases, which are critical to the manufacturing of our products. At times, we have experienced a limited supply of certain raw material polymers as well as the need to substitute polymers, resulting in delays, increased costs and risks associated with qualifying products made from such new polymers with our customers. An industry-wide increase in demand for these polymers or the discontinuation of such polymers could affect our ability to acquire sufficient quantities. If we are unable to obtain an adequate quantity of such supplies, our manufacturing operations may be interrupted. Obtaining alternative sources would likely result in increased costs and shipping delays, which could decrease profitability and damage our relationships with current and potential customers.

Prices for polymers can vary widely. In a volatile oil price environment, some suppliers have added and may in the future add surcharges to the prices of the polymers we purchase. While we have long-term arrangements with certain key suppliers of polymers that fix our price for purchases up to specified quantities, if our polymer requirements exceed the quantities specified, we could be exposed to higher material costs. If the cost of polymers increases and we are unable to correspondingly increase the sales price of our products, our profit margins will decline.

Our filtration products incorporate a wide variety of filter membranes designed to meet specific customer filtration needs, not all of which are produced internally. In the event that a manufacturer of outsourced membrane discontinues supply or production, we may be required to identify and qualify an alternative filter membrane for that application to incorporate into our products. This could require extensive lead times and increased costs which may cause us to lose sales and cause our profit margins to decline.

Our graphite synthesis process requires petroleum coke that meets specified criteria. While there are multiple suppliers for this petroleum coke, the sources are limited and our required criteria may cause the price of this petroleum coke to increase.

The unavailability or reduced availability of the materials or resources we use for our SCEM segment products may require us to reduce production of these products or may require us to incur additional costs in order to obtain an adequate supply of these materials or resources. The occurrence of any of these events could adversely affect our business and results of operations.

OUR MANUFACTURING PROCESSES ARE BECOMING INCREASINGLY COMPLEX, AND OUR PRODUCTION COULD BE DISRUPTED IF WE ARE UNABLE TO AVOID MANUFACTURING DIFFICULTIES.

Our manufacturing processes are complex and require the use of expensive and technologically sophisticated equipment and materials. These processes are frequently modified to improve manufacturing yields and product quality. We have, on occasion, experienced manufacturing difficulties, such as occasional critical equipment breakdowns and the introduction of impurities in the manufacturing process, which cause lower manufacturing yields, make our products unmarketable and/or delay deliveries to customers. A number of our product lines are manufactured at only one or two facilities in different countries, and any disruption could impact our sales until another facility could commence or expand production of such products. We could experience these or other manufacturing difficulties, which might result in a loss of customers and exposure to warranty and product liability claims.

WE MAY LOSE SALES IF WE ARE UNABLE TO TIMELY PROCURE, REPAIR OR REPLACE CAPITAL EQUIPMENT NECESSARY TO MANUFACTURE MANY OF OUR PRODUCTS.

If our existing equipment fails, or we are unable to obtain new equipment quickly enough to satisfy any increased demand for our products, we may lose sales to competitors. In particular, we do not maintain duplicate tools or equipment for most of our important products. Fixing or replacing complex tools is time consuming, and we may not be able to replace a damaged tool in time to meet customer requirements. In addition, from time to time we may upgrade or add new manufacturing equipment that may require substantial lead times to build and qualify. Delays in building and qualifying new equipment could result in a disruption of our manufacturing processes and prevent us from meeting our customers' requirements, which could lead our customers to seek seek other suppliers.

WE ARE SUBJECT TO A VARIETY OF ENVIRONMENTAL LAWS THAT COULD CAUSE US TO INCUR SIGNIFICANT LIABILITIES AND EXPENSES.

Failure to comply with the wide variety of federal, state, local and non-U.S. regulatory requirements affecting our business relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation, of, and human exposure to, hazardous chemicals, which have tended to become stricter over time, could result in future liabilities or the suspension of production. For example, the Frank R. Lautenberg Chemical Safety for the 21st Century Act modified the Toxic Control Substances Act ("TSCA") by requiring Environmental Protection Agency ("EPA") to prioritize and evaluate the environmental and health risks of existing chemicals and providing EPA with greater authority to regulate chemicals posing unreasonable risks. According to this statute, EPA is required to make an affirmative finding that a new chemical will not pose an unreasonable risk before such chemical can go into production. As a result, TSCA has been updated so that it operates in a similar fashion to the Registration, Evaluation, and Authorization of Chemicals (“REACH”) legislation in Europe. Regulations similar to REACH have been enacted in South Korea and Taiwan. Any such changes to these and similar regulations promulgated by other countries could increase our cost of doing business and have a negative impact on our financial condition, results of operations and cash flows. Furthermore, the nature of our business exposes us to risk of liability for environmental contamination if hazardous materials are released into the environment, which could result in substantial losses, reputational harm, increase in our insurance cost or otherwise adversely impact our results of operations. In addition, compliance with present or future laws could restrict our ability to expand our facilities or to build or acquire new facilities or require us to acquire costly control equipment, incur other significant expenses, such as costs of remediation of contamination found on any site that we may acquire, or to modify our manufacturing processes.

IF WE ARE UNABLE TO SUCCESSFULLY MANAGE OUR MANUFACTURING OPERATIONS, OUR ABILITY TO DELIVER PRODUCTS TO OUR CUSTOMERS COULD BE DISRUPTED AND OUR BUSINESS, FINANCIAL CONDITION AND RESULTS OF OPERATIONS COULD BE ADVERSELY AFFECTED.

In order to enhance the efficiency and cost effectiveness of our manufacturing operations, and to better serve customers located in various countries, as we have in the past, we may in the future move several product lines from one of our plants to another and consolidate manufacturing operations in certain of our plants. If we are unable to establish stable processes to efficiently and effectively produce high quality products in relocated manufacturing processes in the destination plant, production may be disrupted and we may not be able to deliver these products to meet customer orders in a timely manner, which may cause us to lose credibility with our customers and harm our business. Even if we successfully move our manufacturing processes, there is no assurance that the cost savings and efficiencies we anticipate will be achieved.

International Risks

WE CONDUCT A SIGNIFICANT AMOUNT OF OUR SALES AND MANUFACTURING ACTIVITY OUTSIDE THE UNITED STATES, WHICH SUBJECTS US TO ADDITIONAL BUSINESS RISKS AND MAY CAUSE OUR PROFITABILITY TO DECLINE DUE TO INCREASED COSTS.

Sales to customers outside the United States accounted for approximately 78%, 77% and 75% of our net sales in 2016, 2015 and 2014, respectively. We anticipate that international sales will continue to account for a majority of our net sales. In addition, a number of our key domestic customers derive a significant portion of their revenues from sales in international markets. We also manufacture a significant portion of our products outside the United States and are dependent on international suppliers for many of our parts and raw materials. We intend to continue to pursue opportunities in both sales and manufacturing internationally. Our international operations are subject to a number of risks and potential costs that could adversely affect our revenue and profitability, including:

- unexpected changes in regulatory requirements that could impose additional costs on our operations or limit our ability to operate our business;
- greater difficulty in collecting our accounts receivable and longer payment cycles than are typical in domestic operations;
- changes in labor conditions and difficulties in staffing and managing foreign operations;
- expense and complexity of complying with U.S. and foreign import and export regulations;
- liability for foreign taxes assessed at rates higher than those applicable to our domestic operations;
- unanticipated government actions, such as trade wars; and
- political and economic instability.

In the past, we have incurred costs or experienced disruptions due to the factors described above and we expect to do so in the future. For example, our operations in Asia, and particularly South Korea, Taiwan and Japan, have been negatively impacted in the past as a result of regional economic instability. In addition, Taiwan and South Korea account for a growing portion of the world’s semiconductor manufacturing. There have historically been strained relations between China and Taiwan and there are continuing tensions between North Korea and other countries, including South Korea and the United States. Any adverse developments in those relations could significantly disrupt the worldwide production of semiconductors, which may lead to reduced sales of our products. Furthermore, we incur additional legal compliance costs associated with our international operations and could become subject to legal penalties in foreign countries if we do not comply with local laws and regulations, which may be substantially different from those in the United States. In a number of foreign countries, some companies engage in business practices that are prohibited by U.S. law applicable to us, such as the Foreign Corrupt Practices Act. Although we implement policies and procedures designed to ensure compliance with these laws, there can be no assurance that all of our employees, contractors and agents, as well as those companies to which we outsource certain of our business operations, including those based in countries where practices that violate such U.S. laws may be customary or common, will not take actions in violation of our policies. Any such violation, even if prohibited by our policies, could have an adverse effect on our business and results of operations.

WE WILL LOSE SALES IF WE ARE UNABLE TO OBTAIN GOVERNMENT AUTHORIZATION TO EXPORT CERTAIN OF OUR PRODUCTS OR TO IMPORT CERTAIN OF OUR PRODUCTS INTO FOREIGN MARKETS, AND WE WILL BE SUBJECT TO LEGAL AND REGULATORY CONSEQUENCES IF WE DO NOT COMPLY WITH APPLICABLE EXPORT AND IMPORT CONTROL LAWS AND REGULATIONS.

Exports of certain of our products are subject to export controls imposed by the U.S. Government and administered by the U.S. Departments of State and Commerce. In certain instances, these regulations may require pre-shipment authorization from the administering department. Certain of our products are subject to the Export Administration Regulations ("EAR") administered by the Department of Commerce's Bureau of Industry and Security, which requires a license depending on the type and end use of the product, the final destination, the identity of the end user and whether a license exception might apply and the International Traffic in Arms Regulations ("ITAR") administered by the Department of State's Directorate of Defense Trade Controls, for which a license is often required. Failure to comply with these regulations could result in the prohibition of our ability to export altogether, which could materially and adversely affect our business.

Products developed and manufactured in our foreign locations are subject to export controls of the applicable foreign nation. Obtaining export licenses can be difficult, time-consuming and costly. Failure to obtain export licenses could significantly reduce our revenue and materially and adversely affect our business, financial condition and results of operations. The absence of comparable restrictions on competitors in other countries may adversely affect our competitive position.

In addition, certain countries require import and other special licenses in order for certain of our products to be imported into or sold in that country. Our inability to satisfy these requirements in a timely manner has in the past prevented, and may continue to prevent us from meeting our customers' expectations in these countries and to lose sales. For example, in response to recent explosions at gas storage facilities in Singapore and China, the import of gas canisters and chemicals viewed as dangerous have come under increased regulatory scrutiny by governmental officials. This increased regulation may impair the ability of our SCEM segment to import those products into Singapore and China and may cause us to lose sales.

CHANGES IN TAXATION OR ADVERSE TAX RULINGS COULD ADVERSELY AFFECT OUR RESULTS OF OPERATIONS.

We have facilities in many foreign countries and, as a result, are subject to taxation at various rates and audit by a number of taxing authorities. Our results of operations could be affected by changes in applicable tax rates or audits by the taxing authorities in countries in which we operate, changes in laws and regulations governing calculation and location of earned profit and taxation thereof, changes in laws and regulations affecting our ability to realize deferred tax assets on our balance sheet and changes in laws and regulations relating to the repatriation of cash into the United States. Each quarter we forecast our tax liability based on our forecast of our performance for the year. If that performance forecast changes, our forecasted tax liability may change.

We have undertaken a number of complex internal reorganizations of our foreign subsidiaries in order to rationalize and streamline our foreign operations, focus our management efforts on certain local opportunities and take advantage of favorable business conditions in certain localities. While we have exercised diligence in undertaking this internal reorganization, there can be no assurance that this reorganization, or any future internal reorganization, will not result in adverse tax consequences in the United States or in foreign countries in which we have operations. This could adversely impact our profitability from foreign operations and result in a material reduction in our results of operations.

As we purchase raw materials and components from foreign countries in an effort to reduce the cost of our products or to obtain the highest quality materials, our products manufactured from these materials and components may be burdened by import taxes and duties, and these additional costs may put our products at a competitive disadvantage.

FLUCTUATIONS IN THE VALUE OF THE U.S. DOLLAR IN RELATION TO OTHER CURRENCIES MAY LEAD TO LOWER NET INCOME AND SHAREHOLDERS' EQUITY OR MAY CAUSE US TO RAISE PRICES, WHICH COULD RESULT IN REDUCED NET SALES.

Foreign currency exchange rate fluctuations could have an adverse effect on our net sales, results of operations and shareholders' equity. Foreign currency fluctuations against the U.S. dollar could require us to increase prices to foreign customers, which could result in lower net sales by us to such customers. Alternatively, if we do not adjust the prices for our products in response to foreign currency fluctuations, our profitability could decline. In addition, sales made by our foreign subsidiaries are generally denominated in the currency of the country in which these products are sold, and the currency we receive in payment for such sales could be less valuable at the time of receipt versus the time of sale as a result of foreign currency exchange rate fluctuations.

VOLATILITY IN THE GLOBAL ECONOMY COULD ADVERSELY AFFECT OUR RESULTS.

Financial markets in the United States, Europe and Asia have been experiencing extreme disruption in recent years, including, among other things, volatility in securities prices, severely diminished liquidity and credit availability, rating downgrades of sovereign debt, declining valuation of certain investments, declines in consumer confidence, declines in economic growth, volatility in unemployment rates, and uncertainty about economic stability. In the past such conditions have had a significant adverse impact on our industry, our financial condition and results of operations. There may be further changes in the global economy, which could lead to further challenges in our business and negatively impact our financial results. For example, the U.K. vote in favor of leaving the European Union may cause instability in European economies and may negatively impact the outlook for the global economy. Tightness of credit in financial markets could adversely affect the ability of our customers and suppliers to obtain financing for significant purchases and operations and could result in a decrease in orders and spending for our products and services. We are unable to predict the likely duration and severity of any disruption in European or global financial markets and adverse economic conditions and the effects they may have on our business and financial condition. If uncertain economic conditions return or deteriorate, our business and results of operations could be further materially and adversely affected.

TERRORIST ATTACKS, SUCH AS THE ATTACKS THAT OCCURRED IN NEW YORK AND WASHINGTON, D.C. ON SEPTEMBER 11, 2001, AND OTHER ACTS OF VIOLENCE OR WAR MAY AFFECT THE MARKETS IN WHICH WE OPERATE OR OUR OPERATIONS AND ADVERSELY AFFECT OUR ABILITY TO MANUFACTURE PRODUCTS AND OUR PROFITABILITY.

Terrorist attacks may negatively affect our operations and any security we issue. There can be no assurance that there will not be future terrorist attacks against the United States or U.S. businesses. These attacks or other armed conflicts may directly impact our physical facilities or those of our suppliers or customers. Our primary facilities include headquarters, research and development and manufacturing facilities in the United States; sales, research and development and manufacturing facilities in Japan, South Korea, Taiwan and Malaysia; and sales and service facilities in Europe and Asia. Attacks may also disrupt the global insurance and reinsurance industries with the result that we may not be able to obtain insurance at historical terms and levels for our facilities. Furthermore, such attacks may make travel and the transportation of our supplies and products more difficult and more expensive and may ultimately affect the sales of our products in the United States and overseas. As a result of terrorism, the United States may enter into additional armed conflicts, which could have a further impact on our domestic and international sales, our supply chain, our production capacity and our ability to deliver products to our customers. The consequences of these armed conflicts and the associated instability are unpredictable, and we may not be able to foresee events that could have an adverse effect on our business and any security we issue.

Risks Related to Owning our Common Stock

THE PRICE OF OUR COMMON STOCK HAS BEEN VOLATILE IN THE PAST AND MAY BE VOLATILE IN THE FUTURE.

The price of our common stock has been volatile in the past and may be volatile in the future. In 2016, the closing price of our stock on The NASDAQ Global Select Market (“NASDAQ”) ranged from a low of $10.60 to a high of $18.55, and, as in past years, the price of our common stock may show greater volatility.

The trading price of our common stock is subject to significant volatility in response to various factors, some of which are beyond our control or may be unrelated to our operating results, and which may adversely affect the market price of our common stock, including the following: the failure to meet the published expectations of securities analysts; changes in financial estimates by securities analysts; press releases or announcements by, or changes in market values of, comparable companies; volatility in the markets for high-technology stocks, general stock market price and volume fluctuations, which are particularly common among securities of high-technology companies; stock market price and volume fluctuations attributable to inconsistent trading volume levels; the public perception of equity values of publicly traded companies and the other risks and uncertainties described in this Annual Report on Form 10-K and in our other filings with the SEC. Future decreases in our stock price may adversely impact our ability to raise sufficient additional capital in the future, if needed.

IF OUR COMMON STOCK TRADES BELOW BOOK VALUE OR OUR BUSINESS OUTLOOK ERODES, WE COULD BE REQUIRED TO RECORD MATERIAL IMPAIRMENT LOSSES FOR OUR LONG-LIVED ASSETS, INCLUDING PROPERTY, PLANT AND EQUIPMENT AND OUR IDENTIFIABLE INTANGIBLES.

In accordance with U.S. generally accepted accounting principles, we review our long-lived assets whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. If the carrying amount of an asset or group of assets exceeds its undiscounted cash flows, the asset will be written down to its fair value. The evaluation of the recoverability of long-lived assets requires us to make significant estimates and assumptions, including, but not limited to, the identification of the asset group at the lowest level of independent cash flows and the primary asset of the group, and long-range forecasts of revenue, reflecting management’s assessment of general economic and industry conditions, operating income, depreciation and amortization and working capital requirements.

Due to the inherent uncertainty involved in making these assumptions and estimates, actual results could differ from our estimates and the conclusion that an asset group’s carrying value is recoverable, or that an asset is impaired, including the extent of the impairment, may not be accurate. Due to the uncertain economic environment within the semiconductor industry, we continually monitor circumstances and events to determine whether asset impairment testing is warranted.

It is possible that in the future we may no longer be able to conclude that there is no impairment of our long-lived assets, nor that we can we provide assurance that material impairment charges of long-lived assets will not occur in future periods.

OUR ANNUAL AND QUARTERLY OPERATING RESULTS ARE SUBJECT TO FLUCTUATIONS AS A RESULT OF RAPID DEMAND SHIFTS AND OUR MODEST LEVEL OF BACKLOG, AND IF WE FAIL TO MEET THE EXPECTATIONS OF SECURITIES ANALYSTS OR INVESTORS, THE MARKET PRICE OF OUR COMMON STOCK MAY DECREASE SIGNIFICANTLY.

Our sales and profitability can vary significantly from quarter to quarter and year to year. Because our expense levels are relatively fixed in the short-term, an unanticipated decline in revenue in a particular quarter could significantly reduce our net income, or lead to a net loss, in that quarter. In addition, we make a substantial portion of our shipments shortly after we receive the order, and therefore we operate with a relatively modest level of backlog. As a consequence of the just-in-time nature of shipments and the modest level of backlog, our results of operations may decline quickly and significantly in response to changes in order patterns or rapid decreases in demand for our products. We anticipate that fluctuations in operating results will continue in the future. Such fluctuations in our results could cause us to fail to meet the expectations of securities analysts or investors, which could cause the market price of our common stock to decline substantially. We believe that period-to-period comparisons of our results of operations may not be meaningful, and you should not rely upon them as indicators of our future performance.

IF WE FAIL TO MAINTAIN AN EFFECTIVE SYSTEM OF INTERNAL CONTROLS, WE MAY NOT BE ABLE TO ACCURATELY REPORT OUR FINANCIAL RESULTS. AS A RESULT, CURRENT AND POTENTIAL STOCKHOLDERS COULD LOSE CONFIDENCE IN OUR FINANCIAL REPORTING, WHICH WOULD HARM THE TRADING PRICE OF OUR STOCK.

Effective internal controls are necessary for us to provide reliable financial reports. We have in the past discovered, and may in the future identify, material weaknesses in internal controls over financial reporting, which represent a reasonable possibility that a material misstatement of our annual or interim financial statements would not have been prevented or detected. If we fail to implement and maintain our controls over our financial reporting, or encounter difficulties implementing improvements in our controls, we may not meet our reporting obligations. Any failure in our internal controls that leads to a material weakness could also cause investors to lose confidence in our reported financial information, which could have a negative impact on the trading price of our stock.

CHANGES IN THE SECURITIES LAWS AND REGULATIONS HAVE IN THE PAST INCREASED OUR COSTS AND MAY DO SO IN THE FUTURE.

The Sarbanes-Oxley Act of 2002 and the Dodd-Frank Wall Street Reform and Consumer Protection Act, as well as related rules and listing standards promulgated by the Securities and Exchange Commission and the NASDAQ, effected, at least in part, in response to the turmoil over the past several years in the securities and credit markets, as well as the global economy, required changes in some of our corporate governance, securities disclosure and compliance practices. Compliance with these rules and listing standards has increased our legal and financial and accounting costs, and we expect these increased costs to continue indefinitely. While these costs are no longer increasing, they may increase in the future.

PROVISIONS IN OUR CHARTER DOCUMENTS AND DELAWARE LAW MAY DELAY OR PREVENT AN ACQUISITION OF US, WHICH COULD DECREASE THE VALUE OF YOUR SHARES.

Our restated certificate of incorporation and by-laws and Delaware law contain provisions that could make it harder for a third party to acquire us without the consent of our board of directors. These provisions include limitations on actions by our stockholders by written consent.

Our restated certificate of incorporation makes us subject to the anti-takeover provisions of Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits publicly held Delaware corporations to which it applies from engaging in a “business combination” with an “interested stockholder” for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. This provision could discourage others from bidding for our shares of common stock and could, as a result, reduce the likelihood of an increase in the price of our common stock that would otherwise occur if a bidder sought to buy our common stock.

Our restated certificate of incorporation provides that our board of directors is authorized to issue from time to time, without further stockholder approval, up to 5,000,000 shares of preferred stock in one or more series and to fix and designate the rights, preferences, privileges and restrictions of the preferred stock, including dividend rights, conversion rights, voting rights, redemption rights and terms of redemption and liquidation preferences. Such shares of preferred stock could have preferences over our common stock with respect to dividends and liquidation rights. Our issuance of preferred stock may have the effect of delaying or preventing a change in control. Our issuance of preferred stock could decrease the amount of earnings and assets available for distribution to the holders of common stock or could adversely affect the rights and powers, including voting rights, of the holders of common stock. The issuance of preferred stock could have the effect of decreasing the market price of our common stock.

YOUR PERCENTAGE OWNERSHIP IN US MAY BE DILUTED BY FUTURE ISSUANCES OF CAPITAL STOCK, WHICH COULD REDUCE YOUR INFLUENCE OVER MATTERS ON WHICH STOCKHOLDERS VOTE.

Subject to applicable NASDAQ standards, our board of directors has the authority, without action or vote of our stockholders, to issue all or any part of our authorized but unissued shares. Issuances of common stock or the exercise of employee and director stock options would dilute your percentage ownership interest, which will have the effect of reducing your influence over matters on which our stockholders vote. In addition, we may issue substantial quantities of our common stock in order to effect acquisitions which would also dilute your ownership interest. If the issuances are made at prices that reflect a discount from the then current trading price of our common stock, your interest in the book value of our common stock might be diluted.

Item 1B. Unresolved Staff Comments.

Not Applicable.

Item 2. Properties.

Our principal executive offices are located in Billerica, Massachusetts. We also have manufacturing, research and equipment cleaning facilities in the United States, Japan, France, Taiwan, South Korea, Singapore and Malaysia. Information about our principal facilities is set forth below:

Location	Principal Function	Approximate Square Feet	Leased/ Owned	Reporting Segment
Bedford, Massachusetts	Research & Manufacturing	80,000	Owned	MC & SCEM
Billerica, Massachusetts[1]	Executive Offices, Research & Manufacturing	175,000	Leased	MC & SCEM
Bloomington, MN	Research & Manufacturing	68,000	Leased	AMH
Burnet, TX	Research & Manufacturing	77,000	Owned	SCEM
Chaska, Minnesota	Executive Offices, Research & Manufacturing	186,000	Owned	AMH
Colorado Springs, CO	Manufacturing	82,000	Owned	AMH
Colorado Springs, CO	Manufacturing	40,000	Leased	AMH
Danbury, CT	Research & Manufacturing	73,000	Leased	SCEM
Decatur, Texas	Manufacturing	359,000	Owned	SCEM
Hsin-chu, Taiwan	Executive Offices, Sales Research & Manufacturing	109,000	Leased	MC, SCEM & AMH
Yangmei City, Taiwan	Manufacturing	40,000	Leased	AMH
JangAn, South Korea	Manufacturing	127,000	Owned	SCEM & AMH
Kulim, Malaysia	Manufacturing	195,000	Owned	SCEM & AMH
Montpellier, France	Cleaning Services	53,000	Owned	AMH
Suwon, South Korea	Executive Offices & Research	42,000	Leased	MC & SCEM
Tokyo, Japan	Executive Offices, Sales & Research	27,000	Leased	MC, SCEM & AMH
Wonju City, South Korea	Manufacturing	39,000	Owned	AMH
Yonezawa, Japan	Manufacturing	185,000	Owned	MC & AMH

(1) This lease has been extended through September 30, 2026 and is subject to one five-year renewal option.

We lease approximately 13,000 square feet of research and development and manufacturing office space located in San Diego, California, approximately 31,000 square feet of manufacturing space located in Franklin, Massachusetts, an aggregate of approximately 23,000 square feet of manufacturing space in Anseong, South Korea, approximately 15,000 square feet of office space in Round Rock, Texas, and approximately 3,300 square feet of office space in Tempe, Arizona.

We lease approximately 10,000 square feet for our Asia manufacturing management offices in Singapore. In addition, we maintain a worldwide network of sales, service, repair or cleaning centers in the United States, Germany, France, Israel, Japan, Malaysia, Taiwan, Singapore, China and South Korea. Leases for our facilities expire through December 2024. We currently expect to be able to extend the terms of expiring leases or to find suitable replacement facilities on reasonable terms.

We believe that our facilities are well-maintained and suitable for their respective operations. All of our facilities are generally utilized within a normal range of production volume.

Item 3. Legal Proceedings.

As of December 31, 2016, we were not involved in any legal proceedings that we believe will have a material impact on our consolidated financial position, results of operations or cash flows. From time to time the Company may be a party to litigation involving claims against the Company arising in the ordinary course of our business. We are not aware of any material potential litigation or claims against us which would have a material adverse effect upon our financial statements.

Item 4. Mine Safety Disclosures.

Not applicable.

EXECUTIVE OFFICERS OF THE REGISTRANT

The following is a list of our Executive Officers and their ages, as of January 31, 2017. All of the Executive Officers listed below were elected to serve until the first Directors Meeting following the 2017 Annual Stockholders Meeting.

Name	Age	Office	First Appointed To Office*
Bertrand Loy	51	*President & Chief Executive Officer*	2001
Gregory B. Graves	56	*Executive Vice President, Chief Financial Officer & Treasurer*	2002
Sue Lee	40	*Senior Vice President, Secretary & General Counsel*	2016
John J. Murphy	64	*Senior Vice President, Human Resources*	2005
Todd Edlund	54	*Executive Vice President & Chief Operating Officer*	2007
Clint Haris	44	*Senior Vice President & General Manager, Microcontamination Control*	2016
William Shaner	48	*Senior Vice President & General Manager, Advanced Materials Handling*	2007
Stuart Tison	53	*Senior Vice President & General Manager, Specialty Chemicals and Engineered Materials*	2016
Corey Rucci	57	*Vice President, Business Development*	2014
Gregory Marshall	59	*Senior Vice President, Quality, EH&S and Entegris Business Support*	2011
Michael D. Sauer	51	*Vice President, Controller & Chief Accounting Officer*	2011

* With either the Company or a predecessor company

Bertrand Loy has been our Chief Executive Officer, President and a director since November 2012. Mr. Loy served as our Executive Vice President and Chief Operating Officer since 2008. From August 2005 until July 2008, he served as our Executive Vice President and Chief Administrative Officer in charge of our global supply chain and manufacturing operations. He served as the Vice President and Chief Financial Officer of Mykrolis from January 2001 until August 2005. Prior to that, Mr. Loy served as the Chief Information Officer of Millipore Corporation during 1999 and 2000. From 1995 until 1999, he served as the Division Controller and Head of Manufacturing for Millipore's Laboratory Water Division. From 1989 until 1995, Mr. Loy served Sandoz Pharmaceuticals (now Novartis) in a variety of financial, audit and controller positions located in Europe, Central America and Japan. Mr. Loy served as a director of BTU International, Inc. (supplier of advanced thermal processing equipment) until its acquisition in January 2015. He also serves as a director of Harvard Bioscience, Inc. (scientific equipment) since November 2014 and has been a director for SEMI (Semiconductor Equipment and Materials International) (global high-technology manufacturing trade association) since July 2013.

Gregory B. Graves has served as our Executive Vice President and Chief Financial Officer since July 2008. Prior to that he served as Senior Vice President and Chief Financial Officer since April 2007. Prior to April 2007, he served as Senior Vice President, Strategic Planning & Business Development since the effectiveness of the merger with Mykrolis. Mr. Graves served as the Chief Business Development Officer of Entegris Minnesota since September 2002 and from September 2003 until August 2004 he also served as Senior Vice President of Finance. Prior to joining Entegris Minnesota, Mr. Graves held positions in investment banking and corporate development, including at U.S. Bancorp Piper Jaffray from June 1998 to August 2002 and at Dain Rauscher from October 1996 to May 1998.

Sue Lee has been our Senior Vice President, Secretary and General Counsel since April 2016. Prior to joining Entegris, Ms. Lee was general counsel and corporate secretary with CYREN, a network security firm since 2013. From 2010 to 2013, Ms. Lee served as general counsel for Harmonix Music Systems, a former MTV company. Prior to that, Ms. Lee was vice president of business and legal affairs for MTV Networks and counsel at Genzyme Corporation. Prior to going in-house in 2005, Ms. Lee was an attorney at the law firm, Cleary Gottlieb Steen & Hamilton, in New York.

John J. Murphy joined us as our Senior Vice President, Human Resources in October 2005. He served as the Senior Vice President Human Resources of HNTB, an engineering and architectural services firm, from February 2004 until October 2005 and as Corporate Vice President, Human Resources of Cadence Design Systems, Inc. from May 2000 through October 2003. Prior to that Mr. Murphy held senior human resources positions with Williams Companies, L.M. Ericsson Telephone Company and General Electric Company.

Todd Edlund has been our Executive Vice President and Chief Operating Officer since July 2016. Prior to that he was our Senior Vice President and Chief Operating Officer since November 2014. After the merger with ATMI, Mr. Edlund served as Senior Vice President and General Manager of our Critical Materials Handling business and prior to the merger with ATMI, he was the Vice President and General Manager of our Contamination Control Solutions division since December 2007. He served as the Vice President and General Manager of our Liquid Systems business unit from 2005 to 2007, and prior to that as Entegris Minnesota's Vice President of Sales for semiconductor markets from 2003 to 2005. Prior to 2003, Mr. Edlund held a variety of positions with our predecessor companies since 1995.

Clint Haris has been our Senior Vice President, Microcontamination Control since July 2016. Prior to that, Mr. Haris served as our Vice President, Liquid Microcontamination Control since August 2014. Prior to joining Entegris, Mr. Haris served in a variety of executive roles at Brooks Automation Inc. including Senior Vice President, Life Science Systems from 2010 to 2014 and Senior Vice President and General Manager, Systems Solutions from 2009 to 2010.

William Shaner has been our Senior Vice President, Advanced Materials Handling since July 2016. Prior to that, Mr. Shaner served as our Senior Vice President, Global Operations since February 2014 and as our Vice President and General Manager, Microenvironments division since 2007. He has served in a variety of sales, marketing, business development and engineering roles since joining Entegris in 1995.

Stuart Tison has been our Senior Vice President, Specialty Chemicals and Engineered Materials since July 2016. Prior to that, Mr. Tison served as Vice President, Specialty Gas Solutions since February 2015, as Vice President, Business Development since January 2010 and as Vice President, Corporate Development since July 2007. Prior to that he served Celerity, Inc. as Vice President, Engineering and served Entegris predecessor companies Mykrolis and Millipore in a variety of sales, marketing, business development and engineering roles.

Gregory Marshall has been our Senior Vice President, Quality, EH&S and Entegris Business Support since August 2016. Prior to that Mr. Marshall served as our Vice President, Quality and EH&S since March 2010 and our Global Director of Quality since the merger with Mykrolis Corporation, prior to which he served as the Director of Quality for Mykrolis. Prior to joining Mykrolis, Mr. Marshall served as the Director of US Quality for Kokusai Semiconductor Equipment Corporation.

Corey Rucci assumed his current position of Vice President, Business Development in February 2014. Prior to that he served as Vice President and General Manager of our Specialty Materials Division since 2011 and as General Manager of Poco Graphite, Inc. (POCO) since 2008 when we acquired POCO. Prior to joining Entegris, Mr. Rucci served POCO as the President and Chief Operating Officer since 2007, Chief Operating Officer since 2005, Chief Financial Officer since 2001 and Vice President of Business Development since 1998. Prior to that he worked at UNOCAL Corp. for 17 years in a variety of accounting, marketing and business development roles.

Michael D. Sauer has been our Vice President, Controller and Chief Accounting Officer since June 2012. Prior to that, he served as the Corporate Controller since 2008. From the time of the merger with Mykrolis until April 2008, Mr. Sauer served as Director of Treasury and Risk Management. Mr. Sauer joined Fluoroware, Inc., a predecessor to Entegris Minnesota in 1988 and held a variety of finance and accounting positions until 2001 when he became the Director of Business Development for Entegris Minnesota, the successor to Fluoroware, serving in that position until the merger with Mykrolis.

PART II

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

Market Information and Holders:

Entegris' Common Stock, $0.01 par value, trades on the NASDAQ Global Select Market under the symbol "ENTG". The following table sets forth the high and low sales prices of the Company shares for each full quarterly period during 2016 and 2015. As of February 14, 2017 there were 1,198 shareholders of record. On February 14, 2017, the last sale price reported on the Nasdaq Global Select Market for our common stock was $21.60 per share.

	2016		2015	
	Low	High	Low	High
First quarter	$ 10.37	$ 13.80	$ 11.90	$ 13.94
Second quarter	$ 12.79	$ 14.77	$ 13.02	$ 15.11
Third quarter	$ 13.97	$ 17.73	$ 12.63	$ 15.20
Fourth quarter	$ 14.73	$ 18.95	$ 12.36	$ 14.32

Dividend Policy:

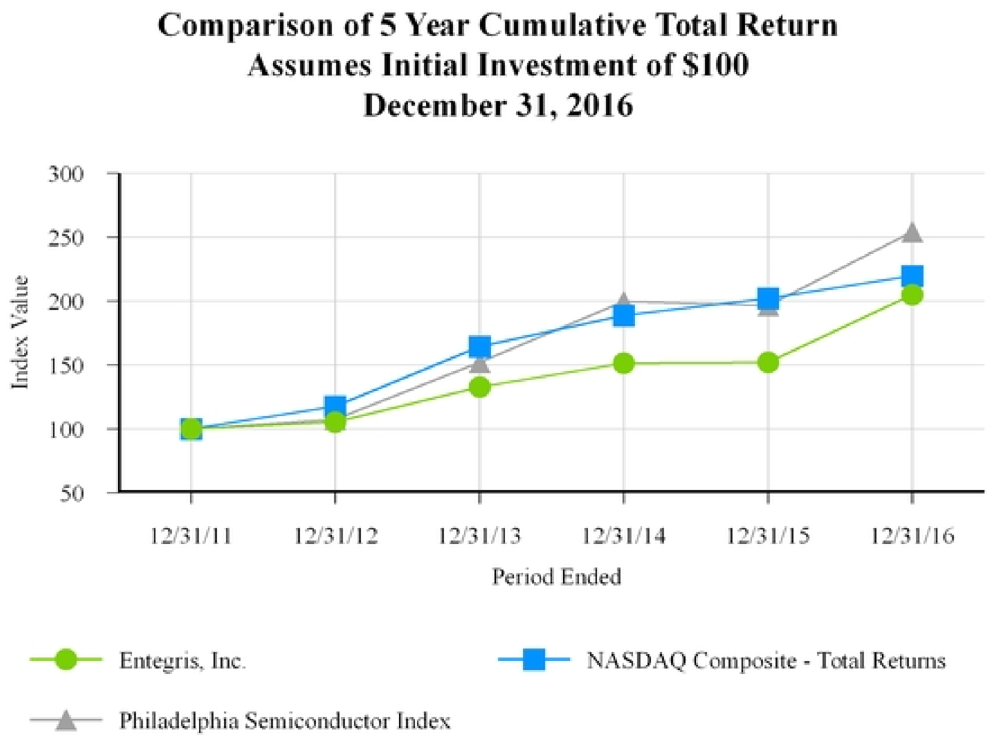
The Company has never declared or paid any cash dividends on its capital stock. The Company currently intends to retain all available earnings for use in its business operations and does not anticipate paying any cash dividends in the foreseeable future. Furthermore, the credit agreements governing our Term Loan and our ABL Facility and the indenture that governs the Notes contain restrictions that limit our ability to pay dividends.

Issuer Sales of Unregistered Securities During the Past Three Years:

None

Comparative Stock Performance

The following graph compares the cumulative total shareholder return on the common stock of Entegris, Inc. from December 31, 2011 through December 31, 2016 with the cumulative total return of (1) The NASDAQ Composite Index, and (2) The Philadelphia Semiconductor Index, assuming $100 was invested at the close of trading December 31, 2011 in Entegris, Inc. common stock, the NASDAQ Composite Index and the Philadelphia Semiconductor Index and that all dividends are reinvested.



	December 31, 2011	December 31, 2012	December 31, 2013	December 31, 2014	December 31, 2015	December 31, 2016
Entegris, Inc.	$100.00	$105.15	$132.76	$151.32	$152.00	$205.04
NASDAQ Composite	100.00	117.45	164.57	188.84	201.98	219.89
Philadelphia Semiconductor Index	100.00	107.20	152.05	199.79	196.56	254.21

Issuer Purchases of Equity Securities:

On February 5, 2016, the Company’s Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company’s common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expired on February 15, 2017. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.

The following table provides information concerning shares of the Company's Common Stock $0.01 par value purchased during the three months ended December 31, 2016:

Period	(a) Total Number of Shares Purchased	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number (or Approximate Dollar Value) of Shares that May Yet Be Purchased Under the Plans or Programs
October 2 through October 31, 2016	30,000	$15.82	30,000	$95,952,609
November 1 through November 30, 2016	100,994	$17.74	100,994	$94,161,285
December 1 through December 31, 2016	95,105	$18.23	95,105	$92,427,294
Total	226,099	$17.69	226,099	$92,427,294

Item 6. Selected Financial Data.

The table that follows presents selected financial data for each of the last five years from the Company's consolidated financial statements and should be read in conjunction with the Company's Consolidated Financial Statements and the related Notes and with "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this Annual Report on Form 10-K. The selected financial data set forth below as of December 31, 2016 and 2015 and for the years ended December 31, 2016, 2015 and 2014 are derived from our audited financial statements included in this Annual Report on Form 10-K. All other selected financial data set forth below is derived from our audited financial statements not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of our results of operations to be expected in the future.

(In thousands, except per share amounts)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014	Year ended December 31, 2013	Year ended December 31, 2012
Operating Results					
Net sales	$ 1,175,270	$ 1,081,121	$ 962,069	$ 693,459	$ 715,903
Gross profit	508,691	470,231	376,683	294,214	307,383
Selling, general and administrative expenses	201,901	198,914	231,833	137,123	147,405
Engineering, research and development expenses	106,991	105,900	87,711	55,320	50,940
Amortization of intangible assets	44,263	47,349	37,067	9,347	9,594
Contingent consideration fair value adjustment	—	—	(1,282)	(1,813)	—
Operating income	155,536	118,068	21,354	94,237	99,444
Income (loss) before income taxes and equity in net income (loss) of affiliate	119,999	92,185	(13,392)	96,195	99,703
Income tax expense (benefit)	22,852	10,202	(21,572)	21,669	30,881
Net income	97,147	80,296	7,887	74,526	68,825
Earnings Per Share Data					
Diluted earnings per share	$ 0.68	$ 0.57	$ 0.06	$ 0.53	$ 0.50
Weighted average shares outstanding – diluted	142,050	141,121	140,062	139,618	138,412
Operating Ratios – % of net sales					
Gross profit	43.3%	43.5%	39.2%	42.4%	42.9%
Selling, general and administrative expenses	17.2	18.4	24.1	19.8	20.6
Engineering, research and development expenses	9.1	9.8	9.1	8.0	7.1
Amortization of intangible assets	3.8	4.4	3.9	1.3	1.3
Contingent consideration fair value adjustment	—	—	(0.1)	—	—
Operating income	13.2	10.9	2.2	13.6	13.9
Income (loss) before income taxes and equity in net income (loss) of affiliate	10.2	8.5	(1.4)	13.9	13.9
Effective tax rate	19.0	11.1	161.1	22.5	31.0
Net income	8.3	7.4	0.8	10.7	9.6
Cash Flow Statement Data					
Depreciation and amortization	$ 99,886	$ 101,654	$ 83,704	$ 38,815	$ 37,607
Capital expenditures	65,260	71,977	57,733	60,360	49,929
Net cash provided by operating activities	207,555	120,918	126,423	109,402	115,162
Net cash used in investing activities	(66,686)	(63,638)	(860,295)	(47,029)	(72,467)
Net cash (used in) provided by financing activities	(81,747)	(92,787)	747,648	(3,895)	10,890
Balance Sheet and Other Data					
Current assets	$ 800,131	$ 708,787	$ 763,604	$ 612,305	$ 579,324
Current liabilities	261,571	175,550	262,520	97,585	93,263
Working capital	538,560	533,237	501,084	514,720	486,061
Current ratio	3.06	4.04	2.91	6.27	6.21
Long-term debt, including current maturities	584,677	656,044	753,012	—	—
Shareholders' equity	899,218	802,883	748,441	756,843	694,799
Total assets	1,699,532	1,646,697	1,748,307	875,294	811,544
Return on average shareholders' equity – %	11.4%	10.4%	1.0%	10.3%	10.6%
Shares outstanding at end of year	141,320	140,716	139,793	138,734	138,458

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

The following discussion and analysis of the Company's consolidated financial condition and results of operations should be read along with the consolidated financial statements and the accompanying notes to the consolidated financial information included elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve numerous risks and uncertainties, including, but not limited to, those described in the "Cautionary Statements" sections of this Item 7 below. The Company's actual results may differ materially from those contained in any forward-looking statements. You should review the Item 1A "Risk Factors" of this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Cautionary Statements

This Annual Report on Form 10-K and the documents incorporated by reference in this Annual Report on Form 10-K contain "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. The information in this Management's Discussion and Analysis of Financial Condition and Results of Operations, except for the historical information, contains forward-looking statements. These forward-looking statements reflect the Company's current views with respect to future events and financial performance. The words "believe," "expect," "anticipate," "intend," "estimate," "forecast," "project," "may," "will," "would," "could," "should" and similar expressions are intended to identify these "forward-looking statements." You should read statements that contain these words carefully because they discuss future expectations, contain projections of future results of operations or of financial position or state other "forward-looking" information. All forecasts and projections in this report are "forward-looking statements," and are based on management's current expectations of the Company's near-term results, based on current information available pertaining to the Company. The important factors listed below, as well as any cautionary language elsewhere in this Annual Report on Form 10-K, provide examples of risks, uncertainties and events that may cause our actual results to differ materially from the expectations described in these forward-looking statements. The risks which could cause actual results to differ from those contained in such "forward looking statements" include, without limitation, the risks described under Item 1A of this Annual Report on Form 10-K for the year ended December 31, 2016 under the headings "Risks Relating to our Business and Industry," "Risks Related to our Indebtedness," "Manufacturing Risks," "International Risks" and "Risks Related to Owning Our Common Stock" as well as in the Company's quarterly reports on Form 10-Q and current reports on Form 8-K as filed with the Securities and Exchange Commission. Any forward-looking statements in this Annual Report on Form 10-K are not guarantees of future performance, and actual results, developments and business decisions may differ from those envisaged by such forward-looking statements, possibly materially. We disclaim any duty to update any forward-looking statements.

Overview

This overview is not a complete discussion of the Company's financial condition, changes in financial condition and results of operations; it is intended merely to facilitate an understanding of the most salient aspects of its financial condition and operating performance and to provide a context for the detailed discussion and analysis that follows, and must be read in its entirety in order to fully understand the Company's financial condition and results of operations.

The Company is a leading global developer, manufacturer and supplier of microfiltration control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. Entegris seeks to leverage its unique breadth of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher device performance.

Our technology portfolio includes approximately 20,000 standard and customized products and solutions to achieve the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes, or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity. The Company's customers consist primarily of semiconductor manufacturers, semiconductor equipment and materials suppliers as well as thin film transistor-liquid crystal display (TFT-LCD) and hard disk manufacturers, which are served through direct sales efforts, as well as sales and distribution relationships, in the United States, Asia, Europe and the Middle East.

Our business is organized and operated in three operating segments which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials (SCEM) segment provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Advanced Materials Handling (AMH) segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries. The Microcontamination Control (MC) segment offers solutions to purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. While these segments have separate products and technical know-how, they each share a single, global sales force, unified core systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise and technologies from these three segments to create new and increasingly integrated solutions for its customers. See note 15 to the consolidated financial statements for additional information on the Company's three segments.

Key operating factors Key factors, which management believes have the largest impact on the overall results of operations of the Company, include:

- ***Level of sales*** Since a significant portion of the Company's product costs (except for raw materials, purchased components and direct labor) are largely fixed in the short-to-medium term, an increase or decrease in sales affects gross profits and overall profitability significantly. Also, increases or decreases in sales and operating profitability affect certain costs such as incentive compensation and commissions, which are highly variable in nature. The Company's sales are subject to the effects of industry cyclicality, technological change, substantial competition, pricing pressures and foreign currency fluctuation.

- ***Variable margin on sales*** The Company's variable margin on sales is determined by selling prices and the costs of manufacturing and raw materials. This is affected by a number of factors, which include the Company's sales mix, purchase prices of raw material (especially polymers, membranes, stainless steel and purchased components), domestic and international competition, direct labor costs, and the efficiency of the Company's production operations, among others.

- ***Fixed cost structure*** The Company's operations include a number of large fixed or semi-fixed cost components, which include salaries, indirect labor and benefits, facility costs, lease expenses, and depreciation and amortization. It is not possible to vary these costs easily in the short-term as volumes fluctuate. Accordingly, increases or decreases in sales volume can have a large effect on the usage and productivity of these cost components, resulting in a large impact on the Company's profitability.

Overall Summary of Financial Results for the Year Ended December 31, 2016

Total net sales for the year ended December 31, 2016 were $1,175.3 million, up $94.1 million, or 9%, from sales of $1,081.1 million for the year ended December 31, 2015.

Exclusive of favorable foreign currency translation effects of $13.8 million, the Company's sales increased 7%, reflecting an increase in overall demand for the Company's products from semiconductor industry customers, particularly in the sale of advanced deposition materials, wafer and reticle handling solutions, and wet etch and CMP products. The sales increase in 2016 was driven primarily by higher volume and the effect of selling price erosion was nominal. Semiconductor industry demand in 2016 was driven by slightly improved demand from device makers, as wafer starts and semiconductor unit production increased, higher industry fab utilization rates, and increased capital spending levels. The Company believes sales of its products in 2016 exceeded the overall semiconductor industry growth rate.

The Company's gross profit rose by $38.5 million for the year ended December 31, 2016, to $508.7 million, up from $470.2 million for the year ended December 31, 2015. Accordingly, the Company reported a 43.3% gross margin rate compared to 43.5% in 2015. The gross profit and gross margin figures in 2016 included $6.3 million of charges related to impairment of equipment and severance. Excluding those charges, the Company's gross margin for 2016 was 43.8%.

The Company's selling, general and administrative (SG&A) and engineering, research and development (ER&D) expenses increased slightly in 2016, mainly due to higher employee costs which were offset partly by the absence of integration costs incurred in 2015 related to the April 30, 2014 acquisition of ATMI, Inc. (ATMI).

As a result of the aforementioned and other factors discussed below, net income for 2016 was $97.1 million, or $0.68 per diluted share, compared to net income of $80.3 million, or $0.57 per diluted share, in 2015.

During 2016, the Company's operating activities provided cash flow of $207.6 million. Cash and cash equivalents, and short-term investments were $406.4 million at December 31, 2016 compared with $352.0 million at December 31, 2015. The Company had long-term borrowings, including current maturities, of $584.7 million at December 31, 2016 compared with $656.0 million at December 31, 2015.

Subsequent Event

On February 15, 2017, the Company's Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company's common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expires February 15, 2018. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.

Critical Accounting Policies

Management's discussion and analysis of financial condition and results of operations are based upon the Company's consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these consolidated financial statements requires the Company to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities. At each balance sheet date, management evaluates its estimates, including, but not limited to, those related to inventories, long-lived assets (property, plant and equipment, goodwill and identified intangibles), income taxes and business combinations. The Company bases its estimates on historical experience and various other assumptions that are believed to be reasonable under the circumstances. If management made different judgments or utilized different estimates, this could result in material differences in the amount and timing of the Company's results of operations for any period. In addition, actual results could be different from the Company's current estimates, possibly resulting in increased future charges to earnings.

The critical accounting policies affected most significantly by estimates, assumptions and judgments used in the preparation of the Company's consolidated financial statements are discussed below.

Inventory Valuation The Company uses certain estimates and judgments to properly value its inventory. The Company's inventories are recorded at the lower of cost or net realizable value. The Company evaluates its ending inventories for obsolescence and excess quantities each quarter. This evaluation includes analysis of inventory levels, historical write-off trends, expected product lives, and historical and projected sales levels by product. Inventories that are considered obsolete are written off or a full allowance is recorded. In addition, allowances are established for inventory quantities in excess of forecasted demand. Inventory allowances were $13.8 million and $13.2 million at December 31, 2016 and 2015, respectively.

The Company's inventories include materials and products subject to technological obsolescence, which are sold in highly competitive industries. If future demand or market conditions are less favorable than current conditions or the Company's projected outlook for sales, inventory write-downs or additional allowances may be required and would be reflected in cost of sales in the period in which the revision is made.

Impairment of Long-Lived Assets As of December 31, 2016, the Company had $321.6 million of net property, plant and equipment and $217.5 million of net intangible assets. The Company routinely considers whether indicators of impairment of the value of its long-lived assets, particularly its manufacturing equipment, and its intangible assets, are present. A long-lived asset (asset group) shall be tested for recoverability whenever events or changes in circumstances (triggering events) indicate that its carrying amount may not be recoverable. The following are examples of such events or changes in circumstances:

a. A significant decrease in the market price of a long-lived asset (asset group);

b. A significant adverse change in the extent or manner in which a long-lived asset (asset group) is being used or in its physical condition;

c. A significant adverse change in legal factors or in the business climate that could affect the value of a long-lived asset (asset group), including an adverse action or assessment by a regulator;

d. An accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of a long-lived asset (asset group);

e. A current-period operating or cash flow loss combined with a history of operating or cash flow losses or a projection or forecast that demonstrates continuing losses associated with the use of a long-lived asset (asset group); and

f. A current expectation that, more likely than not, a long-lived asset (asset group) will be sold or otherwise disposed of significantly before the end of its previously estimated useful life.

If such indicators are present, it is determined whether the sum of the estimated undiscounted cash flows attributable to the asset group in question is less than its carrying value. If less, an impairment loss is recognized based on the excess of the carrying amount of the assets in the group over its respective fair value. Fair value is determined by discounting estimated future cash flows, appraisals or other methods deemed appropriate. If the asset groups determined to be impaired are to be held and used, the Company recognizes an impairment charge to the extent the fair value attributable to the asset group is less than the assets' carrying value. The fair value of the assets then becomes the assets' new carrying value, which is depreciated or amortized over the remaining estimated useful life of the assets.

The Company's long-lived assets are grouped with other assets and liabilities at the lowest level (asset groups) for which the identifiable cash flows are largely independent of the cash flows of other assets and liabilities. As described above, the evaluation of the recoverability of long-lived assets requires the Company to make significant estimates and assumptions. These estimates and assumptions primarily include, but are not limited to, the identification of the asset group at the lowest level of independent cash flows, the primary asset of the group and long-range forecasts of revenue and costs, reflecting management's assessment of general economic and industry conditions, operating income, depreciation and amortization and working capital requirements.

Due to the inherent uncertainty involved in making estimates, actual results could differ from those estimates. In addition, changes in the underlying assumptions would have a significant impact on the conclusion that an asset group's carrying value is recoverable, or the determination of any impairment charge if it was determined that the asset values were indeed impaired.

Based on current general economic conditions and trends within the semiconductor industry and the absence of any other triggering events, the Company has not been required to perform impairment testing for any of its asset groups. The Company will continue to monitor circumstances and events to determine whether asset impairment testing is warranted. It is possible that in the future the Company may no longer be able to conclude that there is no impairment of its long-lived assets, nor can the Company provide assurance that material impairment charges of long-lived assets will not occur in future periods.

Goodwill Goodwill is not subject to amortization and is tested for impairment annually and whenever events or changes in circumstances indicate that impairment may have occurred. The Company performs its annual impairment test as of August 31. The Company first assesses qualitative factors to determine whether it is more likely than not (that is, a likelihood of more than 50%) that the fair value of a reporting unit is less than its carrying amount, including goodwill. If, after assessing qualitative factors, the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, then a two-step impairment test is performed to identify potential goodwill impairment and measure the amount of goodwill impairment loss to be recognized, if any.

As of August 31, 2016, the Company's assessment of qualitative factors informed its conclusion that a goodwill impairment did not occur. The significant qualitative factors considered include a significant increase in the Company's share price, increasing revenues and operating cash flow combined with solid demand in the semiconductor industry driven by the Internet of Things concept, virtual reality applications, autonomous car and artificial intelligence/machine learning. The Company noted that a significant number of its very largest customers purchase from all of the Company's reporting units. For example, approximately 100 customers, accounting for over 60% of net sales, purchase from all of the Company's reporting units.

The assessment of qualitative factors also indicated that two reporting units did not have fair values substantially in excess of their carrying value. One of these reporting units carried an immaterial amount of goodwill. The other reporting unit offers product lines supporting 10 nanometer technology that is gaining acceptance early in 2017. This reporting unit also maintains a significant market share in products that are required in this space of the industry. Through this qualitative assessment, it was determined that it was more likely than not that the fair value exceeded the carrying value and that there was no indication of impairment for these reporting units. All other reporting units had fair values substantially in excess of their carrying value.

In the fourth quarter of 2016, the Company changed its financial segment reporting as described in note 15. The Company performed additional qualitative analysis in connection with this organizational revision, which included changes to its reporting unit structure. Based on the analysis performed during the fourth quarter of 2016, there was no indication of impairment of goodwill and the estimated fair value of each reporting unit substantially exceeded its carrying value.

Income Taxes In the preparation of the Company's consolidated financial statements, the income tax expense, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect management's best assessment of estimated current and future taxes to be paid. The Company is subject to income taxes in both the United States and numerous foreign jurisdictions. Significant judgments and estimates are required in determining consolidated income tax expense.

Deferred income taxes arise from temporary differences between the tax basis of assets and liabilities and their reported amounts in the consolidated financial statements, which will result in taxable or deductible amounts in the future. In evaluating the Company's ability to recover its deferred tax assets within the jurisdiction from which they arise, management considers all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies, and results of recent operations. In projecting future taxable income, the Company begins with historical results adjusted for the results of discontinued operations and incorporates assumptions about the amount of future state, federal and foreign pretax operating income adjusted for items that do not have tax consequences. The assumptions about future taxable income require significant judgment and are consistent with the plans and estimates management is using to manage the underlying business. In evaluating the objective evidence that historical results provide, the Company considers three years of cumulative operating income.

The Company has deferred tax assets related to certain federal and state credit carryforwards, and foreign net operating loss carryforwards of $31.8 million and $17.0 million as of December 31, 2016 and 2015, respectively. Management believes it is more likely than not that the benefit from a portion of these carryforwards will not be realized. In recognition of this risk, the Company provided a valuation allowance of $14.7 million and $12.7 million as of December 31, 2016 and 2015, respectively, relating to these carryforwards. If the Company's assumptions change and it determines it will be able to realize these carryforwards, the tax benefits relating to any reversal of the valuation allowance on the deferred tax assets will be recognized as a reduction of income tax expense.

The calculation of tax liabilities involves dealing with uncertainties in the application of complex tax laws and regulations in a multitude of jurisdictions across our global operations. A tax benefit from an uncertain tax position may be recognized when it is more likely than not that the position will be sustained upon examination, including resolutions of any related appeals or litigation processes, on the basis of the technical merits. Resolution of these uncertainties in a manner inconsistent with management's expectations could have a material impact on the Company's financial condition and operating results.

Business Acquisitions

The Company accounts for acquired businesses using the acquisition method of accounting which requires that the assets acquired and liabilities assumed be recorded at the date of acquisition at their respective fair values. The judgments made in determining the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact net income. Accordingly, for significant items, the Company typically obtains assistance from a third-party valuation firm.

There are several methods that can be used to determine the fair value of assets acquired and liabilities assumed in a business combination. For intangible assets, the Company normally utilizes the "income method." This method starts with a forecast of all of the expected future net cash flows attributable to the subject intangible asset. These cash flows are then adjusted to present value by applying an appropriate discount rate that reflects the risk factors associated with the cash flow streams. Some of the more significant estimates and assumptions inherent in the income method (or other methods) include the projected future cash flows (including timing) and the discount rate reflecting the risks inherent in the future cash flows.

Estimating the useful life of an intangible asset also requires judgment. For example, different types of intangible assets will have different useful lives, influenced by the nature of the asset, competitive environment, and rate of change in the industry. Certain assets may even be considered to have indefinite useful lives. All of these judgments and estimates can significantly impact the determination of the amortization period of the intangible asset, and thus net income.

Results of Operations

Year ended December 31, 2016 compared to year ended December 31, 2015

The following table sets forth the results of operations and the relationship between various components of operations, stated as a percent of net sales, for the years ended December 31, 2016 and 2015. The Company's historical financial data was derived from its consolidated financial statements and related notes included elsewhere in this annual report.

	2016		2015	
(Dollars in thousands)		% of net sales		% of net sales
Net sales	$ 1,175,270	100.0 %	$ 1,081,121	100.0 %
Cost of sales	666,579	56.7	610,890	56.5
Gross profit	508,691	43.3	470,231	43.5
Selling, general and administrative expenses	201,901	17.2	198,914	18.4
Engineering, research and development expenses	106,991	9.1	105,900	9.8
Amortization of intangible assets	44,263	3.8	47,349	4.4
Operating income	155,536	13.2	118,068	10.9
Interest expense	36,846	3.1	38,667	3.6
Interest income	(318)	—	(429)	—
Other income, net	(991)	(0.1)	(12,355)	(1.1)
Income before income taxes and equity in net loss of affiliate	119,999	10.2	92,185	8.5
Income tax expense	22,852	1.9	10,202	0.9
Equity in net loss of affiliate	—	—	1,687	0.2
Net income	$ 97,147	8.3	$ 80,296	7.4

Net sales For the year ended December 31, 2016, net sales were $1,175.3 million, up $94.1 million, or 9%, from sales for the year ended December 31, 2015. An analysis of the factors underlying the increase in net sales is presented in the following table:

(In thousands)		
Net sales in 2015	$	1,081,121
Organic growth associated with volume and pricing		80,375
Increase associated with effect of foreign currency translation		13,774
Net sales in 2016	$	1,175,270

The Company's sales increase was due to improved demand for the Company's products from semiconductor industry customers, reflecting both higher industry fab utilization and semiconductor industry capital spending compared to the year-ago period. This sales increase reflected improved sales of 300mm transport module, liquid chemistry filtration solutions and certain specialty materials products. Exclusive of favorable currency translation effects of $13.8 million for the year, mainly due to the strengthening of the Japanese yen relative to the U.S. dollar, the Company's sales grew 7% in 2016 when compared to 2015.

On a geographic basis, in 2016, total sales to North America were 22%, to Asia Pacific were 56%, to Europe were 9% and to Japan were 13%. In 2015, total sales to North America were 23%, to Asia Pacific were 55%, to Europe were 10% and to Japan were 12%. From 2015 to 2016, net sales to customers in Japan and Asia Pacific increased, 19%, and 12%, respectively, while net sales to customers in North America and Europe were flat.

Demand drivers for the Company’s business primarily consist of semiconductor fab utilization and production (unit-driven) as well as capital spending for new or upgraded semiconductor fabrication equipment and facilities (capital-driven). The Company analyzes sales of its products by these two key drivers. Sales of unit-driven products represented 76% of total sales and sales of capital-driven products represented 24% of total sales in 2016. This compares to a unit-driven to capital-driven ratio of 78%:22% for 2015.

Gross profit Gross profit for 2016 increased by $38.5 million, to $508.7 million, an increase of 8% from $470.2 million for 2015. The gross margin rate for 2016 was 43.3% versus 43.5% for 2015. An analysis of the factors underlying the increase in gross profit is presented in the following table:

(In thousands)		
Gross profit in 2015	$	470,231
Growth associated with volume and pricing		44,717
Decrease associated with impairment of equipment and severance related to organization realignment		(6,257)
Gross profit in 2016	$	508,691

The gross profit improvements primarily reflect the growth associated with volume and pricing, offset by charges related to the impairment of equipment and severance related to the organization realignment. Excluding the latter item, the Company's gross margin in 2016 was 43.8%.

Selling, general and administrative expenses

Selling, general and administrative expense (SG&A) consists primarily of payroll and related expenses for the sales and administrative staff, professional fees (including accounting, legal and technology costs and expenses), and sales and marketing costs. SG&A expenses for 2016 increased $3.0 million, or 2%, to $201.9 million from $198.9 million in 2015. SG&A expenses, as a percent of net sales, decreased to 17.2% from 18.4% a year earlier, reflecting the increase in net sales.

An analysis of the factors underlying the increase in SG&A is presented in the following table:

(In thousands)		
Selling, general and administrative expenses in 2015	$	198,914
Integration costs recorded in prior year		(12,667)
Professional fees		2,335
Employee costs		12,962
Other increases, net		357
Selling, general and administrative expenses in 2016	$	201,901

Engineering, research and development expenses

Engineering, research and development (ER&D) expenses related to the support of current product lines and the development of new products and manufacturing technologies increased by $1.1 million, or 1%, to $107.0 million in 2016 compared to $105.9 million in 2015. ER&D expenses as a percent of net sales were 9.1% compared to 9.8% a year ago, reflecting the increase in net sales, offset by the increase in ER&D expenditure levels, primarily due to higher employee costs.

The Company’s overall ER&D efforts will continue to focus on the support or extension of current product lines, the development of its technologies to create differentiated and high-value, unit-driven products for the most advanced and demanding semiconductor applications and leveraging its unique and diverse technology portfolio to develop innovative, integrated solutions for unmet customer needs. The Company expects ER&D costs to stay relatively stable as a percentage of net sales.

Amortization of intangible assets Amortization of intangible assets was $44.3 million in 2016 compared to $47.3 million for 2015. The decline reflects the absence of amortization expense for certain identifiable non-compete intangible assets acquired in the ATMI merger that became fully amortized in early 2016.

Interest expense Interest expense was $36.8 million and $38.7 million in the years ended December 31, 2016 and 2015, respectively. Interest expense includes interest associated with debt outstanding issued to help fund the acquisition of ATMI in 2014 and the amortization of debt issuance costs associated with such borrowings.

The decrease in 2016 reflects lower outstanding borrowings due to the Company's payments on its senior secured term loan in 2016, offset partly by higher amortization of debt issuance costs due to the acceleration of actual and expected payments on the Company's senior secured term loan.

Other income, net Other income, net, was $1.0 million in 2016 compared to other expense, net, of $12.4 million in 2015.

In 2016, other income, net, included foreign currency transaction gains of $0.6 million and other gains of $0.4 million.

In 2015, other income, net, included foreign currency transaction gains of $9.1 million and a gain of $3.4 million related to the sale of an equity investment.

Income tax expense The Company recorded income tax expense of $22.9 million in 2016 compared to income tax expense of $10.2 million in 2015. The Company’s effective tax expense rate was 19.0% in 2016, compared to an effective tax rate of 11.1% in 2015.

The increase in the effective tax rate in 2016 from 2015 and the variance in both years from the U.S. statutory rate of 35% reflects several factors. The effective tax rates in both years reflects a greater concentration in the Company's geographic composition of income toward jurisdictions with lower tax rates than in the U.S. In addition, the 2015 effective tax rate reflects the benefit of the Malaysian tax holiday which expired December 31, 2015.

Net income Net income was $97.1 million, or $0.68 per diluted share, in 2016 compared to net income of $80.3 million, or $0.57 per diluted share, in 2015. The significant increase reflects the Company's aforementioned operating results described in greater detail above.

Non-GAAP Measures Information The Company’s consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company’s business and results of operations. See “Non-GAAP Information” included below in this section for additional detail, including the reconciliation of GAAP measures to the Company’s non-GAAP measures.

The Company’s non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA increased 13% to $263.7 million in 2016, compared to $232.4 million in 2015. Adjusted EBITDA, as a percent of net sales, was 22.4% in 2016 compared to 21.5% in 2015. Adjusted Operating Income increased 17% to $208.0 million in 2016, compared to $178.1 million in 2015. Adjusted Operating Income, as a percent of net sales, was 17.7% in 2016 compared to 16.5% in 2015. Non-GAAP Earnings Per Share increased 11% to $0.94 in 2016, compared to $0.85 in 2015. The improvement in the Adjusted EBITDA and Adjusted Operating Income reflect the increase in net sales and related increase in gross profit. In addition, Non-GAAP Earnings Per Share was positively affected by a lower adjusted effective tax rate.

Segment Analysis

The following table and discussion concern the results of operations of the Company's three reportable segments for the years ended December 31, 2016 and 2015.

(In thousands)	2016	2015
Specialty Chemicals and Engineered Materials		
Net sales	$ 428,328	$ 418,878
Segment profit	96,060	100,370
Advanced Materials Handling		
Net sales	$ 384,284	$ 346,426
Segment profit	73,452	66,419
Microcontamination Control		
Net sales	362,658	315,817
Segment profit	110,042	83,076

Specialty Chemicals and Engineered Materials (SCEM)

For the year ended December 31, 2016, SCEM net sales increased to $428.3 million, up 2%, from $418.9 million in the comparable period last year. The sales increase primarily reflects strong product sales for advanced deposition materials products, with flat sales across the segment's other product lines.

SCEM reported a segment profit of $96.1 million for the year ended December 31, 2016 compared to a $100.4 million segment profit in the year-ago period. The decrease in the SCEM's profit in 2016 reflects lower margins reflecting unfavorable product mix and higher operating expenses of 2%.

Advanced Materials Handling (AMH)

For the year ended December 31, 2016, AMH net sales increased 11% to $384.3 million, from $346.4 million in 2015. The increase primarily reflects strong sales of 300mm transport module, fluid handling solutions and containers.

AMH reported a segment profit of $73.5 million in 2016, up 11% from $66.4 million in 2015. The increase in the AMH's profit in 2016 was due to higher sales and its associated slightly favorable sales mix, offset by a 10% increase in operating expenses.

Microcontamination Control (MC)

For the year ended December 31, 2016, MC net sales increased to $362.7 million, up 15%, from $315.8 million in the comparable period last year. The sales increase primarily reflects strength in liquid chemistry filters for wet, etch and clean and bulk photo applications and strength in gas filter products driven by strong industry tool shipments.

MC reported a segment profit of $110.0 million for the year ended December 31, 2016 compared to a $83.1 million segment profit in the year-ago period. The increase in the MC's profit in 2016 reflects the higher sales and improved plant utilization offset by higher operating expenses of 2%.

Unallocated general and administrative expenses

Unallocated general and administrative expenses for the year ended December 31, 2016 totaled $79.8 million compared to $84.4 million for the year ended December 31, 2015. The $4.7 million decline includes the absence of integration expenses of $12.7 million, offset by the increased employee and severance costs and higher professional fees noted above.

Results of Operations

Year ended December 31, 2015 compared to year ended December 31, 2014

The following table sets forth the results of operations and the relationship between various components of operations, stated as a percent of net sales, for the years ended December 31, 2015 and 2014. The Company’s historical financial data was derived from its consolidated financial statements and related notes included elsewhere in this annual report.

(Dollars in thousands)	2015	2015 % of net sales	2014	2014 % of net sales
Net sales	$ 1,081,121	100.0 %	$ 962,069	100.0 %
Cost of sales	610,890	56.5	585,386	60.8
Gross profit	470,231	43.5	376,683	39.2
Selling, general and administrative expenses	198,914	18.4	231,833	24.1
Engineering, research and development expenses	105,900	9.8	87,711	9.1
Amortization of intangible assets	47,349	4.4	37,067	3.9
Contingent consideration fair value adjustment	—	—	(1,282)	(0.1)
Operating income	118,068	10.9	21,354	2.2
Interest expense	38,667	3.6	33,355	3.5
Interest income	(429)	—	(1,336)	(0.1)
Other (income) expense, net	(12,355)	(1.1)	2,727	0.3
Income (loss) before income taxes and equity in net loss of affiliate	92,185	8.5	(13,392)	(1.4)
Income tax expense (benefit)	10,202	0.9	(21,572)	(2.2)
Equity in net loss of affiliate	1,687	0.2	293	—
Net income	$ 80,296	7.4	$ 7,887	0.8

Net sales For the year ended December 31, 2015, net sales were $1,081.1 million, up $119.1 million, or 12%, from sales for the year ended December 31, 2014. An analysis of the factors underlying the increase in net sales is presented in the following table:

(In thousands)	
Net sales in 2014	$ 962,069
Organic growth associated with volume and pricing	31,375
Decrease associated with effect of foreign currency translation	(32,665)
Incremental sales associated with acquisition of ATMI, Inc	120,342
Net sales in 2015	$ 1,081,121

The inclusion of incremental ATMI sales is the key factor underlying the increase. Partly offsetting this is an unfavorable foreign currency translation effects of $32.7 million related to the year-over-year weakening of most international currencies versus the U.S. dollar, most notably the Japanese yen, Taiwanese dollar, Korean won and Euro.

Exclusive of those factors, the Company's sales grew 3% in 2015 when compared to 2014, reflecting an increase in overall demand from the Company's semiconductor industry customers, particularly an increase in the sale of specialty materials products. The Company believes the overall sales increase was primarily volume driven and that the effect of selling price erosion was nominal. Overall demand from the semiconductor industry reflected the following factors: slightly improved demand from device makers, as wafer starts and semiconductor unit production increased; higher industry fab utilization rates; and increased capital spending levels. The Company believes sales of its products in 2015 exceeded overall industry growth rates.

On a geographic basis, in 2015, total sales to North America were 23%, to Asia Pacific were 55%, to Europe were 10% and to Japan were 12%. In 2014, total sales to North America were 25%, to Asia Pacific were 51%, to Europe were 11% and to Japan were 13%. When comparing 2015 to 2014, all regions experienced year-over-year sales increases, primarily reflecting the incremental ATMI sales. From 2014 to 2015, net sales to customers in North America, Japan, and Asia Pacific increased 5%, 8%, and 20%, respectively, generally due to the the inclusion of incremental sales from ATMI, while net sales to customers in Europe decreased 3%. Net sales for Japan were affected by unfavorable foreign currency translation effects of $32.7 million.

Demand drivers for the Company’s business primarily consist of semiconductor fab utilization and production (unit-driven) as well as capital spending for new or upgraded semiconductor fabrication equipment and facilities (capital-driven). The Company analyzes sales of its products by these two key drivers. Sales of unit-driven products represented 78% of total sales and sales of capital-driven products represented 22% of total sales in 2015. This compares to a unit-driven to capital-driven ratio of 74%:26% for 2014. The shift toward unit-driven products reflects the inclusion of sales from ATMI, which are primarily unit-driven.

Gross profit Gross profit for 2015 increased by $93.5 million, to $470.2 million, an increase of 25% from $376.7 million for 2014. The gross margin rate for 2015 was 43.5% versus 39.2% for 2014. An analysis of the factors underlying the increase in gross profit is presented in the following table:

(In thousands)		
Gross profit in 2014	$	376,683
Charge for fair value mark-up of inventory sold in 2014		48,586
Increase associated with incremental ATMI net sales		59,854
Other		(14,892)
Gross profit in 2015	$	470,231

The gross profit and gross margin improvements primarily reflect the inclusion of four additional months of sales from ATMI and the absence of the incremental cost of sales charges of $48.6 million recorded in the second and third quarters of 2014 associated with the sale of inventory acquired in the acquisition with ATMI. Excluding the latter item, the Company's gross margin in 2014 was 44.2%. When compared to the adjusted gross margin for 2014, the 2015 gross margin decline relates to a slightly unfavorable sales mix, higher warranty costs, unfavorable foreign currency translation effects and lower levels of factory utilization, particularly in the latter half of the year, offset in part by the benefit of the Company's organic sales growth.

Selling, general and administrative expenses

Selling, general and administrative expense (SG&A) consists primarily of payroll and related expenses for the sales and administrative staff, professional fees (including accounting, legal and technology costs and expenses), and sales and marketing costs. SG&A expenses for 2015 decreased $32.9 million, or 14%, to $198.9 million from $231.8 million in 2014. SG&A expenses, as a percent of net sales, decreased to 18.4% from 24.1% a year earlier, reflecting the significant decrease in SG&A expenditure levels due to the absence of ATMI merger costs and a reduction in integration expenditures.

An analysis of the factors underlying the decrease in SG&A is presented in the following table:

(In thousands)		
Selling, general and administrative expenses in 2014	$	231,833
Increase associated with ATMI infrastructure		15,383
Transaction-related costs incurred in 2014		(26,776)
Deal costs incurred in 2014		(9,125)
Decrease in integration costs		(6,985)
Other decreases, net		(5,416)
Selling, general and administrative expenses in 2015	$	198,914

Engineering, research and development expenses

Engineering, research and development (ER&D) expenses related to the support of current product lines and the development of new products and manufacturing technologies increased by $18.2 million, or 21%, to $105.9 million in 2015 compared to $87.7 million in 2014. ER&D expenses as a percent of net sales were 9.8% compared to 9.1% a year ago, reflecting the increase in ER&D expenditure levels, offset by the increase in net sales.

Incremental ER&D expenses of $12.7 million reflecting the inclusion of four additional months of operations at ATMI account for approximately 70% of the increase. The increase for the year December 31, 2015 also reflect higher legacy Entegris ER&D activity levels, including increased employee costs, and customer samples and supplies expense.

Contingent consideration fair value adjustment In the year ended December 31, 2014, the Company recognized an acquisition-related contingent consideration adjustment of $1.3 million reflecting a change in the fair value of the contingent consideration liability associated with the 2013 Jetalon acquisition.

Amortization of intangible assets Amortization of intangible assets was $47.3 million in 2015 compared to $37.1 million for 2014. The increase reflects the additional amortization associated with the identifiable intangible assets acquired in the ATMI merger.

Interest expense Interest expense was $38.7 million and $33.4 million in the years ended December 31, 2015 and 2014. Interest expense includes interest associated with debt outstanding issued to help fund the acquisition of ATMI in 2014 and the amortization of debt issuance costs associated with such borrowings. In addition, bridge financing costs of $4.0 million related to the acquisition of ATMI were recorded in the second quarter of 2014.

The increase in 2015 reflects a full year's interest in 2015 compared to eight months' interest in 2014, offset in part by the absence of the aforementioned bridge financing costs included in 2014.

Other (income) expense, net Other income, net, was $12.4 million in 2015 compared to other expense, net, of $2.7 million in 2014.

In 2015, other income, net, included foreign currency transaction gains of $9.1 million and a gain of $3.4 million related to the sale of an equity investment.

In 2014, other expense includes foreign currency transaction losses of $1.1 million and an impairment loss of $1.9 million recorded in connection with an equity investment, partially offset by $0.2 million in net realized gains on the sale of equity investments.

Income tax expense (benefit) The Company recorded income tax expense of $10.2 million in 2015 compared to an income tax benefit of $21.6 million in 2014. The Company's effective tax expense rate was 11.1% in 2015, compared to an effective tax rate of 161.1% in 2014.

The change in the effective tax rate in 2015 from 2014 and the variance in both years from the U.S. statutory rate reflects several factors. The effective tax rates in both years reflects a greater concentration in the Company's geographic composition of income toward jurisdictions with lower tax rates. In addition, the 2014 effective tax rate reflects the benefit of a foreign dividend, net of the nondeductibility of certain acquisition-related expenditures.

Net income Net income was $80.3 million, or $0.57 per diluted share, in 2015 compared to net income of $7.9 million, or $0.06 per diluted share, in 2014. The significant improvement in operating results, described in greater detail above, mainly reflects the absence in 2015 of the significant costs recorded in connection with the acquisition of ATMI in 2014.

Non-GAAP Measures Information The Company's consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company's business and results of operations. See "Non-GAAP Information" included below in this section for additional detail, including the reconciliation of GAAP measures to the Company's non-GAAP measures.

The Company's non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA increased 12% to $232.4 million in 2015, compared to $207.9 million in 2014. Adjusted EBITDA, as a percent of net sales, was 21.5% in 2015 compared to 21.6% in 2014. Adjusted Operating Income increased 10% to $178.1 million in 2015, compared to $161.3 million in 2014. Adjusted Operating Income, as a percent of net sales, was 16.5% in 2015 compared to 16.8% in 2014. Non-GAAP Earnings Per Share increased 23% to $0.85 in 2015, compared to $0.69 in 2014. The improvement in the Adjusted EBITDA and Adjusted Operating Income measures reflect the increase in net sales and related increase in gross profit. In addition, Non-GAAP Earnings Per Share was positively affected by a lower adjusted effective tax rate.

Segment Analysis

The following table and discussion concern the results of operations of the Company's three reportable segments for the years ended December 31, 2015 and 2014.

(In thousands)	2015	2014
Specialty Chemicals and Engineered Materials		
Net sales	$ 418,878	$ 292,339
Segment profit	100,370	59,017
Advanced Materials Handling		
Net sales	$ 346,426	$ 346,571
Segment profit	66,419	70,464
Microcontamination Control		
Net sales	$ 315,817	$ 323,159
Segment profit	83,076	99,019

Specialty Chemicals and Engineered Materials (SCEM)

For the year ended December 31, 2015, SCEM net sales increased to $418.9 million, up 43%, from $292.3 million in the comparable period last year. The sales increase primarily reflects the inclusion of incremental sales of $105.3 million from ATMI. Offsetting the incremental ATMI sales were unfavorable foreign currency translation effects of approximately $5.2 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and slightly lower sales of gas microcontamination control systems products.

SCEM reported a segment profit of $100.4 million for the year ended December 31, 2015 compared to a $59.0 million segment profit in the year-ago period. The increase in the SCEM's profit in 2015 primarily reflects the incremental ATMI sales and related gross profit, offset in part by higher operating expenses.

Advanced Materials Handling (AMH)

For the year ended December 31, 2015, AMH net sales were flat, $346.4 million, from $346.6 million in 2015. The 2015 sales reflects the inclusion of incremental sales of $15.1 million from ATMI. Offsetting these factors were unfavorable foreign currency translation effects of approximately $11.2 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and modest reductions in the sales of fluid management and liquid microcontamination control products.

AMH reported a segment profit of $66.4 million in 2015, down 6% from $70.5 million in 2015. The decrease in AMH's profit in 2015 was due to a 15% increase in operating expenses, offset partly by a slightly favorable sales mix.

Microcontamination Control (MC)

For the year ended December 31, 2015, MC net sales decreased to $315.8 million, down 2%, from $323.2 million in the comparable period last year. The sales decrease primarily reflects unfavorable foreign currency translation effects of approximately $16.3 million, related to the year-over-year weakening of most international currencies versus the U.S. dollar, and slightly lower sales of gas microcontamination control systems products.

MC reported a segment profit of $83.1 million for the year ended December 31, 2015 compared to a $99.0 million segment profit in the year-ago period. The decrease in the MC's profit in 2015 reflects lower margins due to reduced plant utilization, particularly in the latter half of the year, and higher operating expenses.

Unallocated general and administrative expenses

Unallocated general and administrative expenses for the year ended December 31, 2015 totaled $84.4 million compared to $122.8 million for the year ended December 31, 2014. The $38.3 million decline includes the absence of transaction-related costs of $26.8 million and deal costs of $9.1 million, as well as a decrease in integration expenses of $7.0 million. These items were offset by incremental ATMI infrastructure expenses of $6.4 million.

Quarterly Results of Operations

The following table presents selected data from the Company's consolidated statements of operations for the eight quarters ended December 31, 2016. This unaudited information has been prepared on the same basis as the audited consolidated financial statements appearing elsewhere in this annual report. All adjustments that management considers necessary for the fair presentation of the unaudited information have been included in the quarters presented.

QUARTERLY STATEMENTS OF OPERATIONS DATA

	2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(In thousands)								
Net sales	$ 263,373	$ 280,709	$ 270,253	$ 266,786	$ 267,024	$ 303,052	$ 296,692	$ 308,502
Gross profit	116,536	128,087	116,310	109,298	114,706	139,205	122,980	131,800
Selling, general and administrative expenses	50,890	50,270	46,730	51,024	47,956	53,597	51,614	48,734
Engineering, research and development expenses	25,800	26,542	26,841	26,717	25,902	28,146	25,720	27,223
Amortization of intangible assets	12,307	11,928	11,673	11,441	11,289	11,062	10,974	10,938
Operating income	27,539	39,347	31,066	20,116	29,559	46,400	34,672	44,905
Net income	14,872	24,448	23,403	17,573	16,212	32,890	21,947	26,098

	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
(Percent of net sales)								
Net sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Gross profit	44.2	45.6	43.0	41.0	43.0	45.9	41.5	42.7
Selling, general and administrative expenses	19.3	17.9	17.3	19.1	18.0	17.7	17.4	15.8
Engineering, research and development expenses	9.8	9.5	9.9	10.0	9.7	9.3	8.7	8.8
Amortization of intangibles	4.7	4.2	4.3	4.3	4.2	3.7	3.7	3.5
Operating income	10.5	14.0	11.5	7.5	11.1	15.3	11.7	14.6
Net income	5.6	8.7	8.7	6.6	6.1	10.9	7.4	8.5

The Company's quarterly results of operations have been, and will likely continue to be, subject to significant fluctuations due to a myriad of factors, many of which are beyond the Company's control. The variability in sales, and its corresponding effect on gross profit, are generally the most important factors underlying the changes in the Company's operating income and net income over the past eight quarters.

Liquidity and Capital Resources

The Company has historically financed its operations and capital requirements through cash flow from its operating activities, long-term loans, lease financing and borrowings under domestic and international short-term lines of credit. In fiscal 2000 and 2009, the Company raised capital via public offerings of its common stock.

Operating activities

Net cash flow provided by operating activities totaled $207.6 million for the year ended December 31, 2016. Cash generated by the Company's operations included net income of $97.1 million, as adjusted for the impact of various non-cash charges, most notably depreciation and amortization of $99.9 million, and share-based compensation expense of $13.4 million. These operating cash flows were partly offset by changes in operating assets and liabilities, mainly due to an increase in accounts receivables and inventories, and an increase in accounts payable and accrued liabilities.

Working capital was $538.6 million at December 31, 2016, which included $406.4 million in cash and cash equivalents, an increase from $533.2 million as of December 31, 2015, which included $349.8 million in cash and cash equivalents.

Accounts receivable increased by $24.3 million during 2016, or $25.3 million after accounting for the effect of foreign currency translation. The net increase reflects the year-over-year increase in fourth quarter sales of the Company's products. The Company's days sales outstanding measure (DSO) stood at 49 days at December 31, 2016 compared to 48 days at the beginning of the year.

Inventories at December 31, 2016 increased by $10.4 million from a year earlier, or $19.9 million after accounting for foreign currency translation and the provision for excess and obsolete inventory. The net increase reflects higher levels of all categories of inventory, due to higher sales and production activity.

Accounts payable and accrued liabilities were $32.4 million higher than a year ago, or $31.3 million higher after accounting for the effect of foreign currency translation. The increase reflects higher accounts payable associated with increased levels of business activity and higher accrued bonuses in 2016.

Investing activities Cash flow used in investing activities totaled $66.7 million in 2016.

Acquisition of property and equipment totaled $65.3 million, which primarily reflected investments in equipment and tooling. Capital expenditures in 2016 generally reflected more normalized capital spending levels. The Company expects its capital expenditures in 2017 to be approximately $80 to $90 million.

Financing activities Cash flow used in financing activities totaled $81.7 million during 2016. This primarily reflects the Company's payments of $75 million on its senior secured term loan facility. In addition, the Company repurchased shares of the Company's common stock during 2016 at a total cost of $7.6 million under the stock repurchase program authorized by the Company's Board of Directors. The Company received proceeds of $4.8 million in connection with common shares issued under the Company’s stock plans less $4.0 million paid for taxes related to the net share settlement of equity awards.

The Company has a senior secured asset-based revolving credit facility maturing April 30, 2019 that provides financing of $75 million, subject to a borrowing base. As of December 31, 2016, the Company had no outstanding borrowings and $0.2 million undrawn on outstanding letters of credit under the senior secured asset-based revolving credit facility.

Through December 31, 2016, the Company was in compliance with all applicable financial covenants included in the terms of its senior unsecured notes, senior secured term loan facility and senior secured asset-based revolving credit facility.

The Company also has a line of credit with two banks that provide for borrowings of Japanese yen for the Company’s Japanese subsidiary equivalent to an aggregate of approximately $10.3 million. There were no outstanding borrowings under these lines of credit at December 31, 2016.

At December 31, 2016, the Company’s shareholders’ equity stood at $899.2 million, up 12% from $802.9 million at the beginning of the year. The 2016 increase reflects net income of $97.1 million, additional paid-in capital of $13.4 million associated with the Company’s share-based compensation expense and $0.8 million received in connection with common shares issued under the Company’s stock and employee stock purchase plans. These increases to shareholders’ equity were partly offset by unfavorable foreign currency translation effects of $7.4 million, mainly associated with the strengthening of the U.S. dollar versus the Korean won, and the repurchase and retirement of the Company's stock of $7.6 million.

As of December 31, 2016, the Company’s sources of available funds were its cash and cash equivalents of $406.4 million, funds available under its senior secured asset-based revolving credit facility and international credit facilities and cash flow generated from operations. As of December 31, 2016, the amount of cash and cash equivalents associated with indefinitely reinvested foreign earnings was $265.6 million. These amounts held by foreign subsidiaries are generally subject to U.S. income taxation on repatriation to the United States. Certain of these amounts are associated with indefinitely reinvested foreign earnings and are subject to U.S. income taxation on repatriation to the United States. The Company does not anticipate the need to repatriate funds associated with indefinitely reinvested foreign earnings to the United States to satisfy domestic liquidity needs arising in the ordinary course of business.

The Company believes its existing balances of domestic cash and cash equivalents, available cash and cash equivalents held by foreign subsidiaries not associated with indefinitely reinvested foreign earnings and operating cash flows will be sufficient to meet the Company’s domestic cash needs arising in the ordinary course of business for the next twelve months. If available liquidity is not sufficient to meet the Company’s operating and debt service obligations as they come due, management would need to pursue alternative arrangements through additional equity or debt financing in order to meet the Company’s cash requirements. There can be no assurance that any such financing would be available on commercially acceptable terms, or at all.

New Accounting Pronouncements

Recently adopted accounting pronouncements Refer to Note 1 to the Company’s consolidated financial statements for a discussion of accounting pronouncements implemented in 2016. Other than the adoption of ASU 2015-03, there were no recently issued accounting pronouncements adopted in 2016.

Recently issued accounting pronouncements Refer to Note 1 to the Company's consolidated financial statements for a discussion of accounting pronouncements recently issued but not yet adopted.

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Contractual Obligations

The following table summarizes the maturities of the Company's significant financial obligations as of December 31, 2016:

(In thousands)	Total	2017	2018	2019	2020	2021	Thereafter
Long-term debt[1]	$ 593,850	$ —	$ —	$ —	$ —	$ 233,850	$ 360,000
Interest[2]	149,072	29,832	29,832	29,832	29,832	24,344	5,400
Pension obligations	6,330	65	106	145	187	736	5,091
Capital purchase obligations[3]	4,728	4,728	—	—	—	—	—
Operating leases	44,998	9,837	7,356	5,635	4,220	3,860	14,090
Total	$ 798,978	$ 44,462	$ 37,294	$ 35,612	$ 34,239	$ 262,790	$ 384,581

Unrecognized tax benefits[4]

[1]Debt obligations are classified based on their stated maturity date, regardless of their classification on the Company's consolidated balance sheets.
[2]Interest projections on both variable and fixed rate long-term debt are based on interest rates effective as of December 31, 2016 and do not include $9.2 million for net unamortized discounts and debt issuance costs.
[3]Capital purchase obligations represent commitments for the construction or purchase of property, plant and equipment. They were not recorded as liabilities on the Company's consolidated balance sheet as of December 31, 2016, as the Company had not yet received the related goods or taken title to the property.
[4]The Company had $8.3 million of total gross unrecognized tax benefits at December 31, 2016. The timing of any payments associated with these unrecognized tax benefits will depend on a number of factors. Accordingly, the Company cannot make reasonably reliable estimates of the amount and period of potential cash settlements, if any, with taxing authorities and are not included in the table above.

Non-GAAP Information The Company's consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP).

The Company also provides certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company's business and results of operations. Regulation G, "*Conditions for Use of Non-GAAP Financial Measures*," and other regulations under the Securities Exchange Act of 1934, as amended, define and prescribe the conditions for use of certain non-GAAP financial information. The Company provides non-GAAP financial measures of Adjusted EBITDA and Adjusted Operating Income together with related measures thereof, and non-GAAP Earnings Per Share (EPS).

Adjusted EBITDA, a non-GAAP term, is defined by the Company as net income before (1) equity in net loss of affiliates, (2) income tax expense (benefit), (3) interest expense (4) interest income (5) other (income) expense, net, (6) charge for the fair value write-up of acquired inventory sold, (7) transaction-related costs, (8) deal costs, (9) integration costs, (10) contingent consideration fair value adjustment, (11) severance related to organizational realignment, (12) impairment of equipment, (13) amortization of intangible assets and (14) depreciation. Adjusted Operating Income, another non-GAAP term, is defined by the Company as Adjusted EBITDA exclusive of the depreciation addback noted above. The Company also utilizes non-GAAP measures whereby Adjusted EBITDA and Adjusted Operating Income are each divided by the Company's net sales to derive Adjusted EBITDA Margin and Adjusted Operating Margin, respectively.

Non-GAAP EPS, a non-GAAP term, is defined by the Company as net income before (1) charge for fair value write-up of acquired inventory sold, (2) transaction-related costs, (3) deal costs, (4) integration costs, (5) severance related to organizational realignment, (6) impairment of equipment, (7) contingent consideration fair value adjustment, (8) net (gain) loss on impairment/sale of short-term and equity investment, (9) amortization of intangible assets and (10) the tax effect of those adjustments to net income.

The charge for fair value write-up of acquired inventory sold, transaction-related costs, deal costs and integration costs adjustments underlying Adjusted EBITDA and Non-GAAP EPS relate specifically to the ATMI acquisition.

The Company provides supplemental non-GAAP financial measures to better understand and manage its business and believes these measures provide investors and analysts additional and meaningful information for the assessment of the Company's ongoing results. Management also uses these non-GAAP measures to assist in the evaluation of the performance of its business segments and to make operating decisions.

Management believes the Company's non-GAAP measures help indicate the Company's baseline performance before certain gains, losses or other charges that may not be indicative of the Company's business or future outlook and offer a useful view of business performance in that the measures provide a more consistent means of comparing performance. The Company believes the non-GAAP measures aid investors’ overall understanding of the Company’s results by providing a higher degree of transparency for such items and providing a level of disclosure that will help investors understand how management plans, measures and evaluates the Company’s business performance. Management believes that the inclusion of non-GAAP measures provides consistency in its financial reporting and facilitates investors’ understanding of the Company’s historical operating trends by providing an additional basis for comparisons to prior periods.

Management uses Adjusted EBITDA and Adjusted Operating Income to assist it in evaluations of the Company’s operating performance by excluding items that management does not consider as relevant in the results of its ongoing operations. Internally, these non-GAAP measures are used by management for planning and forecasting purposes, including the preparation of internal budgets; for allocating resources to enhance financial performance; for evaluating the effectiveness of operational strategies; and for evaluating the Company’s capacity to fund capital expenditures, secure financing and expand its business.

In addition, and as a consequence of the importance of these non-GAAP financial measures in managing its business, the Company’s Board of Directors uses non-GAAP financial measures in the evaluation process to determine management compensation.

The Company believes that certain analysts and investors use Adjusted EBITDA, Adjusted Operating Income and non-GAAP EPS as supplemental measures to evaluate the overall operating performance of firms in the Company’s industry. Additionally, lenders or potential lenders use Adjusted EBITDA measures to evaluate the Company’s creditworthiness.

The presentation of non-GAAP financial measures is not meant to be considered in isolation, as a substitute for, or superior to, financial measures or information provided in accordance with GAAP. Management strongly encourages investors to review the Company’s consolidated financial statements in their entirety and to not rely on any single financial measure.

Management notes that the use of non-GAAP measures has limitations:

First, non-GAAP financial measures are not standardized. Accordingly, the methodology used to produce the Company’s non-GAAP financial measures is not computed under GAAP and may differ notably from the methodology used by other companies. For example, the Company’s non-GAAP measure of Adjusted EBITDA may not be directly comparable to EBITDA or an adjusted EBITDA measure reported by other companies.

Second, the Company’s non-GAAP financial measures exclude items such as amortization and depreciation that are recurring. Amortization of intangibles and depreciation have been, and will continue to be for the foreseeable future, a significant recurring expense with an impact upon the Company’s results of operations, notwithstanding the lack of immediate impact upon cash flows.

Third, there is no assurance the Company will not have future restructuring activities, gains or losses on sale of equity investments, contingent consideration fair value adjustments or similar items and, therefore, may need to record additional charges (or credits) associated with such items, including the tax effects thereon. The exclusion of these items from the Company’s non-GAAP measures should not be construed as an implication that these costs are unusual, infrequent or non-recurring.

Management considers these limitations by providing specific information regarding the GAAP amounts excluded from these non-GAAP financial measures and evaluating these non-GAAP financial measures together with their most directly comparable financial measures calculated in accordance with GAAP. The calculations of Adjusted EBITDA, Adjusted operating income, and non-GAAP EPS, and reconciliations between these financial measures and their most directly comparable GAAP equivalents are presented below in the accompanying tables.

The reconciliation of GAAP measures to Adjusted Operating Income and Adjusted EBITDA for the years ended December 31, 2016, 2015 and 2014 are presented below:

(Dollars in thousands)	2016	2015	2014
Net sales	$ 1,175,270	$ 1,081,121	$ 962,069
Net income	$ 97,147	$ 80,296	$ 7,887
Adjustments to net income			
Equity in net loss of affiliate	—	1,687	293
Income tax expense (benefit)	22,852	10,202	(21,572)
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
GAAP – Operating income	155,536	118,068	21,354
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Transaction-related costs	—	—	26,776
Deal costs	—	—	9,125
Integration costs	—	12,667	19,652
Contingent consideration fair value adjustment	—	—	(1,282)
Severance related to organizational realignment	2,405	—	—
Impairment of equipment	5,826	—	—
Amortization of intangible assets	44,263	47,349	37,067
Adjusted operating income	208,030	178,084	161,278
Depreciation	55,623	54,305	46,637
Adjusted EBITDA	$ 263,653	$ 232,389	$ 207,915
Adjusted operating margin	17.7%	16.5%	16.8%
Adjusted EBITDA – as a % of net sales	22.4%	21.5%	21.6%

The reconciliation of GAAP measures to Non-GAAP Earnings per Share for the years ended December 31, 2016, 2015 and 2014 are presented below:

(Dollars in thousands)	2016	2015	2014
Net income	$ 97,147	$ 80,296	$ 7,887
Adjustments to net income:			
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Transaction-related costs	—	—	26,776
Deal costs	—	—	13,288
Integration costs	—	12,667	19,510
Severance related to organizational realignment	2,405	—	—
Impairment of equipment	5,826	—	—
Contingent consideration fair value adjustment	—	—	(1,282)
Net (gain) loss on impairment/sale of short-term investment or equity investment	(156)	(1,449)	1,710
Amortization of intangible assets	44,263	47,349	37,067
Tax effect of adjustments to net income attributable to Entegris	(16,637)	(18,248)	(56,819)
Non-GAAP net income	$ 132,848	$ 120,615	$ 96,723
Diluted earnings per common share	$ 0.68	$ 0.57	$ 0.06
Effect of adjustments to net income	$ 0.25	$ 0.29	$ 0.63
Diluted non-GAAP earnings per common share	$ 0.94	$ 0.85	$ 0.69

Item 7A. Quantitative and Qualitative Disclosure About Market Risks

Entegris' principal financial market risks are sensitivities to interest rates and foreign currency exchange rates. The Company's interest-bearing cash equivalents and short-term investments are subject to interest rate fluctuations. The Company's cash equivalents are instruments with maturities of three months or less. A 100 basis point change in interest rates would potentially increase or decrease annual net income by approximately $1.1 million annually.

The cash flows and results of operations of the Company's foreign-based operations are subject to fluctuations in foreign exchange rates. The Company occasionally uses derivative financial instruments to manage the foreign currency exchange rate risks associated with its foreign-based operations. At December 31, 2016, the Company had no net exposure to any foreign currency forward contracts.

Item 8. Financial Statements and Supplementary Data.

The information called for by this item is set forth in the Consolidated Financial Statements covered by the Report of Independent Registered Public Accounting Firm at the end of this report.

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

This item is not applicable.

Item 9A. Controls and Procedures.

DISCLOSURE CONTROLS AND PROCEDURES

Management evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, (the Exchange Act)), as of December 31, 2016, the end of the fiscal period covered by this report on Form 10-K. The Securities and Exchange Commission, or SEC, rules define the term "disclosure controls and procedures" to mean a company's controls and other procedures that are designed to ensure that information required to be disclosed in the reports it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time period specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in its reports filed under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Based on the evaluation of the effectiveness of our disclosure controls and procedures by our management team with the participation of the Chief Executive Officer and the Chief Financial Officer, our Chief Executive Officer and our Chief Financial Officer have concluded that, as of the end of the period covered by this report, our disclosure controls and procedures were effective to provide reasonable assurance that information required to be disclosed in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC rules and forms and is accumulated and communicated to management, including the principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

There was no change in the Company's internal control over financial reporting during the most recently completed fiscal quarter that has materially affected, or is reasonably likely to materially affect, internal controls over financial reporting.

MANAGEMENT'S ANNUAL REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management is responsible for establishing and maintaining an adequate system of internal control over financial reporting of the Company. This system of internal financial reporting controls is designed to provide reasonable assurance that assets are safeguarded and transactions are properly recorded and executed in accordance with management's authorization. The design, monitoring and revision of the system of internal financial reporting controls involves, among other things, management's judgments with respect to the relative cost and expected benefits of specific control measures. The effectiveness of the control system is supported by the selection, retention and training of qualified personnel and an organizational structure that provides an appropriate division of responsibility and formalized procedures. The system of internal accounting controls is periodically reviewed and modified in response to changing conditions. Designated Company employees regularly monitor the adequacy and effectiveness of internal accounting controls.

Because of its inherent limitations, a system of internal control over financial reporting can provide only reasonable assurance and may not prevent or detect misstatements. Further, because of changes in conditions, the effectiveness of internal controls over financial reporting may vary over time. Our system contains control-monitoring mechanisms, and actions are taken to correct deficiencies as they are identified.

Management conducted an evaluation of the effectiveness of the system of internal control over financial reporting based on the framework in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO 2013). Based on this evaluation, management concluded that the Company’s system of internal control over financial reporting was effective as of December 31, 2016.

KPMG LLP, the independent registered public accounting firm which audited the consolidated financial statements included in this annual report, has issued an attestation report on our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders

Entegris, Inc.:

We have audited Entegris, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Entegris, Inc.'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" appearing under Item 9A of the Company's December 31, 2016 Annual Report on Form 10-K. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). 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, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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.

In our opinion, Entegris, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the years in the three-year period ended December 31, 2016, and our report dated February 17, 2017 expressed an unqualified opinion on those consolidated financial statements.

/s/ KPMG LLP

Minneapolis, Minnesota
February 17, 2017

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

Except as set forth below, the information required by this Item 10 has been omitted from this report, and is incorporated by reference to the sections “Section 16(a) Beneficial Ownership Reporting Compliance,” “Election of Directors,” “Corporate Governance” in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Information called for by this item with respect to registrant’s executive officers is set forth under “Executive Officers of the Registrant” in Part I of this report.

At their first meeting following the August 10, 2005 merger described under "Our History" in Item 1 of Part I above, our Board of Directors adopted a code of business ethics, The Entegris, Inc. Code of Business Ethics, applicable to all of our executives, directors and employees as well as a set of corporate governance guidelines. The Entegris, Inc. Code of Business Ethics was amended by the Entegris Board of Directors on July 30, 2014. The amended Entegris, Inc. Code of Business Ethics, the Corporate Governance Guidelines and the charters for our Audit & Finance Committee, Governance & Nominating Committee and our Management Development & Compensation Committee all appear on our website at http://www.Entegris.com under “Investors - Corporate Governance”. The Entegris Code of Business Ethics, Corporate Governance Guidelines and committee charters are also available in print to any shareholder that requests a copy. Copies may be obtained by contacting Sue Lee, our Senior Vice President, Secretary and General Counsel through our corporate headquarters. The Company intends to comply with the requirements of Item 5.05 of Form 8-K with respect to any amendment to or waiver of the provisions of the Entegris, Inc. Code of Business Ethics applicable to the registrant’s Chief Executive Officer, Chief Financial Officer or Chief Accounting Officer by posting notice of any such amendment or waiver at the same location on our website.

Item 11. Executive Compensation.

The information required by this Item 11 has been omitted from this report, and is incorporated by reference to the sections entitled "Compensation of Executive Officers" and "Management Development & Compensation Committee Report" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

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

Securities Authorized for Issuance Under Equity Compensation Plans:

As of December 31, 2016, our equity compensation plan information is as follows:

Equity Compensation Plan Information

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 (1) (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (2) (c)
Equity compensation plans approved by security holders	4,385,165	$ 11.54	9,391,937
Equity compensation plans not approved by security holders	—	—	—
Total	4,385,165	$ 11.54	9,391,937

(1) The weighted average exercise price does not take into account the shares issuable upon outstanding restricted stock unit vesting, which have no exercise price.

(2) These shares are available under the 2010 Stock Plan for future issuance for stock options, restricted stock units, performance shares and stock awards in accordance with the terms of the 2010 Stock Plan.

The other information called for by this Item 12 has been omitted from this report, and is incorporated by reference to the section entitled “Ownership of Entegris Common Stock” in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

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

The information required by this Item 13 has been omitted from this report, and is incorporated by reference to the section entitled "Corporate Governance" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

Item 14. Principal Accountant Fees and Services.

The information required by this Item 14 has been omitted from this report, and is incorporated by reference to the section entitled "Proposal 2 - Ratification of Selection of Independent Registered Public Accounting Firm for 2016" in our definitive Proxy Statement for the Entegris, Inc. Annual Meeting of Stockholders to be held on May 24, 2017, and to be filed with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after the end of our 2016 fiscal year.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

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

1. **Financial Statements.** The Consolidated Financial Statements listed under Item 8 of this report and in the Index to Consolidated Financial Statements on page F-1 of this report are incorporated by reference herein.

2. **Exhibits.**

A. The following exhibits are incorporated by reference:

Reg. S-K Item 601(b) Reference	Document Incorporated	Referenced Document on file with the Commission
(2)	Agreement and Plan of Merger, dated as of February 4, 2014, among Entegris, Inc., Atomic Merger Corporation and ATMI, Inc.	Exhibit 2.1 to Entegris, Inc Current Report on Form 8-K filed on February 4, 2014
(3)	By-Laws of Entegris, Inc., as amended December 17, 2008	Exhibit 3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2008
(3)	Amended and Restated Certificate of Incorporation of Entegris, Inc., as amended	Exhibit 3.1 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2011
(4)	Form of certificate representing shares of Common Stock, $.01 par value per share	Exhibit 4.1 to Form S-4 Registration Statement of Entegris, Inc. and Eagle DE, Inc. (No. 333-124719)
(4)	Indenture, dated as of April 1, 2014, between Entegris, Inc., as Issuer and Wells Fargo Bank National Association, as Trustee, with respect to $360,000,000 6% Senior Unsecured Notes Due 2022, including the form of note representing the 2022 Senior Unsecured Notes	Exhibit 4.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on April 2, 2014
(10)	ABL Credit and Guaranty Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as administrative agent and collateral agent	Exhibit 10.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Term Loan Credit and Guaranty Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as administrative agent and collateral agent	Exhibit 10.2 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	ABL Pledge and Security Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as collateral agent	Exhibit 10.3 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Term Loan Pledge and Security Agreement, dated as of April 30, 2014, among the Company, certain subsidiaries of the Company as guarantors, the lenders party thereto and Goldman Sachs Bank USA as collateral agent	Exhibit 10.4 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	ABL Intercreditor Agreement, dated as of April 30, 2014, among Goldman Sachs Bank USA, as ABL Collateral Agent, Goldman Sachs Bank USA, as Term Collateral Agent, and acknowledged by the Company and its wholly owned domestic subsidiaries	Exhibit 10.5 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on May 1, 2014
(10)	Entegris, Inc. – 2010 Stock Plan, as amended*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended July 3, 2010
(10)	Entegris, Inc. Outside Directors' Stock Option Plan*	Exhibit 10.2 to Entegris, Inc. Registration Statement on Form S-1 (No. 333-33668)
(10)	Entegris, Inc. Amended and Restated Employee Stock Purchase Plan*	Exhibit 4.1 to Entegris, Inc. Registration Statement on Form S-8 (No. 333-211444)

(10)	Amended and Restated Entegris Incentive Plan*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended June 28, 2008
(10)	Trust Agreement between Entegris, Inc. Fidelity Management Trust Company and Entegris Inc. 401(k) Savings and Profit Sharing Plan Trust, dated December 29, 2007.	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2007
(10)	Entegris, Inc. 2007 Deferred Compensation Plan*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form10-Q for the fiscal period ended June 30, 2007
(10)	Amended and Restated Supplemental Executive Retirement Plan for Key Salaried Employees*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2008
(10)	Amendment to Amended and Restated SERP*	Exhibit 10.15 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2009.
(10)	Lease Agreement, dated April 1, 2002 between Nortel Networks HPOCS Inc. and Mykrolis Corporation, relating to Executive office, R&D and manufacturing facility located at 129 Concord Road Billerica, MA	Exhibit 10.1.3 to Mykrolis Corporation’s Quarterly Report on Form 10-Q for the quarter ended March 31, 2002
(10)	Amendment of Lease between Entegris, Inc. and KBS Rivertech, LLC dated April 1, 2012	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended June 30, 2012
(10)	Second Amendment of Lease, dated March 8, 2016, between Entegris, Inc. and KBS Rivertech, LLC	Exhibit 10.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on March 11, 2016
(10)	Fluoropolymer Purchase and Sale Agreement, by and between E.I. Du Pont De Nemours and Company and the Registrant, dated January 1, 2011, as amended	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the quarter ended April 2, 2011
(10)	Form of Indemnification Agreement between Entegris, Inc. and each of its executive officers and Directors	Exhibit 10.30 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended August 27, 2005
(10)	Form of Executive Change of Control Termination Agreement between Entegris, Inc. and certain of its executive officers*	Exhibit 10.31 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended August 27, 2005
(10)	Form of Revised Executive Change of Control Termination Agreement between Entegris, Inc. and certain of its executive officers executed in 2015 (other than those executive officers who executed the form previously filed)*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2010 RSU Unit Award Agreement*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended April 3, 2010
(10)	Entegris, Inc. 2010 Stock Option Award Agreement*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended April 3, 2010
(10)	Entegris, Inc. 2011 RSU Unit Award Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012
(10)	Entegris, Inc. 2011 Stock Option Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012
(10)	Entegris, Inc. 2012 RSU Unit Award Agreement*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended March 31, 2012

(10)	Entegris, Inc. 2012 Stock Option Grant Agreement*	Exhibit 10.3 to Entegris, Inc. Quarterly Report on Form 10-Q for the fiscal period ended March 31, 2012
(10)	Entegris, Inc. 2013 RSU Unit Award Agreement*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2013 Stock Option Grant Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2014 Performance Award Agreement	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on October 31, 2014
(10)	Entegris, Inc. 2014 RSU Unit Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2014 Stock Option Grant Agreement*	Exhibit 10.4 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Entegris, Inc. 2015 Performance Share Award Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2015 RSU Unit Award Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Entegris, Inc. 2015 Stock Option Grant Agreement*	Exhibit 10.4 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 29, 2016
(10)	Executive Employment Agreement, effective November 28, 2012, between the Registrant and Bertrand Loy*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2012
(10)	Amendment No. 1, dated April 26, 2013, to Executive Change in Control Termination Agreement, between Entegris, Inc. and Bertrand Loy*	Exhibit 99.1 to Entegris, Inc. Current Report on Form 8-K filed with the Securities and Exchange Commission on April 26, 2013
(10)	Severance Protection Agreement, dated May 13, 2011 between Entegris, Inc. and Gregory B. Graves*	Exhibit 10.2 to Entegris, Inc. Quarterly Report on Form 10-Q for the period ended July 2, 2011
(10)	Amendment No. 1, dated as of February 23, 2016, to the Severance Protection Agreement by and between Entegris, Inc, and Gregory B. Graves*	Exhibit 10.3 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on April 28, 2016
(10)	Executive Separation Letter Agreement, dated November 13, 2014, between Registrant and Gregory Morris*	Exhibit 10.5 to Entegris, Inc. Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 26, 2015
(10)	Executive Separation Letter Agreement, dated as of June 13, 2016, by and between Entegris, Inc. and Christian F. Kramer*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on July 28, 2016
(10)	Executive Separation Letter Agreement, dated as of February 3, 2016 by and between Entegris, Inc. and Peter W. Walcott*	Exhibit 10.1 to Entegris, Inc. Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on April 28, 2016

* A “management contract or compensatory plan”

B. The Company hereby files as exhibits to this Annual Report on Form 10-K the following documents:

Reg. S-K

Item 601(b)

Reference	Exhibit No.	Documents Filed Herewith
(10)	10.1	Entegris, Inc. - 401(k) Savings and Profit Sharing Plan (2017 Restatement)*
(10)	10.2	Entegris, Inc. 2016 Performance Share Award Agreement*
(10)	10.3	Entegris, Inc. 2016 RSU Unit Award Agreement*
(10)	10.4	Entegris, Inc. 2016 Stock Option Grant Agreement*
(10)	10.5	Agreement to Terminate Executive Change of Control Termination Agreement, dated as of January 16, 2017, by and between Entegris, Inc. and William Shaner
(21)	21	Subsidiaries of Entegris, Inc.
(23)	23	Consent of Independent Registered Public Accounting Firm
(24)	24	Power of Attorney by the Directors of Entegris, Inc.
(31)	31.1	Certification required by Rule 13a-14(a) in accordance with Section 302 of the Sarbanes—Oxley Act of 2002.
(31)	31.2	Certification required by Rule 13a-14(a) in accordance with Section 302 of the Sarbanes—Oxley Act of 2002.
(32)	32.1	Certification required by Rule 13a-14(b) and 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
(32)	32.2	Certification required by Rule 13a-14(b) and 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
(101)	101.INS	XBRL Instance Document
(101)	101.SCH	XBRL Taxonomy Extension Schema Document
(101)	101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
(101)	101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
(101)	101.LAB	XBRL Taxonomy Extension Label Linkbase Document
(101)	101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

* A “management contract or compensatory plan”

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.

ENTEGRIS, INC.

Date: February 17, 2017

By /s/ BERTRAND LOY
Bertrand Loy
President & 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/ BERTRAND LOY Bertrand Loy	President, Chief Executive Officer and Director (Principal executive officer)	February 17, 2017
/s/ GREGORY B. GRAVES Gregory B. Graves	Executive Vice President, Chief Financial Officer & Treasurer (Principal financial officer)	February 17, 2017
/s/ MICHAEL D. SAUER Michael D. Sauer	Vice President, Controller & Chief Accounting Officer (Principal accounting officer)	February 17, 2017
PAUL L.H. OLSON* Paul L.H. Olson	Director, Chairman of the Board	February 17, 2017
MICHAEL A. BRADLEY* Michael A. Bradley	Director	February 17, 2017
MARVIN D. BURKETT* Marvin D. Burkett	Director	February 17, 2017
R. NICHOLAS BURNS* R. Nicholas Burns	Director	February 17, 2017
DANIEL W. CHRISTMAN* Daniel W. Christman	Director	February 17, 2017
JAMES F. GENTILCORE* James F. Gentilcore	Director	February 17, 2017
JAMES P. LEDERER* James P. Lederer	Director	February 17, 2017
BRIAN F. SULLIVAN* Brian F. Sullivan	Director	February 17, 2017

*By /s/ SUE LEE
Sue Lee, Attorney-in-fact

EXHIBIT INDEX

Reg. S-K Item 601(b)

Reference	Exhibit No.	Documents Filed Herewith
(10)	10.1	Entegris, Inc. - 401(k) Savings and Profit Sharing Plan (2017 Restatement)*
(10)	10.2	Entegris, Inc. 2016 Performance Share Award Agreement*
(10)	10.3	Entegris, Inc. 2016 RSU Unit Award Agreement*
(10)	10.4	Entegris, Inc. 2016 Stock Option Grant Agreement*
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* A “management contract or compensatory plan”

ENTEGRIS, INC.
INDEX TO FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders

Entegris, Inc.:

We have audited the accompanying consolidated balance sheets of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), equity and cash flows for each of the years in the three-year period ended December 31, 2016. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the years in the three-year period ended December 31, 2016, 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), Entegris, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated February 17, 2017 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

/s/ KPMG LLP

Minneapolis, Minnesota
February 17, 2017

ENTEGRIS, INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share data)	December 31, 2016	December 31, 2015
ASSETS		
Current assets:		
Cash and cash equivalents	$ 406,389	$ 349,825
Short-term investments	—	2,181
Trade accounts and notes receivable, net	165,675	141,409
Inventories, net	183,529	173,176
Deferred tax charges and refundable income taxes	20,140	18,943
Other current assets	24,398	23,253
Total current assets	800,131	708,787
Property, plant and equipment, net	321,562	321,301
Other assets:		
Goodwill	345,269	342,111
Intangible assets, net	217,548	258,942
Deferred tax assets and other noncurrent tax assets	8,022	7,771
Other	7,000	7,785
Total assets	$ 1,699,532	$ 1,646,697
LIABILITIES AND EQUITY		
Current liabilities:		
Long-term debt, current maturities	$ 100,000	$ 50,000
Accounts payable	61,617	36,916
Accrued payroll and related benefits	54,317	41,891
Other accrued liabilities	29,213	33,968
Income taxes payable	16,424	12,775
Total current liabilities	261,571	175,550
Long-term debt, excluding current maturities	484,677	606,044
Pension benefit obligations and other liabilities	27,220	24,608
Deferred tax liabilities and other noncurrent tax liabilities	26,846	37,612
Commitments and contingent liabilities	—	—
Equity:		
Preferred stock, par value $.01; 5,000,000 shares authorized; none issued and outstanding	—	—
Common stock, par value $.01; 400,000,000 shares authorized; issued and outstanding shares: 141,319,964 and 140,716,420	1,413	1,407
Additional paid-in capital	859,778	848,667
Retained earnings (deficit)	92,303	(416)
Accumulated other comprehensive loss	(54,276)	(46,775)
Total equity	899,218	802,883
Total liabilities and equity	$ 1,699,532	$ 1,646,697

See the accompanying notes to consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share data)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Net sales	$ 1,175,270	$ 1,081,121	$ 962,069
Cost of sales	666,579	610,890	585,386
Gross profit	508,691	470,231	376,683
Selling, general and administrative expenses	201,901	198,914	231,833
Engineering, research and development expenses	106,991	105,900	87,711
Amortization of intangible assets	44,263	47,349	37,067
Contingent consideration fair value adjustment	—	—	(1,282)
Operating income	155,536	118,068	21,354
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
Income (loss) before income tax expense (benefit) and equity in net loss of affiliate	119,999	92,185	(13,392)
Income tax expense (benefit)	22,852	10,202	(21,572)
Equity in net loss of affiliate	—	1,687	293
Net income	$ 97,147	$ 80,296	$ 7,887
Basic net income per common share	$ 0.69	$ 0.57	$ 0.06
Diluted net income per common share	$ 0.68	$ 0.57	$ 0.06
Weighted shares outstanding			
Basic	141,093	140,353	139,311
Diluted	142,050	141,121	140,062

See the accompanying notes to consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Net income	$ 97,147	$ 80,296	$ 7,887
Other comprehensive (loss) income, net of tax			
Foreign currency translation adjustments	(7,352)	(44,569)	(26,948)
Unrealized gain (loss) on available-for-sale investment	—	611	(1,884)
Reclassification adjustment associated with unrealized loss realized upon impairment of available-for-sale investment	—	—	1,884
Reclassification adjustment associated with the sale of available-for-sale investments	(611)	—	—
Pension liability adjustments, net of income tax expense (benefit) of $82, $(45), and $(71) for year ended December 31, 2016, 2015, and 2014	462	(142)	(150)
Other comprehensive loss	(7,501)	(44,100)	(27,098)
Comprehensive income (loss)	$ 89,646	$ 36,196	$ (19,211)

See the accompanying notes to consolidated financial statements

ENTEGRIS, INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF EQUITY

(In thousands)	Common shares outstanding	Common stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Available-for-sale investments - Change in net unrealized gains	Defined benefit pension adjustments	Total
Balance at December 31, 2013	138,734	$ 1,387	$ 819,632	$ (88,599)	$ 25,280	$ —	$ (857)	$ 756,843
Shares issued under stock plans	1,059	11	1,069	—	—	—	—	1,080
Share-based compensation expense	—	—	8,887	—	—	—	—	8,887
Tax benefit associated with stock plans	—	—	842	—	—	—	—	842
Pension liability adjustment	—	—	—	—	—	—	(150)	(150)
Foreign currency translation	—	—	—	—	(26,948)	—	—	(26,948)
Net income	—	—	—	7,887	—	—	—	7,887
Balance at December 31, 2014	139,793	1,398	830,430	(80,712)	(1,668)	—	(1,007)	748,441
Shares issued under stock plans	923	9	1,747	—	—	—	—	1,756
Share-based compensation expense	—	—	11,033	—	—	—	—	11,033
Tax benefit associated with stock plans	—	—	5,457	—	—	—	—	5,457
Pension liability adjustment	—	—	—	—	—	—	(142)	(142)
Available-for-sale investment, change in net unrealized gain, net of taxes	—	—	—	—	—	611	—	611
Foreign currency translation	—	—	—	—	(44,569)	—	—	(44,569)
Net income	—	—	—	80,296	—	—	—	80,296
Balance at December 31, 2015	140,716	1,407	848,667	(416)	(46,237)	611	(1,149)	802,883
Shares issued under stock plans	1,123	11	815	—	—	—	—	826
Share-based compensation expense	—	—	13,436	—	—	—	—	13,436
Repurchase and retirement of common stock	(519)	(5)	(3,140)	(4,428)				(7,573)
Pension liability adjustment	—	—	—	—	—	—	462	462
Available-for-sale investment, change in net unrealized loss, net of taxes	—	—	—	—	—	(611)	—	(611)
Foreign currency translation	—	—	—	—	(7,352)	—	—	(7,352)
Net income	—	—	—	97,147	—	—	—	97,147
Balance at December 31, 2016	141,320	$ 1,413	$ 859,778	$ 92,303	$ (53,589)	$ —	$ (687)	$ 899,218

See the accompanying notes to consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Operating activities:			
Net income	$ 97,147	$ 80,296	$ 7,887
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation	55,623	54,305	46,637
Amortization	44,263	47,349	37,067
Share-based compensation expense	13,436	11,033	8,887
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Provision for deferred income taxes	(16,284)	(13,313)	(44,716)
Charge for excess and obsolete inventory	9,302	8,311	4,513
Excess tax benefit from share-based compensation plans	—	(5,457)	(842)
Amortization of debt issuance costs	3,947	3,344	5,848
Other	9,744	(20,299)	2,209
Changes in operating assets and liabilities, net of effects of acquisitions:			
Trade accounts receivable and notes receivable	(25,298)	5,212	(4,845)
Inventories	(19,871)	(26,670)	(11,608)
Accounts payable and other accrued liabilities	31,294	(28,686)	14,348
Other current assets	185	654	(1,699)
Income taxes payable and refundable income taxes	3,408	4,955	10,975
Other	659	(116)	3,176
Net cash provided by operating activities	207,555	120,918	126,423
Investing activities:			
Acquisition of property and equipment	(65,260)	(71,977)	(57,733)
Acquisition of business, net of cash acquired	—	—	(809,390)
Proceeds from sale or maturities of short-term investments	1,726	7,692	13,778
Proceeds from sale of assets held for sale	—	—	—
Payments for non-compete agreements	—	—	(7,517)
Other	(3,152)	647	567
Net cash used in investing activities	(66,686)	(63,638)	(860,295)
Financing activities:			
Proceeds from long-term debt	—	—	855,200
Payments of long-term debt	(75,000)	(100,000)	(88,650)
Payments for debt issuance costs	—	—	(20,747)
Issuance of common stock from employee stock plans	4,844	4,264	3,559
Taxes paid related to net share settlement of equity awards	(4,018)	(2,508)	(2,479)
Repurchase and retirement of common stock	(7,573)	—	—
Other	—	5,457	765
Net cash (used in) provided by financing activities	(81,747)	(92,787)	747,648
Effect of exchange rate changes on cash and cash equivalents	(2,558)	(4,367)	(8,503)
Increase (decrease) in cash and cash equivalents	56,564	(39,874)	5,273
Cash and cash equivalents at beginning of year	349,825	389,699	384,426
Cash and cash equivalents at end of year	$ 406,389	$ 349,825	$ 389,699

Supplemental Cash Flow Information

(In thousands)	Year ended December 31, 2016	Year ended December 31, 2015	Year ended December 31, 2014
Non-cash transactions:			
Equipment purchases in accounts payable	$ 5,104	$ 3,757	$ 3,702
Schedule of interest and income taxes paid:			
Interest paid	$ 32,085	$ 35,126	$ 21,919
Income taxes, net of refunds received	35,722	16,060	12,274

See accompanying notes to consolidated financial statements.

ENTEGRIS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

DECEMBER 31, 2016

(1) SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations Entegris, Inc. (Entegris or the Company) is a leading global developer, manufacturer and supplier of microfiltration control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries.

Principles of Consolidation The consolidated financial statements include the accounts of the Company and its majority-owned subsidiaries. Intercompany profits, transactions and balances have been eliminated in consolidation.

Use of Estimates and Basis of Presentation The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States requires management to make judgments, estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. On an ongoing basis, Entegris evaluates its estimates, including those related to receivables, inventories, property, plant and equipment, intangible assets, accrued liabilities, income taxes and share-based compensation, among others. Actual results could differ from those estimates.

Cash and Cash Equivalents Cash and cash equivalents include cash on hand and highly liquid debt securities with original maturities of three months or less, which are valued at cost and approximates fair value.

Allowance for Doubtful Accounts An allowance for uncollectible trade receivables is estimated based on a combination of write-off history, aging analysis and any specific, known troubled accounts. The Company maintains an allowance for doubtful accounts that management believes is adequate to cover expected losses on trade receivables.

Inventories Inventories are stated at the lower of cost or market. Cost is determined by the first-in, first-out (FIFO) method.

Property, Plant, and Equipment Property, plant and equipment are carried at cost and are depreciated on the straight-line method over the estimated useful lives of the assets. When assets are retired or disposed of, the cost and related accumulated depreciation are removed from the accounts, and gains or losses are recognized in the same period. Maintenance and repairs are expensed as incurred, while significant additions and improvements are capitalized. Long-lived assets, including property, plant and equipment, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or group of assets may not be recoverable based on estimated future undiscounted cash flows. The amount of impairment, if any, is measured as the difference between the net book value and the estimated fair value of the asset(s).

Investments The Company’s nonmarketable investments are accounted for under either the cost or equity method of accounting, as appropriate. All nonmarketable investments are periodically reviewed to determine whether declines, if any, in fair value below cost basis are other-than-temporary. If the decline in fair value is determined to be other-than-temporary, an impairment loss is recorded and the investment is written down to a new cost basis.

Fair Value of Financial Instruments The carrying value of cash equivalents, accounts receivable, accounts payable, accrued payroll and related benefits, and other accrued liabilities approximates fair value due to the short maturity of those instruments.

The fair value of long-term debt, including current maturities, based upon models utilizing market observable (Level 2) inputs and credit risk, was $602 million at December 31, 2016 compared to the carrying amount of long-term debt, including current maturities, of $585 million.

Goodwill and Intangible Assets Goodwill represents the excess of acquisition costs over the fair value of the net assets of businesses acquired. Goodwill is not subject to amortization, but is tested for impairment annually at August 31, the Company's annual testing date, and whenever events or changes in circumstances indicate that impairment may have occurred. The Company compares the carrying value of its reporting units, including goodwill, to their fair value. For reporting units in which the assessment indicates that it is more likely than not that the fair value is more than its carrying value, goodwill is not considered impaired. If the carrying value of the reporting unit exceeds fair value, goodwill is considered impaired.

Based on its annual analysis, the Company determined there was no indication of impairment of goodwill. In the fourth quarter of 2016, the Company changed its financial segment reporting as described in note 15. The Company performed additional analysis in connection with this organizational revision, which included changes to its reporting unit structure. Based on this assessment, there was no indication of impairment of goodwill and the estimated fair value of each reporting unit substantially exceeded its carrying value.

Amortizable intangible assets include, among other items, patented, unpatented and other developed technology and customer-based intangibles, and are amortized using the straight-line method over their respective estimated useful lives of 3 to 15 years.

The Company reviews intangible assets, along with other long-lived assets - primarily property, plant and equipment - for impairment if changes in circumstances or the occurrence of events suggest the remaining value may not be recoverable. At December 31, 2016, the Company concluded there was no impairment of its intangible assets.

Derivative Financial Instruments The Company records derivatives as assets or liabilities on the balance sheet and measures such instruments at fair value. Changes in fair value of derivatives are recorded each period in the Company’s consolidated statements of operations.

The Company periodically enters into forward foreign currency contracts to reduce exposures relating to rate changes in certain foreign currencies. Certain exposures to credit losses related to counterparty nonperformance exist. However, the Company does not anticipate nonperformance by the counterparties since they are large, well-established financial institutions. None of these derivatives is accounted for as a hedge transaction. Accordingly, changes in the fair value of forward foreign currency contracts are recorded as other (income) expense, net, in the Company’s consolidated statements of operations. The fair values of the Company’s derivative financial instruments are based on prices quoted by financial institutions for these instruments.

Foreign Currency Translation Assets and liabilities of certain foreign subsidiaries are translated from foreign currencies into U.S. dollars at period-end exchange rates, and the resulting gains and losses arising from translation of net assets located outside the U.S. are recorded as a cumulative translation adjustment, a component of accumulated other comprehensive loss in the consolidated balance sheets. Income statement amounts are translated at the weighted average exchange rates for the year. Translation adjustments are not adjusted for income taxes, as substantially all translation adjustments relate to permanent investments in non-U.S. subsidiaries. Gains and losses resulting from foreign currency transactions are included in other(income) expense, net, in the Company's consolidated statements of operations.

Revenue Recognition Revenue and the related cost of sales are generally recognized upon shipment of the products. Revenue for product sales is recognized upon delivery, when persuasive evidence of an arrangement exists, when title and risk of loss have been transferred to the customer, collectability is reasonably assured, and pricing is fixed or determinable. Shipping and handling fees related to sales transactions are billed to customers and are recorded as revenue.

The Company sells its products throughout the world primarily to companies in the microelectronics industry. The Company performs continuing credit evaluations of its customers and generally does not require collateral. Letters of credit may be required from its customers in certain circumstances. The Company provides for estimated returns based on historical and current trends in both sales and product returns.

The Company collects various sales and value-added taxes on certain product and service sales that are accounted for on a net basis.

Shipping and Handling Costs Shipping and handling costs incurred are recorded in cost of sales in the Company's consolidated statements of operations.

Engineering, Research and Development Expenses Engineering, research and development costs are expensed as incurred.

Share-based Compensation The Company measures the cost of employee services received in exchange for the award of equity instruments based on the fair value of the award at the date of grant. Compensation expense is based on the grant date fair value. The cost is recognized using the straight-line attribution method to recognize share-based compensation over the service period of the award. Because share-based compensation expense recognized in the Company's consolidated statements of operations is based on awards ultimately expected to vest, it has been reduced for expected forfeitures, which are estimated at the time of grant with such estimates revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

Income Taxes The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined on the basis of the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income tax expense in the period that includes the enactment date.

The Company recognizes deferred tax assets to the extent that it believes these assets are more likely than not to be realized. A valuation allowance is recorded to reduce deferred tax assets when it is more likely than not that the Company would not be able to realize all or part of its deferred tax assets. In making such a determination, the Company considers all available positive and negative evidence, including future reversals of existing temporary differences, projected future taxable income, tax-planning strategies, and results of recent operations. If the Company determines that it would be able to realize its deferred tax assets in the future in excess of their net recorded amount, the Company would make an adjustment to the deferred tax asset valuation allowance, which would reduce the provision for income taxes.

The Company’s policy for recording interest and penalties associated with audits and unrecognized tax benefits is to record such items as a component of income before taxes. Penalties and interest to be paid or received are recorded in other expense (income), net, in the statement of operations.

Comprehensive Income (Loss) Comprehensive income (loss) represents the change in equity resulting from items other than shareholder investments and distributions. The Company’s foreign currency translation adjustments, unrealized gains and losses on available-for-sale investments, and minimum pension liability adjustments are included in accumulated other comprehensive loss. Comprehensive income (loss) and the components of accumulated other comprehensive loss are presented in the accompanying consolidated statements of comprehensive income (loss) and consolidated statements of equity.

Recent Accounting Pronouncements Adopted in 2016 In April 2015, the Financial Standards Accounting Board (FASB) issued Accounting Standards Update (ASU) No. 2015-03, *Simplifying the Presentation of Debt Issuance Costs* (ASU No. 2015-03) which requires an entity to present debt issuance costs as a direct deduction from the carrying amount of the related debt liability on the balance sheet. The update requires retrospective application and represents a change in accounting principle. The update became effective January 1, 2016. Based on the balances as of December 31, 2015, in accordance with ASU No. 2015-03, the Company reclassified $11.2 million of unamortized debt issuance costs from other current assets and other noncurrent assets to long-term debt.

Recent Accounting Pronouncements Yet to be Adopted In May 2014, the Financial Standards Accounting Board (FASB) issued ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* (ASU No. 2014-09). ASU No. 2014-09 outlines a new, single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most current revenue recognition guidance, including industry-specific guidance. This new revenue recognition model provides a five-step analysis in determining when and how revenue is recognized. As such, revenue for its contracts will generally be recognized as control transfers to the customer, which is consistent with the revenue recognition model currently used for the majority of the Company's contracts. ASU No. 2014-09 may be applied either retrospectively or through the use of a modified-retrospective method. ASU No. 2014-09 also requires disclosures sufficient to enable users to understand the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers, including qualitative and quantitative disclosures about contracts with customers. ASU No. 2014-09 is effective for the Company beginning January 1, 2018. The Company is currently assessing the impact that adopting this new accounting guidance will have on its consolidated financial statements and disclosures. To assist in this assessment, and to oversee the eventual adoption of ASU No. 2014-09, the Company has established a cross-functional steering committee. The initial analysis of identifying revenue streams and potential impacts of the new guidance is substantially complete, and the Company is now analyzing the potential magnitude to the consolidated financial statements and related disclosures. Based on its preliminary evaluation of ASU No. 2014-09, the Company does not currently expect it to have a material impact on its results of operations or cash flows in the periods after adoption. The Company has not yet selected a transition approach. The Company expects to complete its assessment of the cumulative effect of adopting ASU No. 2014-09 as well as the selection of a transition approach during the first half of 2017. The evaluation of ASU No. 2014-09 will continue through the date of adoption.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. ASU No. 2016-02 requires the identification of arrangements that should be accounted for as leases by lessees. In general, for lease arrangements exceeding a twelve-month term, these arrangements must now be recognized as assets and liabilities on the balance sheet of the lessee. Under ASU No. 2016-02, a right-of-use asset and lease obligation will be recorded for all leases, whether operating or financing, while the income statement will reflect lease expense for operating leases, and amortization and interest expense for financing leases. The balance sheet amount recorded for existing leases at the date of adoption of ASU No. 2016-02 must be calculated using the applicable incremental borrowing rate at the date of adoption. In addition, ASU No. 2016-02 requires the use of the modified retrospective method, which will require adjustment to all comparative periods presented in the consolidated financial statements. ASU No. 2016-02 is effective beginning January 1, 2019. The Company is currently assessing the impact that adopting this new accounting standard will have on its consolidated financial statements and disclosures, and the timing of adoption.

In April 2016, the FASB issued ASU No. 2016-09, *Compensation-Stock Compensation (Topic 718)*, which simplifies several aspects of the accounting for employee share-based payment transactions, including the accounting for tax effects related to share-based payments, forfeitures, and statutory tax withholding requirements, and the classification of tax-related cash flows in the statement of cash flows. ASU No. 2016-09 is effective for the Company beginning January 1, 2017. The Company's current assessment of the pronouncement indicates that the impact upon adoption will not be material to its consolidated financial statements and and related disclosures.

(2) ACQUISITIONS

ATMI

On April 30, 2014, the Company acquired ATMI, Inc. (the Merger), a Delaware corporation (ATMI), for approximately $1.1 billion in cash pursuant to an Agreement and Plan of Merger (the Merger Agreement), dated as of February 4, 2014. As a result of the Merger, ATMI became a wholly-owned subsidiary of the Company. The Merger was accounted for under the acquisition method of accounting and the results of operations of ATMI are included in the Company's consolidated financial statements as of and since April 30, 2014. Direct costs of $13.3 million associated with the acquisition of ATMI, consisting of professional and consulting fees, and bridge financing costs, were expensed as incurred in the year ended December 31, 2014. These costs are included in selling, general and administrative expense and interest expense, respectively, in the Company's consolidated statements of operations.

ATMI was a leading supplier of high-performance materials, materials packaging and materials delivery systems used worldwide in the manufacture of microelectronic devices. These products consist of “front-end” semiconductor performance materials, sub-atmospheric pressure gas delivery systems for safe handling and delivery of toxic and hazardous gases, and high-purity materials packaging and dispensing systems that allow for the reliable introduction of low volatility liquids and solids to microelectronics processes. The acquisition was executed to expand the Company’s product offering base and technological base, and enhance the leverage of its selling and administrative functions. ATMI’s sales for the year ended December 31, 2013 were approximately $361 million.

The purchase price of ATMI consisted of the following:

(In thousands):		
Cash paid to ATMI shareholders	$	1,099,033
Cash paid in settlement of share-based compensation awards		31,451
Total purchase price		1,130,484
Less cash and cash equivalents acquired		321,094
Total purchase price, net of cash acquired	$	809,390

Under the terms of the Merger Agreement, the Company paid $34 per share for all outstanding common shares of ATMI (excluding treasury shares). In addition, the Company settled all outstanding share-based compensation awards held by ATMI employees at the same per share price. The acquisition method of accounting requires the Company to include the amount associated with pre-combination service as consideration in the acquisition, reflected in the table immediately above, while the fair value of the unvested portion of the awards in the amount of $21.3 million is recorded as expense, classified as selling, general and administrative expense, in the Company's consolidated statement of operations.

The Merger was funded with existing cash balances as well as funds raised by the Company through the issuance of debt in the form of a senior secured term loan in an aggregate principal amount of $460 million and senior unsecured notes in an aggregate principal amount of $360 million as described in note 7 to the consolidated financial statements.

The following table summarizes the allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the ATMI acquisition:

(In thousands):		
Accounts receivable and other current assets	$	109,965
Inventory		114,200
Property, plant and equipment		124,025
Identifiable intangible assets		297,040
Other noncurrent assets		8,503
Current liabilities		(60,943)
Deferred tax liabilities and other noncurrent liabilities		(124,929)
Net assets acquired		467,861
Goodwill		341,529
Total purchase price, net of cash acquired	$	809,390

The final valuation of assets acquired and liabilities assumed was completed in the second quarter of 2015.

The fair value write-up of acquired finished goods inventory was $48.6 million. This amount was recorded as an incremental cost of sales charge, amortized over the expected turn of the acquired inventory, during the year ended December 31, 2014.

The fair value of acquired property, plant and equipment of $124.0 million is valued at its value-in-use.

The fair value of the acquired identifiable intangible assets is $297.0 million. The acquired intangible assets, all of which are finite-lived, have a weighted average useful life of approximately 8.3 years and are being amortized on a straight-line basis. The intangible assets that comprise the amount include customer relationships of $165.1 million (10-year weighted average useful life), developed technology and related trade names of $120.8 million (6-year weighted average useful life), and other intangible assets of $11.1 million (7.4-year weighted average useful life).

The fair value of acquired identifiable intangible assets was determined using the “income approach” on an individual project basis. In performing these valuations, the key underlying probability-adjusted assumptions of the discounted cash flows were projected revenues, gross margin expectations and operating cost estimates. The valuations were based on the information that was available as of the acquisition date and the expectations and assumptions that have been deemed reasonable by the Company’s management. There are inherent uncertainties and management judgment required in these determinations. The fair value measurements of the assets acquired and liabilities assumed were based on valuations involving significant unobservable inputs, or Level 3 in the fair value hierarchy.

The purchase price of ATMI exceeded the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $341.5 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. The purchase price also included the fair values of other assets that were not identifiable, not separately recognizable under accounting rules (e.g., assembled workforce) or of immaterial value in addition to a going-concern element that represents the Company's ability to earn a higher rate of return on the group of assets than would be expected on the separate assets as determined during the valuation process. This additional investment value resulted in goodwill. No amount of goodwill is expected to be deductible for income tax purposes.

Subsequent to the Merger, the Company agreed to make severance payments of $7.5 million to ATMI executives. Under the terms of various agreements, the executives are unable to compete with the Company for specified periods. Based on the Company's analysis, the payments associated with these noncompete clauses were capitalized as finite-lived intangible assets to be amortized over periods averaging 1.6 years. The fair value of these noncompete clauses was determined using the “income approach” on an individual executive basis, following a methodology similar to the one described above for acquired identifiable intangible assets.

Pro Forma Results (Unaudited)

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the acquisition of ATMI had occurred as of the beginning of the years presented. The unaudited pro forma financial information is not necessarily indicative of what the Company’s consolidated results of operations actually would have been had the acquisition occurred at the beginning of each year. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined company.

(In thousands, except per share data) (Unaudited)	Year ended December 31, 2014
Net sales	$ 1,076,334
Net income	68,279
Per share amounts:	
Net income per common share - basic	$ 0.49
Net income per common share - diluted	0.49

The unaudited pro forma financial information above gives effect to the following:

a. The elimination of transactions between Entegris and ATMI, which upon completion of the merger would be considered intercompany. This reflects the elimination of intercompany sales and associated intercompany accounts.

b. Incremental amortization and depreciation expense related to the estimated fair value of identifiable intangible assets and property, plant and equipment from the purchase price allocation.

c. Removal of the operating results of ATMI's discontinued operations.

The unaudited pro forma financial information above for the year ended December 31, 2014 excludes the purchase accounting impact of the incremental charge reported in cost of sales for the sale of acquired inventory that was written-up to fair value of $48.6 million.

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(3) TRADE ACCOUNTS AND NOTES RECEIVABLE

Trade accounts and notes receivable from customers at December 31, 2016 and 2015 consist of the following:

(In thousands)	2016	2015
Accounts receivable	$ 163,759	$ 138,473
Notes receivable	4,390	4,254
	168,149	142,727
Less allowance for doubtful accounts	2,474	1,318
	$ 165,675	$ 141,409

(4) INVENTORIES

Inventories at December 31, 2016 and 2015 consist of the following:

(In thousands)	2016	2015
Raw materials	$ 53,109	$ 51,063
Work-in-process	15,976	11,644
Finished goods [a]	114,444	110,469
	$ 183,529	$ 173,176

[a] Includes consignment inventories held by customers for $16.4 million and $16.1 million at December 31, 2016 and 2015, respectively.

(5) PROPERTY, PLANT AND EQUIPMENT

Property, plant, and equipment at December 31, 2016 and 2015 consists of the following:

(In thousands)	2016	2015	Estimated useful lives in years
Land	$ 15,903	$ 14,630	
Buildings and improvements	155,769	155,337	5-35
Manufacturing equipment	248,201	233,473	5-10
Canisters and cylinders	65,100	54,263	3-12
Molds	76,782	82,019	3-5
Office furniture and equipment	107,194	98,291	3-8
Construction in progress	40,136	25,128	
	709,085	663,141	
Less accumulated depreciation	387,523	341,840	
	$ 321,562	$ 321,301	

The table below sets forth the depreciation expense for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Depreciation expense	$ 55,623	$ 54,305	$ 46,637

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(6) GOODWILL AND INTANGIBLE ASSETS

Goodwill activity for each of the Company's two reportable segments that carry goodwill, Specialty Chemicals and Engineered Materials (SCEM) and Advanced Materials Handling (AMH), for the years ended December 31, 2016 and 2015 is shown below:

(In thousands)	SCEM	AMH	Total
December 31, 2014	$ 293,260	$ 47,483	$ 340,743
Addition due to purchase accounting adjustments	4,972	—	4,972
Other, including foreign currency translation	(3,532)	(72)	(3,604)
December 31, 2015	294,700	47,411	342,111
Addition due to purchase accounting adjustments	4,434	—	4,434
Other, including foreign currency translation	(1,276)	—	(1,276)
December 31, 2016	$ 297,858	$ 47,411	$ 345,269

As of December 31, 2016, goodwill amounted to approximately $345.3 million, an increase of $3.2 million from the balance at December 31, 2015. The increase in goodwill in 2016 reflects purchase accounting adjustments to the Company's deferred tax liabilities related to the acquisition of ATMI described in note 2. The increase was partially offset by the foreign currency translation adjustments.

Identifiable intangible assets at December 31, 2016 and 2015 consist of the following:

2016				
(In thousands)	Gross carrying Amount	Accumulated amortization	Net carrying value	Weighted average life in years
Developed technology	202,591	126,077	76,514	6.7
Trademarks and trade names	16,661	12,617	4,044	9.9
Customer relationships	216,918	90,581	126,337	10.3
Other	18,585	7,932	10,653	6.5
	$ 454,755	$ 237,207	$ 217,548	8.5

2015				
(In thousands)	Gross carrying amount	Accumulated amortization	Net carrying value	Weighted average life in years
Developed technology	202,732	102,883	99,849	6.7
Trademarks and trade names	16,676	10,681	5,995	9.9
Customer relationships	218,283	72,948	145,335	10.3
Other	15,135	7,372	7,763	5.7
	$ 452,826	$ 193,884	$ 258,942	8.5

The table below sets forth the amortization expense for the years ended December 31, 2016, 2015, and 2014:

(In thousands)	2016	2015	2014
Amortization expense	$ 44,263	$ 47,349	$ 37,067

The amortization expense for each of the five succeeding years and thereafter relating to intangible assets currently recorded in the Company's consolidated balance sheets is estimated to be the following at December 31, 2016:

Fiscal year ending December 31		*(In thousands)*
2017	$	43,101
2018		42,721
2019		40,480
2020		25,694
2021		18,951
Thereafter		46,601
	$	217,548

(7) DEBT

Long-term debt at December 31, 2016 and 2015 consists of the following:

(In thousands)		December 31, 2016		December 31, 2015
Senior secured term loan facility due 2021	$	233,850	$	308,850
Senior unsecured notes due 2022		360,000		360,000
		593,850		668,850
Unamortized discount and debt issuance costs		9,173		12,806
Total long-term debt		584,677		656,044
Less current maturities of long-term debt		100,000		50,000
Long-term debt less current maturities	$	484,677	$	606,044

Annual maturities of long-term debt contractually due as of December 31, 2016 are as follows:

Fiscal year ending December 31		*(In thousands)*
2017	$	—
2018		—
2019		—
2020		—
2021		233,850
Thereafter		360,000
	$	593,850

As described in note 2 to the consolidated financial statements, the Company issued debt with a principal amount of $820 million to supply the funding required to complete its acquisition of ATMI. Debt issuance costs of $2.3 million paid directly to lending institutions are recorded as a debt discount, while debt issuance costs of $20.7 million paid to third parties are capitalized as debt issuance costs. These debt issuance costs are being amortized as interest expense over the term of the debt instrument using the effective-interest method for the senior secured term loan facility and senior unsecured notes, and the straight-line method for the senior secured asset-based revolving credit facility. In the years ended December 31, 2016, 2015 and 2014, the Company expensed debt issuance costs of $3.9 million, $3.3 million and $5.8 million, respectively, including $4.0 million for bridge financing fees paid for the availability of funding for the acquisition of ATMI in 2014. These amounts are included in interest expense in the Company's consolidated statements of operations.

Senior Secured Term Loan Facility

On April 30, 2014, the Company entered into a term loan credit and guaranty agreement with Goldman Sachs Bank USA, as administrative agent, collateral agent, sole lead arranger, sole bookrunner and sole syndication agent (the Term Loan Facility), that provides senior secured financing of $460 million (which may be increased by up to $225 million in certain circumstances). Borrowings under the Term Loan Facility bear interest at a rate per annum equal to, at the Company’s option, a base rate (such as prime rate or LIBOR) plus, an applicable margin. The Company's interest rate is 3.52% at December 31,

2016. In addition to paying interest on outstanding principal under the Term Loan Facility, the Company is required to pay customary agency fees.

During the years ended December 31, 2016 and 2015, the Company made payments of $75.0 million and $100.0 million, respectively, on the Term Loan Facility. As of December 31, 2016, under the terms of the Term Loan Facility, the Company is not obligated to remit payments on the Term Loan Facility in 2017. However, based on management's plans and intent, the Company reflects $100 million as the current maturity of long-term debt in its consolidated balance sheet as of December 31, 2016.

The credit agreement governing the Term Loan Facility requires the Company to prepay outstanding term loans, subject to certain exceptions, with (a) up to 50% of the Company’s annual Excess Cash Flow (as defined in the credit agreement governing the Term Loan Facility) and (b) 100% of the net cash proceeds of (i) certain asset sales and casualty and condemnation events, subject to reinvestment rights and certain other exceptions; and (ii) any incurrence or issuance of certain debt, other than debt permitted under the Term Loan Facility.

The Company may voluntarily prepay outstanding loans under the Term Loan Facility at any time without premium or penalty other than customary “breakage” costs with respect to LIBOR loans.

All obligations under the Term Loan Facility are unconditionally guaranteed by certain of the Company’s existing wholly owned domestic subsidiaries, and are secured, subject to certain exceptions, by substantially all of the Company’s assets and the assets of the Company's subsidiary guarantors.

The Term Loan Facility contains a number of negative covenants that, subject to certain exceptions, restrict the Company’s ability and each of the Company’s subsidiaries' ability to incur additional indebtedness; pay dividends on its capital stock or redeem, repurchase or retire its capital stock or its other indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to the Company from the Company’s restricted subsidiaries; engage in transactions with its affiliates; sell assets, including capital stock of its subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions. The credit agreement governing the Term Loan Facility additionally contains certain customary representations and warranties, affirmative covenants and provisions relating to events of default. The Company is in compliance with all of the above covenants at December 31, 2016.

2022 Senior Unsecured Notes

On April 1, 2014, the Company issued $360 million aggregate principal amount of 6% senior unsecured notes due April 1, 2022 (the 2022 Senior Unsecured Notes). The 2022 Senior Unsecured Notes were issued under an indenture dated as of April 1, 2014 (the 2022 Senior Unsecured Notes Indenture) by and among the Company and Wells Fargo Bank, National Association, as trustee (the 2022 Senior Unsecured Notes Trustee). Interest on the 2022 Senior Unsecured Notes is payable semi-annually in arrears on April 1 and October 1, commencing October 1, 2014.

The 2022 Senior Unsecured Notes are guaranteed, jointly and severally, fully and unconditionally, on an unsecured senior basis, by each of the Company’s domestic subsidiaries (the Guarantors) that guarantee indebtedness under the Company’s senior secured term loan facility and senior secured asset-based revolving credit facility (Senior Secured Credit Facilities).

As provided in the Senior Unsecured Notes Indenture, the Company may at its option on one or more occasions redeem all or a part of the 2022 Senior Unsecured Notes at a redemption price equal to (a) 100% of the principal amount of the 2022 Senior Unsecured Notes redeemed plus a make-whole premium if redeemed prior to April 1, 2017, or (b) a percentage of principal amount between a percentage from 100% and 104.5% of the aggregate principal amount of notes to be redeemed depending on the period of redemption, if redeemed on or after April 1, 2017, plus, in each case, accrued and unpaid interest thereto.

Upon a change in control, the Company is required to offer to purchase all of the 2022 Senior Unsecured Notes at a price in cash equal to 101% of the aggregate principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of purchase.

If the Company or its subsidiaries engage in asset sales, the Company generally must either invest the net cash proceeds from such sales in its business within a period of time, prepay debt under the Senior Secured Credit Facilities or make an offer to purchase a principal amount of the 2022 Senior Unsecured Notes equal to the excess net cash proceeds, subject to certain exceptions.

The 2022 Senior Unsecured Notes Indenture contains covenants that, among other things, limit the Company’s ability and the ability of the Company’s restricted subsidiaries to pay dividends or distributions or redeem or repurchase equity; prepay subordinated debt or make certain investments, loans, advances and acquisitions; incur or guarantee additional debt, or issue certain disqualified stock and preferred stock; create liens; engage in a consolidation or merger, or sell, transfer or otherwise dispose of all or substantially all of their assets; enter into transactions with affiliates; and create restrictions on the payment of dividends or other amounts to the Company from its restricted subsidiaries. The Company is in compliance with all of the above covenants at December 31, 2016.

The 2022 Senior Unsecured Notes Indenture also provides for events of default which, if certain of them occur, would permit the trustee or the holders of at least 25% in aggregate principal amount of the then total outstanding 2022 Senior Unsecured Notes to declare the principal, premium, if any, interest and any other monetary obligations on all the then-outstanding 2022 Senior Unsecured Notes to be due and payable immediately.

Senior Secured Asset-Based Revolving Credit Facility

The Company has an asset-based credit agreement with Goldman Sachs Bank USA, as administrative agent, collateral agent, sole lead arranger, sole bookrunner and sole syndication agent (the ABL Facility), that provides senior secured financing of $75 million (which may be increased by up to $35 million in certain circumstances), subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of certain percentages of various accounts and inventories and stood at $60.0 million at December 31, 2016. The ABL Facility includes borrowing capacity in the form of letters of credit up to $35 million of the facility, and up to $20 million in U.S. dollars for borrowings on same-day notice, referred to as swingline loans.

Borrowings under the ABL Facility bear interest at a rate per annum equal to, at the Company’s option, a base rate (prime rate or LIBOR), plus an applicable margin. Swingline loans shall bear interest at a rate per annum equal to the base rate plus the applicable margin.

In addition to paying interest on outstanding principal under the ABL Facility, the Company is required to pay a commitment fee of 0.33% per annum in respect of the unutilized commitments thereunder. The Company must also pay customary letter of credit fees and agency fees.

The Company may voluntarily reduce the unutilized portion of the commitment amount and repay outstanding loans at any time. Prepayments of the loans may be made without premium or penalty other than customary “breakage” costs with respect to LIBOR loans.

There is no scheduled amortization under the Company’s ABL Facility. The principal amount outstanding under the ABL Facility is due and payable in full on April 30, 2019. There is no outstanding balance under the ABL Facility at December 31, 2016.

All obligations under the ABL Facility are unconditionally guaranteed by certain of the Company’s existing wholly owned domestic subsidiaries and are secured, subject to certain exceptions, by substantially all of the Company’s assets and the assets of the Company's subsidiaries that have guaranteed the ABL Facility.

The ABL Facility contains a number of negative covenants that, among other things, subject to certain exceptions, restrict the Company’s ability and the ability of each of the Company’s subsidiaries to incur additional indebtedness; pay dividends on its capital stock or redeem, repurchase or retire its capital stock or its other indebtedness; make investments, loans and acquisitions; create restrictions on the payment of dividends or other amounts to the Company from the Company’s restricted subsidiaries; engage in transactions with its affiliates; sell assets, including capital stock of its subsidiaries; materially alter the business it conducts; consolidate or merge; incur liens; and engage in sale-leaseback transactions. The credit agreement governing the ABL Facility additionally contains certain customary representations and warranties, affirmative covenants and provisions relating to events of default. The Company is in compliance with all of the above covenants at December 31, 2016.

(8) LEASE COMMITMENTS

As of December 31, 2016, the Company was obligated under noncancellable operating lease agreements for certain sales offices and manufacturing facilities, manufacturing equipment, vehicles, information technology equipment and warehouse space. Future minimum lease payments for noncancellable operating leases with initial or remaining terms in excess of one year are as follows:

Fiscal year ending December 31		*(In thousands)*
2017	$	9,837
2018		7,356
2019		5,635
2020		4,220
2021		3,860
Thereafter		14,090
Total minimum lease payments	$	44,998

Total rental expense for all equipment and building operating leases for the years ended December 31, 2016, 2015 and 2014, were $13.3 million, $13.8 million and $13.3 million, respectively.

(9) ASSET RETIREMENT OBLIGATIONS

In connection with the acquisition of ATMI described in note 2, the Company assumed asset retirement obligations (AROs) related to environmental disposal obligations associated with cylinders used to supply customers with ATMI's products, and certain restoration obligations associated with its leased facilities. Prior to the acquisition, the Company also had AROs related certain restoration obligations associated with its leased facilities.

Changes in the carrying amounts of the Company's AROs for the years ended December 31, 2016 and 2015 are shown below:

(In thousands)		2016		2015
Balance at beginning of year	$	11,334	$	9,950
Liabilities assumed in ATMI acquisition		—		589
Liabilities settled		(975)		(698)
Liabilities incurred		491		1,094
Accretion expense		188		196
Revision of estimate		491		203
Balance at end of year	$	11,529	$	11,334

ARO liabilities expected to be settled within twelve months are included in the consolidated balance sheets in other accrued liabilities, while all other ARO liabilities are included in pension benefit obligations and other liabilities in the consolidated balance sheets.

(10) INCOME TAXES

Income (loss) before income taxes for the years ended December 31, 2016, 2015 and 2014 was derived from the following sources:

(In thousands)		2016		2015		2014
Domestic	$	(7,328)	$	(16,751)	$	(118,917)
Foreign		127,327		108,936		105,525
Income (loss) before income tax expense (benefit) and equity in net loss of affiliates	$	119,999	$	92,185	$	(13,392)

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Income tax expense (benefit) for the years ended December 31, 2016, 2015 and 2014 is summarized as follows:

(In thousands)	2016	2015	2014
Current:			
Federal	$ 7,759	$ 4,170	$ 1,574
State	(10)	528	111
Foreign	31,387	18,817	21,459
	39,136	23,515	23,144
Deferred (net of valuation allowance):			
Federal	(8,183)	(11,374)	(41,484)
State	250	(738)	(1,545)
Foreign	(8,351)	(1,201)	(1,687)
	(16,284)	(13,313)	(44,716)
Income tax expense (benefit)	$ 22,852	$ 10,202	$ (21,572)

Income tax (benefit) expense differs from the expected amounts based upon the statutory federal tax rates for the years ended December 31, 2016, 2015 and 2014 as follows:

(In thousands)	2016	2015	2014
Expected federal income tax at statutory rate	$ 42,000	$ 32,265	$ (4,687)
State income taxes before valuation allowance, net of federal tax effect	(769)	(576)	(2,115)
Effect of foreign source income	(22,242)	(23,374)	(19,996)
Tax contingencies	1,103	1,483	1,379
Valuation allowance	1,713	1,109	2,106
Non-deductible acquisition costs	—	363	2,176
U.S. federal research credit	(1,676)	(3,905)	(2,085)
Other items, net	2,723	2,837	1,650
Income tax expense (benefit)	$ 22,852	$ 10,202	$ (21,572)

As a result of commitments made by the Company related to investments in tangible property and equipment, the establishment of a research and development center in 2006 and certain employment commitments, income from certain manufacturing activities in Malaysia has been exempt from tax for years up through 2015. The income tax benefits attributable to the tax status of this subsidiary are $10.2 million ($0.07 cents per diluted share) and $8.0 million ($0.06 cents per diluted share) for the years ended December 31, 2015, and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $4.3 million, $4.4 million, and $3.3 million, respectively, because the corporate tax rate in Malaysia is lower than the U.S. rate.

In 2012, Entegris' Korean subsidiary made commitments to produce a certain line of products. In return for this commitment, the Company has a tax holiday on income earned on sales of these products for five years and a partial holiday for two additional years. The income tax benefit attributable to this tax holiday are $3.3 million ($0.02 cents per diluted share), $1.5 million ($0.01 cent per diluted share) and $0.2 million ($0.00 cent per diluted share) for the years ended December 31, 2016, 2015 and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $1.9 million, $0.9 million and $0.2 million, respectively, because the corporate tax rate in Korea is lower than the U.S. rate.

The Company also has made employment and spending commitments to Singapore. In return for those commitments, the Company has been granted a partial tax holiday for eight years starting in 2013. The income tax benefits attributable to the tax status are $2.3 million ($0.02 cents per diluted share), $1.7 million ($0.01 cent per diluted share) and $1.2 million ($0.01 cent per diluted share) for the years ending December 31, 2016, 2015 and 2014, respectively. The 2016, 2015 and 2014 effective tax rates include additional benefits of $6.5 million, $4.6 million and $3.7 million, because the corporate tax rate in Singapore is lower than the U.S. rate.

The 2014 effective tax rate reflects a $2.6 million benefit related to foreign tax credits.

The significant components of the Company's deferred tax assets and deferred tax liabilities at December 31, 2016 and 2015 are as follows:

(In thousands)	2016	2015
Deferred tax assets attributable to:		
Accounts receivable	$ 470	$ 64
Inventory	5,061	5,491
Accruals not currently deductible for tax purposes	3,729	6,661
Net operating loss and credit carryforwards	27,198	12,247
Capital loss carryforward	3,134	2,141
Depreciation	8,395	21,834
Equity compensation	5,134	4,673
Asset impairments	1,467	1,751
Other, net	4,356	3,578
Gross deferred tax assets	58,944	58,440
Valuation allowance	(14,661)	(12,724)
Total deferred tax assets	44,283	45,716
Deferred tax liabilities attributable to:		
Purchased intangible assets	(55,809)	(68,610)
Total deferred tax liabilities	(55,809)	(68,610)
Net deferred tax liabilities	$ (11,526)	$ (22,894)

Deferred tax assets are generally required to be reduced by a valuation allowance if, based on the weight of available positive and negative evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

As of December 31, 2016 and 2015, the Company had a net U.S. deferred tax liability of $3.5 million and $12.6 million, respectively, which are composed of temporary differences and various tax credit carryforwards. Management believes that it is more likely than not that the benefit from certain state net operating loss carryforwards, state credits, capital asset impairments, and a federal capital loss carryforward will not be realized. In recognition of this risk, management has provided a valuation allowance of $9.6 million and $8.9 million as of December 31, 2016 and 2015, respectively, on the related deferred tax assets. If the assumptions change and management determines the assets will be realized, the tax benefits relating to any reversal of the valuation allowance on deferred tax assets at December 31, 2016 will be recognized as a reduction of income tax expense.

As of December 31, 2016 and 2015, the Company had a net non-U.S. deferred tax asset of $6.6 million and $2.4 million, respectively, for which management determined based upon the available evidence a valuation allowance of $5.0 million and $3.8 million as of December 31, 2016 and 2015, respectively, was required against the non-U.S. gross deferred tax assets. For other non-U.S. jurisdictions, management is relying upon projections of future taxable income to utilize deferred tax assets.

At December 31, 2016, there were approximately $822.0 million of accumulated undistributed earnings of subsidiaries outside the United States, all of which are considered to be reinvested indefinitely. Management has considered its future cash needs and affirms its intention to indefinitely invest such earnings overseas to be utilized for working capital purposes, expansion of existing operations, possible acquisitions and other international items. No U.S. tax has been provided on such earnings. If they were remitted to the Company, applicable U.S. federal and foreign withholding taxes may be partially offset by available foreign tax credits. Management has concluded that it is impracticable to compute the full actual tax impact, but it estimates that $13.0 million of withholding taxes would be incurred if the $822.0 million were distributed.

At December 31, 2016, the Company had state operating loss and credit carryforwards of approximately $5.0 million, which begin to expire in 2019; federal research and development credit carryforwards of approximately $8.5 million, which begin to expire in 2033; federal foreign tax credit carryforward of approximately $8.8 million, which begin to expire in 2019, and foreign operating loss carryforwards of $17.9 million, which begin to expire in 2017.

Benefits from tax positions should be recognized in the financial statements only when it is more likely than not that the tax positions will be sustained upon examination by the appropriate taxing authority that would have full knowledge of all relevant information. A tax position that meets the more-likely-than-not recognition threshold is measured at the largest amount of benefit that is greater than fifty percent likely of being realized upon ultimate settlement. Tax positions that fail to meet the more-likely-than-not recognition threshold should be recognized in the first subsequent financial reporting period in which that threshold is met. Previously recognized tax positions that no longer meet the more-likely-than-not recognition threshold should be derecognized in the first subsequent financial reporting period in which that threshold is no longer met. The provisions also provide guidance on the accounting for and disclosure of unrecognized tax benefits, interest and penalties.

Reconciliations of the beginning and ending balances of the total amounts of gross unrecognized tax benefits for the years ended December 31, 2016 and 2015 are as follows:

(In thousands)	2016	2015
Gross unrecognized tax benefits at beginning of year	$ 7,621	$ 5,984
Increase in tax positions from prior years	14	—
Decreases in tax positions for prior years	—	(51)
Increases in tax positions for current year	1,944	2,067
Settlements	—	(194)
Lapse in statute of limitations	(1,286)	(185)
Gross unrecognized tax benefits at end of year	$ 8,293	$ 7,621

The total amount of net unrecognized tax benefits that, if recognized, would affect the effective tax rate was $6.8 million at December 31, 2016.

Penalties and interest paid or received are recorded in other income, net, in the consolidated statements of operations. For the years ended December 31, 2016 and 2015, the Company has accrued interest and penalties related to unrecognized tax benefits of $0.7 million and $0.6 million, respectively. Expenses (benefits) of $0.1 million, $0.1 million and $(0.4) million were recognized as interest and penalties in the consolidated statements of operations for the years ended December 31, 2016, 2015 and 2014, respectively.

The Company files income tax returns in the U.S. and in various state, local and foreign jurisdictions. The statutes of limitations related to the consolidated Federal income tax return and state returns are closed for all years up to and including 2012 and 2012, respectively. With respect to foreign jurisdictions, the statute of limitations varies from country to country, with the earliest open year for the Company’s major foreign subsidiaries being 2010.

Due to the expiration of various statutes of limitations, it is reasonably possible that the Company’s gross unrecognized tax benefit balance may decrease within the next twelve months by approximately $0.6 million.

(11) EQUITY

Share Repurchase Program

On February 5, 2016, the Company's Board of Directors authorized a repurchase program covering up to an aggregate of $100.0 million of the Company's common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans established in accordance with Rule 10b5-1 under the Securities and Exchange Act of 1934, as amended. Under the repurchase program, which expired February 15, 2017, the Company repurchased $7.6 million of shares for the year ended December 31, 2016.

2010 Stock Plan

At December 31, 2009, the Company had outstanding stock awards under five stock incentive plans. On December 17, 2009, the Company’s Board of Directors approved the 2010 Stock Plan, subject to the approval of the Company’s stockholders. On May 5, 2010, the stockholders approved the 2010 Stock Plan. The 2010 Stock Plan replaced the predecessor plans for future stock awards and stock option grants.

Subsequent to the acquisition of ATMI, the Company's Board of Directors approved the absorption of the ATMI, Inc. 2010 Stock Plan (ATMI Plan) into the Company's 2010 Stock Plan for the remainder of the term of the ATMI Plan. 5.7 million additional shares became available for grant by the Company upon absorption of the ATMI Plan.

The 2010 Stock Plan provides for the issuance of stock options and other share-based awards to selected employees, directors, and other individuals or entities that provide services to the Company or its affiliates. The 2010 Stock Plan has a term of ten years. Under the 2010 Stock Plan, the Board of Directors or a committee selected by the Board of Directors will determine for each award, the term, price, number of shares, rate at which each award is exercisable and whether restrictions are imposed on the shares subject to the awards. The exercise price for option awards generally may not be less than the fair market value per share of the underlying common stock on the date granted. The 2010 Stock Plan allows that after December 31, 2009 any stock awards that were awarded from the expired plans mentioned above that are forfeited, expired or otherwise terminated without issuance of such stock award again be available for issuance under the 2010 Stock Plan.

Stock Options

Stock option activity for the 2010 Stock Plan and predecessor plans for the years ended December 31, 2016, 2015 and 2014 is summarized as follows:

	2016			2015			2014		
(Shares in thousands)	Number of shares		Weighted average exercise price	Number of shares		Weighted average exercise price	Number of shares		Weighted average exercise price
Options outstanding, beginning of year	2,139	$	10.57	2,034	$	9.67	1,961	$	8.20
Granted	549		12.20	411		13.49	651		11.71
Exercised	(633)		8.66	(219)		7.62	(546)		6.56
Expired or Forfeited	(148)		12.32	(87)		10.72	(32)		14.06
Options outstanding, end of year	1,907	$	11.54	2,139	$	10.57	2,034	$	9.67
Options exercisable, end of year	776	$	10.65	961	$	9.07	728	$	7.92

Options outstanding for the Company’s stock plans at December 31, 2016 are summarized as follows:

(Shares in thousands)	Options outstanding				Options exercisable		
Range of exercise prices	Number outstanding	Weighted average remaining life in years		Weighted-average exercise price	Number exercisable		Weighted average exercise price
$5.40 to $9.88	540	2.6 years	$	9.51	429	$	9.42
$11.71 to $11.71	527	4.0 years		11.71	260		11.71
$12.20 to $12.20	495	6.1 years		12.20	—		—
$13.49 to $13.49	345	5.0 years		13.49	87		13.49
	1,907	4.4 years		11.54	776		10.65

The weighted average remaining contractual term for options outstanding and exercisable for all plans at December 31, 2016 was 4.4 years and 3.2 years, respectively.

For all plans, the Company had shares available for future grants of 9.4 million shares, 10.4 million shares, and 11.6 million shares at December 31, 2016, 2015 and 2014, respectively.

For all plans, the total pre-tax intrinsic value of stock options exercised during the years ended December 31, 2016 and 2015 was $5.1 million and $1.4 million, respectively. The aggregate intrinsic value, which represents the total pre-tax intrinsic value based on the Company’s closing stock price of $17.90 at December 31, 2016, which theoretically could have been received by the option holders had all option holders exercised their options as of that date, was $12.1 million and $5.6 million for options outstanding and options exercisable, respectively.

Share-based payment awards in the form of stock option awards for 0.5 million, 0.4 million and 0.7 million options were granted to employees during the years ended December 31, 2016, 2015 and 2014. Compensation expense is based on the grant date fair value. The awards vest annually over a three-year or four-year period and have a contractual term of 7 years. The Company estimates the fair value of stock options using the Black-Scholes valuation model. The Company estimates the fair value of stock options using the Black-Scholes valuation model. Key inputs and assumptions used to estimate the fair value of stock options include the grant price of the award, the expected option term, volatility of the Company’s stock, the risk-free rate and the Company’s dividend yield. Estimates of fair value are not intended to predict actual future events or the value ultimately realized by employees who receive equity awards, and subsequent events are not indicative of reasonableness of the original estimates of fair value made by the Company.

The fair value of each stock option grant was estimated at the date of grant using a Black-Scholes option pricing model. The following table presents the weighted-average assumptions used in the valuation and the resulting weighted-average fair value per option granted for the years ended December 31, 2016, 2015 and 2014:

Employee stock options:	2016	2015	2014
Volatility	27.6%	34.6%	43.3%
Risk-free interest rate	1.1%	1.3%	1.1%
Dividend yield	—%	—%	—%
Expected life (years)	4.0	3.9	3.8
Weighted average fair value per option	$ 2.85	$ 3.86	$ 3.99

A historical daily measurement of volatility is determined based on the expected life of the option granted. The risk-free interest rate is determined by reference to the yield on an outstanding U.S. Treasury note with a term equal to the expected life of the option granted. Expected life is determined by reference to the Company's historical experience. The Company determines the dividend yield by dividing the expected annual dividend on the Company's stock by the option exercise price.

Employee Stock Purchase Plan

The Company maintains the Entegris, Inc. Amended and Restated Employee Stock Purchase Plan (ESPP). The ESPP allows employees to elect, at six-month intervals, to contribute up to 10% of their compensation, subject to certain limitations, to purchase shares of common stock at a discount of 15% from the fair market value on the first day or last day of each six-month period. The Company treats the ESPP as a compensatory plan. At December 31, 2016, 2.3 million shares remained available for issuance under the ESPP. Employees purchased 0.3 million shares, 0.3 million shares, and 0.2 million shares, at a weighted-average price of $11.56, $11.21, and $10.57 during the years ended December 31, 2016, 2015 and 2014, respectively.

The table below sets forth the amount of cash received by the Company from the exercise of stock options and employee contributions to the ESPP during the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Exercise of stock options and employee contributions to the ESPP	$ 4,844	$ 4,049	$ 3,117

Restricted Stock Awards

Restricted stock awards are awards of common stock made under the 2010 Stock Plan that are subject to a risk of forfeiture if the awardee terminates employment with the Company prior to the lapse of the restrictions. The value of such stock is determined using the market price on the grant date. Compensation expense for restricted stock awards is generally recognized using the straight-line single-option method. A summary of the Company's restricted stock activity for the years ended December 31, 2016, 2015 and 2014 is presented in the following table:

	2016		2015		2014	
(Shares in thousands)	Number of shares	Weighted average grant date fair value	Number of shares	Weighted average grant date fair value	Number of shares	Weighted average grant date fair value
Unvested, beginning of year	1,882	$ 12.25	1,613	$ 10.53	1,570	$ 8.98
Granted	1,249	12.42	1,043	13.47	834	11.59
Vested	(711)	11.74	(638)	10.13	(686)	8.32
Forfeited	(256)	12.44	(136)	11.26	(105)	10.14
Unvested, end of year	2,164	12.49	1,882	12.25	1,613	10.53

The weighted average remaining contractual term for unvested restricted shares at December 31, 2016 and 2015 was 2.4 years and 2.3 years, respectively.

During the years ended December 31, 2016 and 2015, Entegris, Inc. awarded performance stock for up to 0.2 million shares and 0.2 million shares, respectively, to be issued upon the achievement of performance conditions (Performance shares) under the Company's 2010 Stock Plan to certain officers and other key employees. Compensation expense is based on the grant date fair value. The awards vest on the third anniversary of the award date. The Company estimates the fair value of the Performance shares using a Monte Carlo simulation process.

As of December 31, 2016, the total compensation cost related to unvested stock options and restricted stock awards not yet recognized was $2.8 million and $21.4 million, respectively, and is expected to be recognized over the next 2.5 years on a weighted-average basis.

Valuation and Expense Information

The Company recognizes compensation expense for all share-based payment awards made to employees and directors based on their estimated fair values on the date of grant. Share-based compensation expense is based on the value of the portion of share-based payment awards that is ultimately expected to vest during the period. The following table summarizes the allocation of share-based compensation expense related to employee stock options, restricted stock awards and grants under the employee stock purchase plan for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Cost of sales	$ 1,579	$ 1,317	$ 809
Engineering, research and development expenses	1,124	1,000	705
Selling, general and administrative expenses	10,733	8,716	7,373
Share-based compensation expense	13,436	11,033	8,887
Tax benefit	4,153	3,362	2,746
Share-based compensation expense, net of tax	$ 9,283	$ 7,671	$ 6,141

(12) BENEFIT PLANS

401(k) Plan

The Company maintains the Entegris, Inc. 401(k) Savings and Profit Sharing Plan (the 401(k) Plan) that qualifies as a deferred salary arrangement under Section 401(k) of the Internal Revenue Code. Under the Plan, eligible employees may defer a portion of their pre-tax wages, up to the Internal Revenue Service annual contribution limit. Entegris matches employees' contributions to a maximum match of 4% of the employee's eligible wages. The employer matching contribution expense under the Plan was $4.9 million, $5.0 million and $4.4 million in the fiscal years ended December 31, 2016, 2015 and 2014, respectively.

Defined Benefit Plans

The employees of the Company's subsidiaries in Japan, Taiwan and Germany are covered in defined benefit pension plans. The Company uses a December 31 measurement date for its pension plans.

The tables below set forth the Company's estimated funded status as of December 31, 2016 and 2015:

(In thousands)	2016	2015
Change in benefit obligation:		
Benefit obligation at beginning of year	$ 8,194	$ 8,482
Service cost	66	65
Interest cost	91	119
Actuarial (gain) loss	(481)	15
Benefits paid	(1,000)	(1,165)
Curtailments	—	(536)
Other	—	1,412
Foreign exchange impact	203	(198)
Benefit obligation at end of year	7,073	8,194
Change in plan assets:		
Fair value of plan assets at beginning of year	718	380
Return on plan assets	7	19
Employer contributions	6	14
Acquisition	—	331
Foreign exchange impact	12	(26)
Fair value of plan assets at end of year	743	718
Funded status:		
Plan assets less than benefit obligation - Net amount recognized	$ (6,330)	$ (7,476)

The curtailments noted above relate to revisions associated with the early termination of personnel in Taiwan.

Amounts recognized in the consolidated balance sheets consist of:

(In thousands)	2016	2015
Noncurrent liability	$ (6,330)	$ (7,476)
Accumulated other comprehensive loss, net of taxes	681	1,149

Amounts recognized in accumulated other comprehensive loss, net of tax consist of:

(In thousands)	2016	2015
Net actuarial loss	$ 170	$ 435
Prior service cost	712	998
Gross amount recognized	882	1,433
Deferred income taxes	(201)	(284)
Net amount recognized	$ 681	$ 1,149

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

(In thousands)	2016	2015
Projected benefit obligation	$ 7,073	$ 8,194
Accumulated benefit obligation	6,145	6,948
Fair value of plan assets	743	718

The components of the net periodic benefit cost for the years ended December 31, 2016, 2015 and 2014 were as follows:

(In thousands)	2016	2015	2014
Pension benefits:			
Service cost	$ 66	$ 65	$ 64
Interest cost	91	119	111
Expected return on plan assets	(10)	(17)	(8)
Amortization of prior service cost	65	76	18
Amortization of net transition obligation	—	(1)	(1)
Amortization of plan loss	—	28	22
Recognized actuarial net loss	17	14	7
Curtailments	—	160	—
Net periodic pension benefit cost	$ 229	$ 444	$ 213

The estimated amount that will be amortized from accumulated other comprehensive income into net periodic benefit cost in 2017 is as follows:

(In thousands)	
Prior service cost	$ 64
Net actuarial loss	21
	$ 85

Assumptions used in determining the benefit obligation and net periodic benefit cost for the Company's pension plans for the years ended December 31, 2016, 2015 and 2014 are presented in the following table as weighted-averages:

	2016	2015	2014
Benefit obligations:			
Discount rate	0.63%	1.10%	1.13%
Rate of compensation increase	2.90%	3.70%	4.41%
Net periodic benefit cost:			
Discount rate	1.70%	1.94%	1.83%
Rate of compensation increase	3.43%	4.41%	3.38%
Expected return on plan assets	1.43%	1.76%	1.35%

The plans' expected return on assets as shown above is based on management's expectations of long-term average rates of return to be achieved by the underlying investment portfolios. In establishing this assumption, management considers historical and expected returns for the asset classes in which the plans are invested, as well as current economic and capital market conditions. The discount rate primarily used by the Company is based on market yields at the valuation date on government bonds as well as the estimated maturity of benefit payments.

Plan Assets

At December 31, 2016 and 2015, the Company's pension plan assets are deposited in Bank of Taiwan in the form of money market funds, where the Bank of Taiwan is the assigned funding vehicle for the statutory retirement benefit.

The fair value measurements of the Company's pension plan assets at December 31, 2016, by asset category are as follows:

(In thousands)		Quoted prices in active markets for identical assets	Significant observable inputs	Significant unobservable inputs
Asset category	Total	(Level 1)	(Level 2)	(Level 3)
Taiwan plan assets (a)	$ 743	$ 743	—	—

(a) This category includes investments in the government of Taiwan's pension fund. The government of Taiwan is responsible for the strategy and allocation of the investment contributions.

The fair value measurements of the Company's pension plan assets at December 31, 2015, by asset category are as follows:

(In thousands)		Quoted prices in active markets for identical assets	Significant observable inputs	Significant unobservable inputs
Asset category	Total	(Level 1)	(Level 2)	(Level 3)
Taiwan plan assets (a)	$ 718	$ 718	—	—

(a) This category includes investments in the government of Taiwan's pension fund. The government of Taiwan is responsible for the strategy and allocation of the investment contributions.

Cash Flows

The Company expects to make the following contributions and benefit payments:

(In thousands)	Contributions	Payments
2017	$ 4	$ 65
2018	—	106
2019	—	145
2020	—	187
2021	—	736
Years 2022-2026	—	2,082

(13) FAIR VALUE MEASUREMENTS

Generally accepted accounting principles establish a fair value hierarchy that prioritizes the inputs used to measure fair value. The three levels of the fair value hierarchy are as follows:

Level 1—Quoted prices in active markets accessible at the reporting date for identical assets and liabilities.

Level 2—Quoted prices for similar assets or liabilities in active markets. Quoted prices for identical or similar assets and liabilities in markets that are not considered active or financial instruments for which all significant inputs are observable, either directly or indirectly.

Level 3—Prices or valuations that require inputs that are significant to the valuation and are unobservable.

A financial instrument's level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement.

Financial Assets Measured at Fair Value on a Recurring Basis

The following table presents the Company's financial assets and liabilities that are measured at fair value on a recurring basis at December 31, 2016 and 2015.

(In thousands)	December 31, 2016				December 31, 2015			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Assets:								
Short-term investments:								
Common stock	—	—	—	—	$ 2,181	—	—	$ 2,181
Other current assets:								
Foreign exchange forward contracts asset	$ —	$ 4,784	$ —	$ 4,784	$ —	$ 2,463	$ —	$ 2,463
Total assets measured and recorded at fair value	$ —	$ 4,784	$ —	$ 4,784	$ 2,181	$ 2,463	$ —	$ 4,644

The following table provides information about derivative positions held by the Company as of December 31, 2016 and 2015:

(In thousands)	December 31, 2016			December 31, 2015		
	Gross amounts of recognized assets	Gross amounts offset in the consolidated balance sheet	Net amount of assets in the consolidated balance sheet	Gross amounts of recognized assets	Gross amounts offset in the consolidated balance sheet	Net amount of assets in the consolidated balance sheet
Foreign exchange forward contracts	$4,784	$0	$4,784	$2,958	$495	$2,463

Gains and losses associated with derivatives are recorded in other expense (income), net, in the consolidated statements of operations. Losses associated with derivative instruments not designated as hedging instruments for the years ended December 31, 2016 and 2015 were as follows:

(In thousands)	2016	2015
Losses on foreign currency forward contracts	$(1,647)	$(10,787)

In the years ended December 31, 2015 and 2014, the Company recorded an other-than-temporary impairment of $0.5 million and $1.9 million, respectively, related to an available-for-sale common stock investment classified in short-term investments in the consolidated balance sheet. The fair value of the investment after impairment was $2.2 million and $4.6 million at December 31, 2015 and 2014, respectively, and is classified as a Level 1 investment in the fair value hierarchy. The fair value measurement of the common stock investment was based on a quoted market price in an active market. The Company determined that it was an other-than-temporary impairment due to the significant decline in fair value compared to the acquisition cost for an extended period of time and the financial condition of the issuer.

(14) EARNINGS PER SHARE (EPS)

Basic EPS is computed by dividing net income by the weighted average number of shares of common stock outstanding during each period. The following table presents a reconciliation of the share amounts used in the computation of basic and diluted earnings per share:

(In thousands)	2016	2015	2014
Basic earnings per share—Weighted common shares outstanding	141,093	140,353	139,311
Weighted common shares assumed upon exercise of options and vesting of restricted stock units	957	768	751
Diluted earnings per share—Weighted common shares outstanding	142,050	141,121	140,062

The Company excluded the following shares underlying stock-based awards from the calculations of diluted EPS because their inclusion would have been anti-dilutive for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Shares excluded from calculations of diluted EPS	434	998	1,183

(15) SEGMENT INFORMATION

In 2016, the Company has changed its financial segment reporting, reflecting an organizational realignment intended to better leverage its unique portfolio of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher performance of devices. While these segments have separate products and technical know-how, they share a single, global sales force, unified core systems and processes, global technology centers, strategic and technology roadmaps, and a focus on a common set of customers. The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The Company's business is reported in the following segments:

- **Specialty Chemicals and Engineered Materials (SCEM):** SCEM provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes.

- **Advanced Materials Handling (AMH):** AMH develops solutions to monitor, protect, transport, and deliver critical liquid chemistries and substrates for a broad set of applications in the semiconductor industry and other high-technology industries.

- **Microcontamination Control (MC):** MC solutions purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries.

Inter-segment sales are not significant. Segment profit is defined as net sales less direct segment operating expenses, excluding certain unallocated expenses, consisting mainly of general and administrative costs for the Company’s human resources, finance and information technology functions as well as interest expense, amortization of intangible assets, charges for the fair value write-up of acquired inventory sold, contingent consideration fair value adjustments, income taxes and equity in net loss of affiliate.

Corporate assets consist primarily of cash and cash equivalents, short-term investments, investments, deferred tax assets and deferred tax charges.

Summarized financial information for the Company's reportable segments is shown in the following tables.

(In thousands)	2016	2015	2014
Net sales:			
SCEM	$ 428,328	$ 418,878	$ 292,339
AMH	384,284	346,426	346,571
MC	362,658	315,817	323,159
Total net sales	$ 1,175,270	$ 1,081,121	$ 962,069

(In thousands)	2016	2015	2014
Segment profit:			
SCEM	$ 96,060	$ 100,370	$ 59,017
AMH	73,452	66,419	70,464
MC	110,042	83,076	99,019
Total segment profit	$ 279,554	$ 249,865	$ 228,500

(In thousands)	2016	2015	2014
Total assets:			
SCEM	$ 766,126	$ 801,250	$ 807,544
AMH	267,085	259,377	288,680
MC	200,399	183,518	195,457
Corporate	465,922	402,552	456,626
Total assets	$ 1,699,532	$ 1,646,697	$ 1,748,307

(In thousands)	2016	2015	2014
Depreciation and amortization:			
SCEM	$ 64,062	$ 65,352	$ 51,046
AMH	22,874	23,604	23,099
MC	9,222	8,733	4,982
Corporate	3,728	3,965	4,577
Total depreciation and amortization	$ 99,886	$ 101,654	$ 83,704

(In thousands)	2016	2015	2014
Capital expenditures:			
SCEM	$ 27,348	$ 29,333	$ 18,960
AMH	19,029	23,617	13,539
MC	6,281	11,408	11,243
Corporate	12,602	7,619	13,991
Total capital expenditures	$ 65,260	$ 71,977	$ 57,733

The following table reconciles total segment profit to income before income taxes and equity in net loss of affiliate:

(In thousands)	2016	2015	2014
Total segment profit	$ 279,554	$ 249,865	$ 228,500
Less:			
Charge for fair value write-up of acquired inventory sold	—	—	48,586
Amortization of intangibles	44,263	47,349	37,067
Contingent consideration fair value adjustment	—	—	(1,282)
Unallocated general and administrative expenses	79,755	84,448	122,775
Operating income	155,536	118,068	21,354
Interest expense	36,846	38,667	33,355
Interest income	(318)	(429)	(1,336)
Other (income) expense, net	(991)	(12,355)	2,727
Income (loss) before income tax expense (benefit) and equity in net loss of affiliate	$ 119,999	$ 92,185	$ (13,392)

The following table presents amortization of intangibles for each of the Company’s segments for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Amortization of intangibles:			
SCEM	$ 40,034	$ 42,909	$ 32,099
AMH	4,229	4,440	4,968
Total amortization of intangibles	$ 44,263	$ 47,349	$ 37,067

The following table summarizes total net sales, based upon the country or region to which sales to external customers were made for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Net sales:			
United States	$ 253,868	$ 253,141	$ 240,767
Japan	156,021	131,336	121,878
Europe	105,779	106,036	108,889
Taiwan	291,309	248,842	230,416
Singapore	65,133	55,409	46,048
South Korea	145,661	148,016	122,322
China	118,435	97,148	73,281
Other	39,064	41,193	18,468
	$ 1,175,270	$ 1,081,121	$ 962,069

The following table summarizes property, plant and equipment, net, attributed to significant countries for the years ended December 31, 2016, 2015 and 2014:

(In thousands)	2016	2015	2014
Property, plant and equipment:			
United States	$ 226,394	$ 229,558	$ 222,125
Korea	33,441	32,400	32,163
Japan	25,248	23,619	22,261
Malaysia	19,180	19,878	20,607
Other	17,299	15,846	16,413
	$ 321,562	$ 321,301	$ 313,569

In the years ended December 31, 2016, 2015 and 2014, one individual customer, Taiwan Semiconductor Manufacturing Company Limited, accounted for $161.9 million, $134.1 million and $130.9 million of net sales, respectively, all of which include sales from all of the Company's segments.

(16) COMMITMENTS AND CONTINGENT LIABILITIES

The Company is subject to various claims, legal actions, and complaints arising in the ordinary course of business. The Company believes the final outcome of these matters will not have a material adverse effect on its consolidated financial statements. The Company expenses legal costs as incurred.

(17) QUARTERLY INFORMATION-UNAUDITED

	Fiscal quarter ended			
(In thousands, except per share data)	April 2, 2016	July 2, 2016	October 1, 2016	December 31, 2016
Net sales	$ 267,024	$ 303,052	$ 296,692	$ 308,502
Gross profit	114,706	139,205	122,980	131,800
Net income	16,212	32,890	21,947	26,098
Basic net income per common share	0.12	0.23	0.16	0.18
Diluted net income per common share	0.11	0.23	0.15	0.18

	Fiscal quarter ended			
(In thousands, except per share data)	March 28, 2015	June 27, 2015	September 26, 2015	December 31, 2015
Net sales	$ 263,373	$ 280,709	$ 270,253	$ 266,786
Gross profit	116,536	128,087	116,310	109,298
Net income	14,872	24,448	23,403	17,573
Basic net income per common share	0.11	0.17	0.17	0.13
Diluted net income per common share	0.11	0.17	0.17	0.12

(18) SUBSEQUENT EVENT

On February 15, 2017, the Company’s Board of Directors authorized a repurchase program covering up to an aggregate of $100 million of the Company’s common stock in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. The authorization expires February 15, 2018. This repurchase program represents a renewal and replacement of the repurchase program originally authorized by the Board of Directors on February 5, 2016, which expired February 15, 2017.

EXHIBIT 10.1

ENTEGRIS, INC.
401(k) SAVINGS AND PROFIT SHARING PLAN
(2017 Restatement)

ENTEGRIS, INC.
401(k) SAVINGS AND PROFIT SHARING PLAN
(2017 Restatement)

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ENTEGRIS, INC.
401(k) SAVINGS AND PROFIT SHARING PLAN

THIS INDENTURE made on the 15th day of December, 2016, by Entegris, Inc., a corporation duly organized and existing under the laws of the State of Delaware (the "Principal Sponsor");

W I T N E S S E T H:

WHEREAS, the Principal Sponsor maintains the Entegris, Inc. 401(k) Savings and Profit Sharing Plan (the "Plan"); and

WHEREAS, the Principal Sponsor has reserved to itself the power to amend the Plan; and

WHEREAS, the Principal Sponsor desires to amend and restate the Plan to incorporate amendments to the Plan subsequent to the 2012 restatement of the Plan, to clarify certain terms, and to comply with Internal Revenue Service Notice 2015-84;

NOW, THEREFORE, the Principal Sponsor does hereby amend the Plan, effective as of January 1, 2017, as follows:

SECTION 1

INTRODUCTION

1.1. **Definitions**. When the following terms are used herein with initial capital letters, they shall have the following meanings:

1.1.1. **Accounts** — the following Accounts will be maintained under the Plan for Participants:

(a)**Total Account** — for convenience of reference, a Participant's entire interest in the Fund, including the Participant's Retirement Savings Account, Roth Account, Employer Matching Account, Employer Profit Sharing Account, Pension Account, ESOP Account, Rollover Account, Roth Rollover Account, After-Tax Account, and QNEC Account.

(b)**Retirement Savings Account** — the Account maintained for each Participant to which are credited Employer contributions made on behalf of a Participant pursuant to Plan Sections 2.4 and 3.2 (but only to the extent those contributions are Pre-Tax Elective Contributions, including any pre-tax Catch-up Contributions), together with any increase or decrease thereon.

(c)**Roth Account** – the Account maintained for each Participant to which are credited the Participant's Roth Contributions (including any Catch-up Contributions designated as Roth Contributions) pursuant to Plan Sections 2.4 and 3.2, together with any increase or decrease thereon. Distribution of a Participant's Roth Account shall be made in accordance with section 402A of the Code and the regulations issued thereunder.

(d)**Employer Matching Account** — the Account maintained for each Participant to which is credited (i) the Participant's allocable share of the Employer contributions made pursuant to Section 3.3 and (ii) the Participant's interest, if any, in employer matching contributions transferred from any plan that was merged into the Plan.

(e)**Employer Profit Sharing Account** — the Account maintained for each Participant to which is credited the Participant's allocable share of the Employer contributions made pursuant to Section 3.4 and the Participant's interest, if any, in profit sharing contributions transferred from any plan that was merged into the Plan, together with any increase or decrease thereon.

(f)**Pension Account** — the Account maintained for each Participant to which is credited the Participant's interest, if any, transferred from the Entegris, Inc. Pension Plan, together with any increase or decrease thereon. A Participant's Pension Account will be distributed in accordance with Appendix E to the Plan.

(g)**ESOP Account** — the Account maintained for each Participant to which is credited the Participant's interest, if any, transferred from the Entegris, Inc. Employee Stock Ownership Plan, together with any increase or decrease thereon. Distributions from a Participant's ESOP Account shall be made in accordance with Plan Section 7 and Appendix F to the Plan.

(h)**Rollover Account** — the Account maintained for each Participant to which are credited the Participant's Rollover Contributions (other than designated Roth contributions as defined in section 402A of the Code) made pursuant to Plan Section 3.7, together with any increase or decrease thereon.

(i) **Roth Rollover Account** — the Account maintained for each Participant to which is credited the Participant's Rollover Contributions consisting of designated Roth contributions (as defined in section 402A of the Code) made pursuant to Plan Section 3.7, together with any increase or decrease thereon.

(j) **After-Tax Account** – the Account maintained for each Participant to which is credited the Participant's nondeductible after-tax contributions (other than Roth Contributions), together with any increase or decrease thereon.

(k) **QNEC Account** – the Account maintained for each Participant who previously participated in the ATMI, Inc. 401(k) Profit Sharing Plan ("ATMI Plan") to which was credited certain qualified non-elective contributions made to the ATMI Plan on behalf of such Participant before October 1, 2014, together with any increase or decrease thereon.

1.1.2. **Affiliate** — a business entity which is not an Employer but which is a part of a "controlled group" with the Employer or under "common control" with the Employer or which is a member of an "affiliated service group" that includes the Employer, as those terms are defined in section 414(b), (c) and (m) of the Code. A business entity which is a predecessor to the Employer shall be treated as an Affiliate if the Employer maintains a plan of such predecessor business entity or if, and to the extent that, such treatment is otherwise required by regulations under section 414(a) of the Code. A business entity shall also be treated as an Affiliate if, and to the extent that, such treatment is required by regulations under section 414(o) of the Code. In addition to said required treatment, the Principal Sponsor may, in its discretion, designate as an Affiliate any business entity which is not such a "controlled group," "common control," "affiliated service group" or "predecessor" business entity but which is otherwise affiliated with the Employer, subject to such limitations as the Principal Sponsor may impose.

1.1.3. **Alternate Payee** — any spouse, former spouse, child or other dependent of a Participant who is recognized by a domestic relations order as having a right to receive all or a portion of the Account of a Participant under the Plan.

1.1.4. **Beneficiary** — a person designated by a Participant (or automatically by operation of the Plan) pursuant to Section 7.4 of the Plan to receive all or a part of the Participant's Vested Total Account in the event of the Participant's death prior to full distribution thereof. A person so designated shall not be considered a Beneficiary until the death of the Participant.

1.1.5. **Catch-up Contribution** — the additional Elective Contributions that a Participant may make pursuant to Section 2.4.2 of the Plan, beyond the dollar limitation set forth under Section 2.4.1 of the Plan and Appendices A and B to the Plan.

1.1.6. **Code** — the Internal Revenue Code of 1986, including applicable regulations for the specified section of the Code. Any reference in the Plan to a section of the Code, including the applicable regulation, shall be considered also to mean and refer to any subsequent amendment or replacement of that section or regulation.

1.1.7. **Committee** — the committee established in accordance with the provisions of Section 11.2 of the Plan, known as the Administrative Committee.

1.1.8. **Disability** — a medically determinable physical or mental impairment which: (a) renders the individual incapable of performing any substantial gainful employment, (b) can be expected to be of long-continued and indefinite duration or result in death, and (c) is evidenced by a certification to this effect by a doctor of medicine approved by the Committee. In lieu of such a certification, the Committee may accept, as proof of Disability, the official written determination that the individual will be eligible for disability benefits under the federal Social Security Act as now enacted or hereinafter amended (when any waiting period expires). Notwithstanding the foregoing, no Participant will be considered to have a Disability unless such doctor's determination or official Social Security determination is received by the Committee within twelve (12) months after the Participant's last day of active work with the Employer or an Affiliate. The Committee shall determine the date on which the Disability shall have occurred if such determination is necessary.

1.1.9. **Effective Date** — January 1, 2017 the effective date of this restatement. The original effective date of the Plan is January 1, 2000.

1.1.10 **Elective Contributions** — contributions made by the Employer in accordance with a Participant's Retirement Savings Election. "Elective Contributions" means Pre-Tax Elective Contributions and Roth Contributions, unless the context clearly indicates only one is meant.

1.1.11. **Eligibility Service** — a measure of an employee's service with the Employer and all Affiliates (stated as a number of years) which is equal to the number of computation periods for which the employee is credited with one thousand (1,000) or more Hours of Service (as determined under Section 1.1.20); subject, however, to the following rules:

(a) **Computation Periods**. The computation periods for determining Eligibility Service shall be the twelve (12) consecutive month period beginning with the date the employee first performs an Hour of Service and all Plan Years beginning after such date (irrespective of any termination of employment and subsequent reemployment).

(b) **Completion**. A year of Eligibility Service shall be deemed completed only as of the last day of the computation period (irrespective of the date in such period that the employee completed one thousand Hours of Service). (Fractional years of Eligibility Service shall not be credited.)

(c) **Pre-2000 Service**. Eligibility Service shall be credited for Hours of Service earned and computation periods completed before January 1, 2000, as if the terms set forth herein were then in effect.

(d) **Breaks in Service**. If the employee has any break in service occurring before or after the Effective Date, the employee's service both before and after such break in service shall be taken into account in computing Eligibility Service for the purpose of determining the employee's entitlement to become a Participant in the Plan.

1.1.12. **Employer** — the Principal Sponsor, any business entity that adopts the Plan pursuant to Section 9.4, and any successor thereof that adopts the Plan.

1.1.13. **Employer Securities** – common stock of Entegris Delaware or of any successor corporation by merger or otherwise or of any other corporation which is an affiliate and a member of a controlled group of corporation, including Entegris, within the meaning of section 407(d)(7) of ERISA, and which is readily tradable on an established securities market.

1.1.14. **Employment Commencement Date** — the date upon which an employee first performs one (1) Hour of Service for the Employer or an Affiliate (without regard to whether such Hour of Service is performed in Recognized Employment or otherwise).

1.1.15. **Enrollment Date** — (a) the first day of each calendar month of the Plan Year, and (b) such other dates as the Committee may by rule establish from time to time for the commencement of retirement savings under Section 2.3.

1.1.16. **ERISA** — the Employee Retirement Income Security Act of 1974, including applicable regulations for the specified section of ERISA. Any reference in the Plan to a section of ERISA, including the applicable regulation, shall be considered also to mean and refer to any subsequent amendment or replacement of that section or regulation.

1.1.17. **Event of Maturity** — any of the occurrences described in Section 6 by reason of which a Participant or Beneficiary may become entitled to a distribution from the Plan.

1.1.18. **Fund** — the assets of the Plan held by the Trustee from time to time, including all contributions and the investments and reinvestments, earnings and profits thereon.

1.1.19. **Highly Compensated Employee** — any employee who (a) is a five percent (5%) owner (as defined in Appendix B) at any time during the current Plan Year or the preceding Plan Year, or (b) receives compensation from the Employer and all Affiliates during the preceding Plan Year in excess of $120,000 (for 2016, which amount shall be adjusted for changes in the cost-of-living as provided in regulations issued by the Secretary of the Treasury). For this purpose, "compensation" means compensation as defined in section 415(c)(3) of the Code. Compensation for any employee who performed services for only part of a year is not annualized for this purpose.

1.1.20. **Hour of Service** — for purposes of determining Eligibility Service under Section 1.1.11 and whether a Participant shall be an Eligible Participant for a Plan Year under Section 3.5, and for any other applicable purpose under the Plan, hours credited to the employee according to the following rules:

(a) **Paid Duty**. An Hour of Service shall be credited for each hour for which the employee is paid, or entitled to payment, for the performance of duties for the Employer or an Affiliate. These hours shall be credited to the employee for the computation period or periods in which the duties are performed.

(b) **Paid Nonduty**. An Hour of Service shall be credited for each hour for which the employee is paid, or entitled to payment, by the Employer or an Affiliate on account of a period of time during which no duties are performed (irrespective of whether the employment relationship has terminated) due to vacation, holiday, illness, incapacity (including disability), layoff, jury duty, military duty or leave of absence; provided, however, that:

(i) no more than five hundred one (501) Hours of Service shall be credited on account of a single continuous period during which the employee performs no duties (whether or not such period occurs in a single computation period),

(ii) no Hours of Service shall be credited on account of payments made under a plan maintained solely for the purpose of complying with applicable workers' compensation, unemployment compensation or disability insurance laws,

(iii) no Hours of Service shall be credited on account of payments which solely reimburse the employee for medical or medically related expenses incurred by the employee, and

(iv) payments shall be deemed made by or due from the Employer or an Affiliate whether made directly or indirectly from a trust fund or an insurer to which the Employer or an Affiliate contributes or pays premiums.

These hours shall be credited to the employee for the computation period for which payment is made or, if the payment is not computed by reference to units of time, the hours shall be credited to the first computation period in which the event, for which any part of the payment is made, occurred.

(c) **Back Pay**. An Hour of Service shall be credited for each hour for which back pay, irrespective of mitigation of damages, has been either awarded or agreed to by the Employer or an Affiliate. The same Hours of Service credited under paragraph (a) or (b) shall not be credited under this paragraph (c). The crediting of Hours of Service under this paragraph (c) for periods and payments described in paragraph (b) shall be subject to all the limitations of that paragraph. These hours shall be credited to the employee for the computation period or periods to which the award or agreement pertains rather than the computation period in which the award, agreement or payment is made.

(d) **Unpaid Absences**. **Leaves of Absence**. If (and to the extent that) the Committee so provides in rules, during each unpaid leave of absence authorized by the Employer or an Affiliate for Plan purposes under such rules, the employee shall be credited with the number of Hours of Service which otherwise would normally have been credited to such employee but for such absence; provided, however, that if the employee does not return to employment for any reason other than death, Disability or attainment of Normal Retirement Age at the expiration of the leave of absence, such Hours of Service shall not be credited.

(e) **Special Rules**. For periods prior to January 1, 2000, Hours of Service may be determined using whatever records are reasonably accessible and by making whatever calculations are necessary to determine the approximate number of Hours of Service completed during such prior period. To the extent not inconsistent with other provisions hereof, Department of Labor regulations 29 C.F.R. § 2530.200b-2(b) and (c) are hereby incorporated by reference herein. To the extent required under section 414 of the Code, services of leased owners, leased managers, shared employees, shared leased employees and other similar classifications (excluding Leased Employees) for the Employer or an Affiliate shall be taken into account as if such services were performed as a common law employee of the Employer for the purposes of determining Eligibility Service. For purposes of the Plan, application of the leased employee rules under section 414(n) of the Code shall be subject to the following: (i) “contingent services” shall mean services performed by a person for the Employer or an Affiliate during the period the person has not performed the services on a substantially full time basis for a period of at least twelve (12) consecutive months, (ii) contingent services performed by a person who has become a Leased Employee (or who would have become a Leased Employee but for the service requirements set forth in Section 1.1.22(b) of the Plan) shall be taken into account for purposes of determining Eligibility Service, and (iii) all service performed as a Leased Employee (i.e., all service following the date an individual has satisfied all three requirements for becoming a Leased Employee) shall be taken into account for purposes of determining Eligibility Service.

(f) **Equivalency for Exempt Employees**. Notwithstanding anything to the contrary in the foregoing, the Hours of Service for any employee for whom the Employer or an Affiliate is not otherwise required by state or federal “wage and hour” or other law to count hours worked shall be credited on the basis that, without regard to the employee’s actual hours, such employee shall be credited with one hundred ninety (190) Hours of Service for a calendar month if, under the provisions of this Section (other than this paragraph), such employee would be credited with at least one (1) Hour of Service during that calendar month.

(g) **Additional Service to be Credited.** Hours of Service shall also be credited in accordance with Schedule I to the Plan with respect to the entities listed therein.

1.1.21. **Investment Manager** — the person or persons, other than the Trustee, appointed pursuant to the Trust Agreement to manage all or a portion of the Fund or any Subfund.

1.1.22. **Leased Employee** — any individual (other than an employee of the Employer or an Affiliate) who performs services for the Employer or an Affiliate if (a) services are performed under an agreement between the Employer or an Affiliate and an individual or company, (b) the individual performs services for the Employer or an Affiliate on a substantially full time basis for a period of at least twelve (12) consecutive months, and (c) the individual’s services are performed under the primary direction or control of the Employer or an Affiliate. In determining whether an individual is a Leased Employee of the Employer or an Affiliate, all prior service with the Employer or an Affiliate (including employment as a common law employee) shall be used for purposes of satisfying (b) above. No individual shall be considered a Leased Employee unless and until all conditions have been satisfied.

1.1.23. **Normal Retirement Age** — the date a Participant attains age sixty-five (65) years.

1.1.24. **One-Year Break in Service** - — a Plan Year for which an employee is not credited with more than five hundred (500) Hours of Service. (A One-Year Break in Service shall be deemed to occur only on the last day of such Plan Year.)

1.1.25. **Participant** — an employee of the Employer who becomes a Participant in the Plan in accordance with the provisions of Section 2. An employee who has become a Participant shall be considered to continue as a Participant in the Plan until the date of the Participant's death or, if earlier, the date when the Participant is no longer employed in Recognized Employment and upon which the Participant no longer has any Account under the Plan (that is, the Participant has both received a distribution of all of the Participant's Vested Total Account, if any, and the non-Vested portion of the Participant's Total Account, if any, has been forfeited and disposed of as provided in Section 6.2). An employee who has not become a Participant in the Plan in accordance with the provisions of Plan Section 2 and who makes a Rollover Contribution to the Plan in accordance with the provisions of Plan Section 3 shall be considered a Participant solely for the purpose of making the Rollover Contribution and receiving a distribution upon an Event of Maturity in accordance with the provisions of Plan Section 7.

1.1.26. **Period of Service** — a measure of an employee's employment with the Employer and all Affiliates which is equal to the period commencing on the employee's Employment Commencement Date or Reemployment Commencement Date, whichever is applicable, and ending on the next following Severance from Service Date; provided, however:

(a)**Aggregation**. Unless some or all of an employee's service may be disregarded pursuant to other rules of the Plan, all discontinuous Periods of Service shall be aggregated in determining the total of an employee's Period of Service. A Period of Service shall be stated in years and days and when aggregating discontinuous periods of less than one (1) year, three hundred sixty-five (365) days shall equal one (1) year.

(b)**Service Spanning Rule No. 1**. If an employee quits, is discharged or retires from service with the Employer and all Affiliates and performs an Hour of Service within the twelve (12) months following the Severance from Service Date, that Period of Severance shall be deemed to be a Period of Service.

(c)**Service Spanning Rule No. 2**. If an employee severs from service by reason of a quit, a discharge or retirement during the first twelve (12) months of an absence from service for any reason other than a quit, a discharge, retirement or death, and then performs an Hour of Service within the twelve (12) months following the date on which the employee was first absent from service, the Period of Severance shall be deemed to be a Period of Service.

(d)**Special Rules**. To the extent required under section 414 of the Code, services of leased owners, leased managers, shared employees, shared leased employees and other similar classifications (excluding Leased Employees) for the Employer or an Affiliate shall be taken into account as if such services were performed as a common law employee of the Employer for the purposes of determining Vesting Service. For purposes of the Plan, application of the leased employee rules under section 414(n) of the Code shall be subject to the following: (i) "contingent services" shall mean services performed by a person for the Employer or an Affiliate during the period the person has not performed the services on a substantially full time basis for a period of at least twelve (12) consecutive months, (ii) contingent services performed by a person who has become a Leased Employee (or who would have become a Leased Employee but for the service requirements set forth in Section 1.1.22(b) of the Plan) shall be taken into account for purposes of determining Vesting Service, and (iii) all service performed as a Leased Employee (i.e., all service following the date an individual has satisfied all three requirements for becoming a Leased Employee) shall be taken into account for purposes of determining Vesting Service.

1.1.27. **Period of Severance** — the period of time commencing on an employee's Severance from Service Date and ending on the date on which that employee next again performs an Hour of Service for the Employer or for an Affiliate (without regard to whether such Hour of Service is performed in Recognized Employment or otherwise). A Period of Severance shall be stated in years and days.

Notwithstanding the foregoing, for the limited purpose of determining the length of a Period of Severance, the Severance from Service Date for an employee shall be advanced during any period of an absence from work (which began after December 31, 1984) due to the pregnancy of the employee, the birth of a child of the employee, the placement of a child with the employee in connection with the adoption of such child by the employee, or for the purpose of caring for such child for a period beginning immediately following such birth or placement. In no event, however, shall the Severance from Service Date be advanced under the foregoing sentence to a date that is later than the last day of the calendar month which is two (2) years after the first of such absence. This adjustment in the Severance from Service Date shall not be made until the employee furnishes timely information which may be reasonably required by the Committee to establish that the absence from work is for a reason for which this adjustment will be made.

1.1.28. **Plan** — the Entegris, Inc. 401(k) Savings and Profit Sharing Plan, as set forth herein.

1.1.29. **Plan Year** — the twelve (12) consecutive month period ending on any December 31.

1.1.30 **Pre-Tax Elective Contributions** – a Participant's Elective Contributions that are not includible in the Participant's gross income at the time deferred.

1.1.31. **Principal Sponsor** — Entegris, Inc., a Delaware corporation.

1.1.32. **Recognized Compensation** — wages within the meaning of section 3401(a) of the Code for purposes of federal income tax withholding at the source but determined without regard to any rules that limit the remuneration included in wages based on the nature or location of the employment or the services performed (such as the exception for agricultural labor in section 3401(a)(2) of the Code) and paid to the Participant by the Employer for the applicable period; subject, however, to the following:

(a)**Included Items**. In determining a Participant's Recognized Compensation there shall be included amounts contributed or deferred by the Employer on behalf of the Participant that are not includible in gross income under sections 125, 132(f)(4), 402(e)(3), 402(h), 403(b), 414(h)(2) and 457 of the Code including contributions authorized by the Participant under a Retirement Savings Election, a cafeteria plan or any other qualified cash or deferred arrangement under section 401(k) of the Code.

(b)**Excluded Items**. In determining a Participant's Recognized Compensation there shall be excluded all of the following: (i) reimbursements or other expense allowances (including all living and other expenses paid on account of the Participant being on foreign assignment), (ii) welfare and fringe benefits (both cash and noncash) including third-party sick pay (*i.e.,* short-term and long-term disability insurance benefits), income imputed from insurance coverages and premiums, employee discounts and other similar amounts, payments for vacation or sick leave accrued but not taken, final payments on account of termination of employment (*i.e.,* severance payments), except that final payments on account of settlement for accrued but unused paid time off shall be taken into account in determining a Participant's Recognized Compensation, (iii) moving expenses, (iv) deferred compensation (both when deferred and when received), and (v) stock-based compensation of any kind, including, but not limited to, amounts realized from the exercise of a non-qualified stock option or restricted stock held by an employee that becomes freely transferable or is no longer subject to a substantial risk of forfeiture.

(c)**Pre-Participation Employment**. Remuneration paid by the Employer attributable to periods prior to the date the Participant became a Participant in the Plan shall not be taken into account in determining the Participant's Recognized Compensation.

(d)**Non-Recognized Employment**. Remuneration paid by the Employer for employment that is not Recognized Employment shall not be taken into account in determining a Participant's Recognized Compensation.

(e)**Attribution to Periods**. A Participant's Recognized Compensation shall be considered attributable to the period in which it is actually paid and not when earned or accrued.

(f)**Excluded Periods**. Amounts received after the Participant's termination of employment shall not be taken into account in determining a Participant's Recognized Compensation.

(g)**Multiple Employers**. If a Participant is employed by more than one Employer in a Plan Year, a separate amount of Recognized Compensation shall be determined for each Employer.

(h)**Annual Maximum**. A Participant's Recognized Compensation for a Plan Year shall not exceed the annual compensation limit in effect for that Plan Year under section 401(a)(17) of the Code (as adjusted under the Code for cost-of-living increases).

1.1.33. **Recognized Employment** — all service with the Employer by persons classified by the Employer as common law employees, excluding, however, service classified by the Employer as:

(a)employment in a unit of employees whose terms and conditions of employment are subject to a collective bargaining agreement between the Employer and a union representing that unit of employees, unless (and to the extent) such collective bargaining agreement provides for the inclusion of those employees in the Plan,

(b)employment of a nonresident alien who is not receiving any earned income from the Employer which constitutes income from sources within the United States,

(c)employment in a division or facility of the Employer which is not in existence on January 1, 2000 (that is, was acquired, established, founded or produced by the liquidation or similar discontinuation of a separate subsidiary after January 1, 2000) unless and until the Committee shall declare such employment to be Recognized Employment,

(d)services of a person who is not a common law employee of the Employer including, without limiting the generality of the foregoing, services of a Leased Employee, leased owner, leased manager, shared employee, shared Leased Employee, temporary worker, independent contractor, contract worker, agency worker, freelance worker or other similar classification, (e)employment of a Highly Compensated Employee to the extent agreed to in writing by the employee, and

(f)employment as a temporary employee.

Employment of a United States citizen or a United States resident alien outside the United States shall be classified as Recognized Employment. The Employer's classification of a person at the time of inclusion or exclusion in Recognized Employment shall be conclusive for the purpose of the foregoing rules. No reclassification of a person's status with the Employer, for any reason, without regard to whether it is initiated by a court, governmental agency or otherwise and without regard to whether or not the Employer agrees to such reclassification, shall result in the person being included in Recognized Employment, either retroactively or prospectively. Notwithstanding anything to the contrary in this provision, however, the Committee may declare that a reclassified person will be included in Recognized Employment, either retroactively or prospectively. Any uncertainty concerning a person's classification shall be resolved by excluding the person from Recognized Employment.

1.1.34. **Reemployment Commencement Date** — the date upon which an Employee first performs an Hour of Service for the Employer or for an Affiliate following a Period of Severance that is not deemed to be a Period of Service (without regard to whether such Hour of Service is performed in Recognized Employment or otherwise).

1.1.35. **Retirement Savings Election** — the election made by a Participant as provided in Section 2.4.

1.1.36 **Rollover Contribution** – any amount transferred to the Fund by a Participant (or an amount transferred to the Fund on behalf of a Participant in a trust-to-trust transfer from any plan meeting the requirements of section 401(a) of the Code), which is an eligible rollover distribution from (a) an eligible retirement plan that is a tax-qualified retirement plan under section 401(a) of the Code; (b) a plan described in sections 403(a) or 403(b) of the Code; (c) an eligible plan under section 457(b) of the Code which is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state; and (d) an individual retirement account or annuity described in sections 408(a) or 408(b) of the Code. Such Rollover Contributions may include designated Roth contributions (as defined in section 402A of the Code) made to another tax-qualified retirement plan.

1.1.37 **Roth Contributions** — a Participant's Elective Contributions that are not excludible from the Participant's gross income at the time deferred and that have irrevocably been designated as Roth Contributions by the Participant in his Retirement Savings Election.

1.1.38. **Severance from Service Date**— — the earlier of:

(a)the date upon which an employee quits, is discharged or retires from service with the Employer and all Affiliates, or dies; or

(b)the date which is the first anniversary of the first day of a period in which an employee remains continuously absent from service (with or without pay) with the Employer and all Affiliates for any reason other than a quit, a discharge, retirement or death, such as vacation, holiday, sickness, disability, leave of absence (excluding any leave for services in the uniformed services).

1.1.39. **Subfund** — a separate pool of assets of the Fund set aside for investment purposes under Plan Section 4.1.

1.1.40. **Trust Agreement** — the separate document entitled "Trust Agreement between Entegris, Inc. and Fidelity Management Trust Company – Entegris 401(k) Savings and Profit Sharing Plan Trust" entered into by and between the Principal Sponsor and the Trustee effective as of January 2, 2008, as may be amended from time to time.

1.1.41. **Trustee** — the Trustee named in the Trust Agreement and its successor or successors in trust.

1.1.42. **Valuation Date** — the last day of the Plan Year and any date that the New York Stock Exchange is open and conducting business.

1.1.43. **Vested** — nonforfeitable.

1.1.44. **Vesting Service** — a measure of an employee's employment with the Employer and all Affiliates which is equal to the employee's Period of Service; subject, however, to the following rules:

(a)**Period of Service**. Except as provided below, an employee's Vesting Service as of any date shall be equal to the employee's Period of Service determined as of that same date.

(b)**Vesting in Pre-Five Year Severance Accounts**. If an employee has a five (5) year (or longer) Period of Severance, the employee's Employer Profit Sharing Account or Pension Account shall be divided into the portion attributable to Employer contributions allocated with respect to employment before such Period of Severance and the portion attributable to Employer contributions allocated with respect to employment after such Period of Severance and employment after such five (5) year (or longer) Period of Severance shall not be taken into account in computing the Vested percentage in the employee's Employer Profit

Sharing Account or Pension Account attributable to Employer contributions allocated with respect to employment before such five (5) year (or longer) Period of Severance.

(c) **Vesting in Post-Severance Accounts**. If an employee has a Period of Severance and returns thereafter to employment with the Employer or an Affiliate, both employment before and employment after such Period of Severance shall be taken into account in computing the Vested percentage in the employee's Employer Profit Sharing Account attributable to Employer contributions allocated with respect to employment after such Period of Severance.

1.2. **Compliance With Uniformed Services Employment and Reemployment Rights Act of 1994 and Heroes Earnings Assistance and Relief Tax Act of 2008**. Effective for veterans rehired on or after December 12, 1994, and notwithstanding any provision of the Plan to the contrary, contributions, benefits or service credits, if any, will be provided in accordance with section 414(u) of the Code. Further, notwithstanding any provision of the Plan to the contrary, (a) differential pay (as defined in section 3401(h)(2) of the Code) shall be included in compensation that is used to determine benefits, and (b) the death after 2006 of a Participant during qualified military service (as defined in section 414(u)(5) of the Code) will be treated as death while in the employment of the Employer and all Affiliates for purposes of any benefits (other than benefit accruals related to the period of qualified military service) to which the Participant's survivors would have been entitled had the Participant resumed employment and then terminated employment on account of death.

1.3. **Transitional Rules of Interpretation**. An individual shall be considered to have attained a given age on the individual's birthday for that age (and not on the day before). The birthday of any individual born on a February 29 shall be deemed to be February 28 in any year that is not a leap year. Notwithstanding any other provision of the Plan or any election or designation made under the Plan, any individual who feloniously and intentionally kills a Participant or Beneficiary shall be deemed for all purposes of the Plan and all elections and designations made under the Plan to have died before such Participant or Beneficiary. A final judgment of conviction of felonious and intentional killing is conclusive for the purposes of this Section. In the absence of a conviction of felonious and intentional killing, the Committee shall determine whether the killing was felonious and intentional for the purposes of this Section. Whenever appropriate, words used herein in the singular may be read in the plural, or words used herein in the plural may be read in the singular; the masculine may include the feminine and the feminine may include the masculine; and the words "hereof," "herein" or "hereunder" or other similar compounds of the word "here" shall mean and refer to this entire Plan and not to any particular paragraph or Section of the Plan unless the context clearly indicates to the contrary. The titles given to the various Sections of the Plan are inserted for convenience of reference only and are not part of the Plan, and they shall not be considered in determining the purpose, meaning or intent of any provision hereof. Any reference in the Plan to a statute or regulation shall be considered also to mean and refer to any subsequent amendment or replacement of that statute or regulation. This document has been executed and delivered in the State of Massachusetts and has been drawn in conformity to the laws of that State and shall, except to the extent that federal law is controlling, be construed and enforced in accordance with the laws of the State of Massachusetts.

1.4. **Special Rules for Merged Plans**. As of March 1, 2000, the assets of the Empak, Inc. Retirement Savings Plan and the Fluoroware, Inc. 401(k) Savings Plan became part of the assets of this Plan. Effective August 6, 2005, the assets of the Mykrolis Corporation Savings and Investment Plan became part of the assets of this Plan. Effective October 1, 2014, the assets of the ATMI, Inc. 401(k) Profit Sharing Plan became part of the assets of this Plan. Any optional form of distribution or other "section 411(d)(6) protected benefit" (as defined by Treasury Regulations §1.411(d)-4) available as to all or a portion of the transferred assets that is not available under this Plan shall continue to be available but only with respect to the portion of transferred assets to which such protected benefit applies.

SECTION 2

ELIGIBILITY AND PARTICIPATION

2.1. **General Eligibility Rule**. Each employee shall become a Participant on the first day of the calendar month coincident with or next following the date the employee is employed in Recognized Employment. A Participant whose employment with the Employer terminates and who subsequently is reemployed by the Employer shall reenter the Plan as a Participant on the first day of the calendar month coincident with or next following the date of the Participant's return to Recognized Employment.

2.2. **Special Eligibility Rule for Profit Sharing Contributions**. Notwithstanding the general eligibility rule in Section 2.1, with respect to discretionary profit sharing contributions made pursuant to Section 3.4 of the Plan, each employee shall become a Participant on the first day of the calendar month coincident with or next following the date the employee has completed one (1) year of Eligibility Service if the employee is then employed in Recognized Employment. If the employee is not then employed in Recognized Employment, the employee shall become a Participant on the first day of the calendar month coincident with or next following the date the employee enters Recognized Employment. A Participant whose employment with the Employer terminates and who subsequently is reemployed by the Employer shall reenter the Plan as a Participant on the first day of the calendar month coincident with or next following the date of the Participant's return to Recognized Employment.

2.3. **Enrollment**. Each employee who is or will become a Participant as provided in Section 2.1 may enroll for Elective Contributions by providing a Retirement Savings Election to the Committee prior to the Enrollment Date as of which the employee desires to make it effective. If an employee does not enroll when first eligible to do so, the employee may enroll as of any subsequent business day by providing a Retirement Savings Election to the Committee prior to that Enrollment Date.

The Committee shall have the authority to adopt rules that modify and waive the enrollment procedures set forth in this Section 2, to ensure that orderly enrollments might be completed. This authority to modify and waive the enrollment procedures does not authorize the Committee to modify the job classification requirements for participation in the Plan.

2.4. **Retirement Savings Election**.

2.4.1 **Amount.** Subject to the following rules, the Retirement Savings Election of each Participant shall provide for Elective Contributions through a reduction equal to not less than one percent (1%) nor more than seventy percent (70%) of the amount of Recognized Compensation which otherwise would be paid to the Participant by the Employer each payday. Except to the extent permitted under Section 2.4.2 of the Plan, no Participant shall be permitted to have Elective Contributions under this Plan and any other qualified plan of the Employer and Affiliates during any taxable year in excess of $18,000 (for 2017, which amount shall be adjusted for changes in the cost-of-living as provided by the Secretary of the Treasury). The Committee may, from time to time, change the minimum and maximum allowable Elective Contributions. A Participant's Retirement Savings Election shall remain in effect until modified by the Participant in the manner specified by the Committee.

2.4.2 **Catch-Up Contributions**. All Participants who are eligible to make Elective Contributions under this Plan and who have attained age fifty (50) before the close of the Plan Year shall be eligible to make Catch-up Contributions in accordance with this Section 2.4.2.

(a) A Participant's Catch-up Contributions shall not exceed the lesser of (i) $6,000 (for 2017), which amount shall be adjusted pursuant to Section 414(v)(20(B) and (C) of the Code, or (ii) the excess (if any) of the Participant's Recognized Compensation over any other Elective Contributions made for the year which are made without regard to this Section 2.4.

(b) Catch-up Contributions shall not be taken into account for purposes of the dollar limitation set forth under Section 2.4.1 of the Plan and shall not be taken into account for purposes of applying the limitation set forth under Appendix D.

(c) The Plan shall not be treated as failing to satisfy the provisions of the Plan implementing Section 415 of the code and Appendix A to the Plan, or of Appendix B to the Plan by the reason of the making of (or the right to make) Catch-up Contributions.

(d) Catch-up Contributions shall be eligible for Employer matching contributions

2.4.3 **Pre-Tax and After-Tax Roth Election.** Each Participant may elect to designate all or a portion of his Elective Contributions (including any Catch-up Contributions) for the taxable year as Roth Contributions. Any Elective Contributions that are not designated as Roth Contributions shall be deemed to be Pre-Tax Elective Contributions. Elective Contributions contributed to the Plan as one type, either Roth Contributions or Pre-Tax Elective Contributions, may not later be reclassified as the other type.

2.5. **Modifications of Retirement Savings Election**. A Participant may revoke or modify his Retirement Savings Election to decrease or increase the rate of future Elective Contributions effective as of the first day of the first payroll period coinciding with or next following the processing of the revocation or modification pursuant to normal administrative procedures. Once a Retirement Savings Election has been revoked or modified, any subsequent Retirement Savings Election shall be effective as of the first day of the first payroll period coinciding with or next following the processing of the election pursuant to normal administrative procedures, provided that the Participant is employed in Recognized Employment. If a Participant ceases to be employed in Recognized Employment, his Retirement Savings Election shall be terminated automatically as of the date he ceases to be employed in Recognized Employment. If such Participant returns to Recognized Employment, he may provide a new Retirement Savings Election effective as of the date he returns to Recognized Employment or as of the first payday on or after any subsequent Enrollment Date.

SECTION 3

CONTRIBUTIONS AND ALLOCATION THEREOF

3.1. **Employer Contributions**.

3.1.1. **Source of Employer Contributions**. All Employer contributions to the Plan may be made without regard to profits. The Principal Sponsor shall have the sole power and authority to determine Employer contributions except that if the Principal Sponsor so consents, each adopting business entity under Section 9.4 shall be treated as an "Employer" under this Section and, as such, may separately determine the amount of all Employer contributions, and such contributions (and any forfeitures related thereto) shall be allocated only to the accounts of Participants who are employed by that particular Employer.

3.1.2. **Limitation**. The contribution of the Employer to the Plan for any year, when considered in light of its contribution for that year to all other tax-qualified plans it maintains, shall, in no event, exceed the maximum amount deductible by it for federal income tax purposes as a contribution to a tax-qualified profit sharing plan under section 404 of the Code. Each such contribution to the Plan is conditioned upon its deductibility for such purpose.

3.1.3. **Form of Payment**. The appropriate contribution of the Employer to the Plan, determined as herein provided, shall be paid to the Trustee and may be paid either in cash or in other assets of any character of a value equal to the amount of the contribution or in any combination of the foregoing ways.

3.2. **Elective Contributions**.

3.2.1 **Amount**. Within the time required by regulations of the United States Department of Labor, the Employer shall contribute to the Trustee for deposit in the Fund the contributions made on behalf of each Participant under Plan Section 2.4 as elected by each Participant pursuant to a Retirement Savings Election.

3.2.2. **Allocation**. The portion of the contribution made with respect to each Participant that consists of Pre-Tax Elective Contributions (including Catch-up Contributions specified as Pre-Tax Elective Contributions) shall be allocated to the Participant's Retirement Savings Account for the Plan Year with respect to which it is made, and the portion of the contribution made with respect to each Participant that consists of Roth Contributions (as specified by the Participant and including any Catch-up Contributions specified as Roth Contributions) shall be allocated to the Participant's Roth Account. For the purposes of Section 4, all contributions shall be credited as soon as practicable after received by the Trustee.

3.3. **Employer Matching Contributions**.

3.3.1. **Amount and Eligibility**. The Employer shall contribute to the Trustee for deposit in the Fund and for crediting to the Participant's Employer Matching Account an amount which will equal one hundred percent (100%) of the amount of the first three percent (3%) and fifty percent (50%) of the amount of the next two percent (2%) of the Participant's Elective Contributions each pay period. Such Employer matching contributions shall be delivered to the Trustee for deposit in the Fund not later than the time prescribed by federal law (including extensions) for filing the federal income tax return of the Employer for the taxable year in which the Plan Year ends.

3.3.2. **Matching Contributions Determined on an Annual Basis.** If the matching contributions made with respect to any Participant for the Plan Year are less than one hundred percent (100%) of the first three percent (3%) and fifty percent (50%) of the amount of the next two percent (2%) of a Participant's Elective Contributions for such Plan Year, then the Employer shall make an additional matching contribution to the Plan so that the total matching contributions with respect to such Participant for such Plan Year will equal one hundred percent (100%) of the amount of the first three percent (3%) and fifty percent (50%) of the amount of the next two percent (2%) of the Participant's Elective Contributions for such Plan Year.

3.3.3. **Allocation**. The Employer matching contribution which is made with respect to a Participant shall be allocated to that Participant's Employer Matching Account for the Plan Year with respect to which it is made and, for the purposes of Plan Section 4, shall be credited as soon as practicable after it is received by the Trustee.

3.4. **Discretionary Contributions**.

3.4.1. **Amount**. The Employer may (but shall not be required to) make discretionary contributions from year to year during the continuance of the Plan in such amounts as the Employer shall from time to time determine. Such contributions shall be delivered to the Trustee for deposit in the Fund not later than the time prescribed by federal law (including extensions) for filing the federal income tax return of the Employer for the taxable year in which the Plan Year ends.

3.4.2. **Allocation**. The Employer discretionary contribution for a Plan Year shall be allocated to the Employer Profit Sharing Accounts of eligible Participants under Section 3.5. The contribution shall be allocated to the Employer Profit Sharing Accounts of eligible Participants in the ratio which the Recognized Compensation of each such eligible Participant for the Plan Year bears to the Recognized Compensation for such Plan Year of all such eligible Participants. The amount so allocated to an eligible Participant shall be allocated to such Participant's Employer Profit Sharing Account for the Plan Year with respect to which it is made and, for the purposes of Plan Section 4, shall be credited as soon as practicable after it is received by the Trustee.

3.5. **Eligible Participants**. For purposes of Section 3.4, a Participant shall be an eligible Participant for a Plan Year only if such Participant satisfies all of the following requirements in either (a) or (b) below:

(a)the Participant:

(i) is credited with at least one thousand (1,000) Hours of Service for such Plan Year, and

(ii) is on the last day of such Plan Year, an employee of the Employer in Recognized Employment (including for this purpose any Participant who then is on temporary layoff or authorized leave of absence or who, during such Plan Year, was inducted into the Armed Forces of the United States from employment with the Employer); or

(b) the Participant terminates employment with the Employer within the Plan Year by reason of death, retirement at or after the Participant's Normal Retirement Age or Disability.

No other Participant shall be an eligible Participant.

3.6. **Adjustments**.

3.6.1. **Make-Up Contributions for Omitted Participants**-. If, after the Employer's contribution for a Plan Year has been made and allocated, it should appear that, through oversight or a mistake of fact or law, a Participant (or an employee who should have been considered a Participant) who should have been entitled to share in such contribution received no allocation or received an allocation which was less than the Participant should have received, the Committee may, at its election, and in lieu of reallocating such contribution, direct the Employer to make a special make-up contribution (or direct that forfeitures be used) for the Account of such Participant in an amount adequate to provide the same addition to the Participant's Account for such Plan Year as the Participant should have received.

3.6.2. **Mistaken Contributions**. If, after the Employer's contribution for a Plan Year has been made and allocated, it should appear that, through oversight or a mistake of fact or law, a Participant (or an individual who was not a Participant) received an allocation which was more than the Participant or individual should have received, the Committee may direct that the mistaken contribution, adjusted for its pro rata share of any net loss or net gain in the value of the Fund which accrued while such mistaken contribution was held therein, shall be withdrawn from the Account of such individual and retained in the Fund and used to reduce the amount of the next succeeding contribution of the Employer to the Fund due after the determination that such mistaken contribution had occurred.

3.7. **Rollover Contributions**.

3.7.1. **Eligible Contributions**. Each employee in Recognized Employment may contribute a Rollover Contribution to the Plan, in the form and manner as may be prescribed by the Committee and in accordance with those provisions of federal law relating to rollover contributions. The Committee may establish rules and conditions regarding the acceptance of direct rollovers under section 401(a)(31) of the Code from trustees or custodians of other qualified pension, profit sharing or stock bonus plans.

3.7.2. **Allocation**. A Rollover Contribution shall be allocated to the Participant's Rollover Account; provided that to the extent that such Rollover Contribution includes designated Roth contributions (as defined in section 402A of the Code) made to another tax-qualified retirement plan, those amounts shall be allocated to the Participant's Roth Rollover Account. For the purposes of Plan Section 4, contributions allocated to the Participant's Rollover Account and Roth Rollover Account shall be credited as soon as practicable after it is received by the Trustee.

3.8. **Limitation on Annual Additions**. In no event shall amounts be allocated to the Account of any Participant if, or to the extent, such amounts would exceed the limitations set forth in Appendix A to the Plan.

3.9. **Effect of Disallowance of Deduction or Mistake of Fact**. All Employer contributions to the Plan are conditioned on their qualification for deduction for federal income tax purposes under section 404 of the Code. If any such deduction should be disallowed, in whole or in part, for any Employer contribution to the Plan for any year, or if any Employer contribution to the Plan is made by reason of a mistake of fact, then there shall be calculated the excess of the amount contributed over the amount that would have been contributed had there not occurred a mistake in determining the deduction or a mistake of fact. The Principal Sponsor shall direct the Trustee to return such excess, adjusted for its pro rata share of any net loss (but not any net gain) in the value of the Fund which accrued while such excess was held therein, to the Employer within one (1) year of the disallowance of the deduction or the mistaken payment of the contribution, as the case may be. If the return of such amount would cause the balance of any Account of any Participant to be reduced to less than the balance which would have been in such Account had the mistaken amount not been contributed, however, the amount to be returned to the Employer shall be limited so as to avoid such reduction.

SECTION 4

INVESTMENT AND ADJUSTMENT OF ACCOUNTS

4.1. **Establishment of Subfunds**.

4.1.1. **Establishing Commingled Subfunds**. At the direction of the Committee, the Fund may be divided into two (2) or more Subfunds, which shall serve as vehicles for the investment of Participants' Accounts. The Committee shall determine the general investment characteristics and objectives of each Subfund and, with respect to each Subfund, shall either (a) designate that an Investment Manager or the Committee has investment discretion over such Subfund, or (b) designate one or more selected pooled investment vehicles (such as collective funds, group trusts, mutual funds, group annuity contracts and separate accounts under insurance contracts) to constitute such Subfund. The Investment Manager or the Committee, as the case may be, shall have complete investment discretion over each Subfund to which it has been assigned investment discretion, subject only to the general investment characteristics and objectives established for the particular Subfund.

4.1.2. **Individual Subfunds**. The Committee also may (but is not required to) establish additional Subfunds that consist solely of all or a part of the assets of a single Participant's Total Account, which assets the Participant controls by investment directives to the Trustee and which may not be commingled with the assets of any other Participant's Accounts (e.g., a self-directed brokerage account). In no event, however, shall the Participant be allowed to direct the investment of assets in such individual Subfund in any work of art, rug or antique, metal or gem, stamp or coin, alcoholic beverage or other similar tangible personal property if the investment in such property shall have been prohibited by the Secretary of the Treasury. Each Participant, each Beneficiary and each Alternate Payee for whom an individually directed Subfund is maintained shall be responsible for the exercise of any voting or similar rights which exist with respect to assets in such individually directed Subfund. Any Beneficiary of a deceased Participant with an individually directed Subfund shall have the responsibility to direct investments for such Subfund until the Beneficiary changes such direction in accordance with applicable Plan procedures.

4.1.3. **Operational Rules**. The Committee shall adopt rules specifying the circumstances under which a particular Subfund may be elected, or shall be automatically utilized, the minimum or maximum amount or percentage of an Account which may be invested in a particular Subfund, the procedures for making or changing investment elections, the extent (if any) to which Beneficiaries of deceased Participants may make investment elections and the effect of a Participant's or Beneficiary's failure to make an effective election with respect to all or any portion of an Account.

4.1.4. **Revising Subfunds**. The Committee shall have the power, from time to time, to dissolve Subfunds, to consolidate separate Subfunds, to direct that additional Subfunds be established and, under rules, to withdraw or limit participation in a particular Subfund.

4.1.5. **ERISA Section 404(c) Compliance**. The Committee may establish investment Subfunds and operational rules which allow Participants, Beneficiaries and Alternate Payees to manage the investment of all or any portion of those assets attributable to his Total Account. To the extent the Committee establishes such rules:

(a) the Plan is intended to comply with section 404(c) of ERISA and no Plan fiduciary shall be liable for any loss or for any breach resulting from a Participant's Beneficiary's or Alternate Payee's direction of the investment of any part of his Account; and

(b) the Committee shall ensure that Participants, Beneficiaries, and Alternate Payees

(i) have the opportunity to choose from at least three investment alternatives, each of which is diversified, each of which presents materially different risk and return characteristics, and which, in the aggregate, enable Participants, Beneficiaries and Alternate Payees to achieve a portfolio with appropriate risk and return characteristics consistent with minimizing risk through diversification;

(ii) have the opportunity, at least once in any three (3) month period, to give investment instructions as to the investment of contributions made on their behalf among the available investment alternatives (and to receive written confirmation of such instructions); and

(iii)_ are provided or have the opportunity to obtain sufficient information to make informed investment decisions with regard to investment alternatives available under the Plan.

(c)With respect to any Subfund consisting of Employer Securities and intended to satisfy the requirements of section 404(c) of ERISA, (i) Participants, Beneficiaries and Alternate Payees shall be entitled to all voting, tender and other rights appurtenant to the ownership of such securities, (ii) procedures shall be established to ensure the confidential exercise of such rights, except to the extent necessary to comply with federal and state laws not preempted by ERISA, and (iii) the Committee or other fiduciary designated by the Committee shall ensure the sufficiency of and compliance with such confidentiality procedures.

Any investment instruction given by a Participant, Beneficiary, or Alternate Payee pursuant to this section 4.1.5 of the Plan shall be made in accordance with the provisions set forth in the Trust.

4.2. **Valuation and Adjustment of Accounts**.

4.2.1. **Valuation of Fund**. The Trustee shall value the Fund pursuant to the terms of the Trust Agreement.

4.2.2. **Adjustment of Accounts**. The Principal Sponsor shall cause the value of each Account or portion of an Account invested in a particular Subfund (including undistributed Total Accounts) to be increased (or decreased) from time to time for distributions, contributions, investment gains (or losses) and expenses charged to the Account.

4.2.3. **Rules**. The Committee shall establish additional rules for the adjustment of Accounts, including the times when contributions shall be credited under Section 3 for the purposes of allocating gains or losses under this Section 4.

4.3. **Investment in Employer Securities**.

4.3.1. **Entegris Stock Subfund**. In addition to the Subfunds created pursuant to Section 4.1, the Trustee shall also maintain at least one Subfund which shall be invested in Employer Securities and which shall be known as the Entegris Stock Subfund. The initial balance of the Entegris Stock Subfund shall consist of Employer Securities (and such cash, if any) transferred from the Employee Stock Ownership Plan sponsored by Entegris (as a Minnesota corporation, now a Delaware corporation) to an ESOP Account under this Plan on or about August 1, 2005. No portion of a Participant's or Beneficiary's Account other than the ESOP Account may be invested in the Entegris Stock Subfund. The primary purpose of the Entegris Stock Subfund is to benefit Participants and Beneficiaries by retaining for them, individually and collectively, a position of equity ownership in the Principal Sponsor and not by producing retirement income or investment gains. The Trustee shall not be permitted to borrow or use the proceeds of any exempt loan (as defined in section 54.4975-7 of the Treasury Regulations) for the purpose of acquiring Employer Securities to be held in the Entegris Stock Subfund.

4.3.2. **Dividends**. Cash dividends, if any, paid on Employer Securities in the Entegris Stock Subfund shall be paid to Participants in proportion to their Entegris Stock Subfund balances on the applicable record date. Cash dividends paid on Employer Securities may not be reinvested in Employer Securities. Distributions of dividend payments shall not be considered distributions under Section 7 or Appendix F.

4.3.3. **Diversification Election**. Each Participant and Beneficiary will be permitted to sell shares of the Entegris Stock Subfund at any time, in accordance with operational rules established by the Committee (which shall comply with Section 4.1.5(c)) and reinvest all or a portion of the ESOP Account in the other Subfunds established under Section 4.1. That portion of a Participant's ESOP Account which is transferred from the Entegris Stock Subfund to another Subfund cannot be reinvested in the Entegris Stock Subfund. All diversification elections authorized pursuant to this Section 4.3.3 shall be made in accordance with such rules established by the Committee regarding the form of such election, the manner of filing such election (including telephonic, electronic or similar methods) and the information required to be furnished in connection with such election. Notwithstanding the foregoing, in no event shall this Section 4.3.3 be applied to prevent a Participant who has attained age 55 and has, cumulatively, at least 10 years of participation in the Plan and the Entegris, Inc. Employee Stock Ownership Plan, from directing the Plan to transfer investment in the Entegris Stock Subfund into any of at least three (3) investment Subfunds offered by the Plan in accordance with section 401(a)(28)(B) of the Code.

4.3.4. **Voting of Employer Securities; Tender Offers for Employer Securities**. All voting and tender rights with respect to Employer Securities shall be governed by the Trust Agreement.

SECTION 5

VESTING

5.1. **Employer Profit Sharing Account and Pension Account**.

5.1.1. **Graduated Vesting**. Except as hereinafter provided, the Vested portion of each Participant's Employer Profit Sharing Account and Pension Account shall be determined in accordance with the following schedule:

When the Participant Has Completed the Following Years of Vesting Service:	The Vested Portion of the Participant's Employer Profit Sharing Account and Pension Account Will Be:
Less than 2 years	0%
2 years but less than 3 years	25%
3 years but less than 4 years	50%
4 years but less than 5 years	75%
5 years or more	100%

Notwithstanding the foregoing, a Participant who performs at least one Hour of Service on or after January 1, 2014, shall be fully (100%) vested in his Employer Profit Sharing Account and Pension Account.

5.1.2. **Full Vesting**. Notwithstanding any of the foregoing provisions for vesting of Employer Profit Sharing Accounts and Pension Accounts, the entire Employer Profit Sharing Account and Pension Account of each Participant shall become fully (100%) vested upon the earliest occurrence of any of the following events while in the employment of the Employer or an Affiliate:

(a)the Participant's death,

(b)the Participant's attainment of Normal Retirement Age,

(c)the Participant's Disability,

(d)a partial termination of the Plan which is effective as to the Participant, or

(e)a complete termination of the Plan or a complete discontinuance of Employer contributions hereto.

5.1.3. **Full Vesting Upon Plan Termination Before Forfeiture Event**. If a Participant is not in the employment of the Employer or an Affiliate upon a complete termination of the Plan or a complete discontinuance of Employer contributions hereto, then the Participant's Employer Profit Sharing Account and Pension Account shall become fully (100%) vested if, on the date of such termination or discontinuance, such Participant has not had a "forfeiture event" as described in Section 6.2.1 of the Plan.

5.1.4. **Special Rule for Partial Distributions**. If a distribution is made of less than the entire Employer Profit Sharing Account or Pension Account of a Participant who is not then fully (100%) vested, then until the Participant's Employer Profit Sharing Account or Pension Account becomes fully (100%) vested or until the Participant incurs five (5) or more consecutive One-Year Breaks in Service, whichever first occurs, (i) a separate account shall be established for the portion of the Employer Profit Sharing Account or Pension Account not so distributed and (ii) the Participant's Vested interest in such account at any relevant time shall not be less than an amount ("X") determined by the formula: $X = P(B + (R \times D)) - (R \times D)$. For the purpose of applying the formula, "P" is the Vested percentage at the relevant time (determined pursuant to Section 5); "B" is the separate account balance at the relevant time; "D" is the amount of the distribution; and "R" is the ratio of the separate account balance at the relevant time to the Employer Profit Sharing Account or Pension Account balance immediately after distribution.

5.1.5. **Effect of Break on Vesting**. If a Participant who is not fully (100%) vested incurs a Period of Severance of five (5) years, returns to Recognized Employment and is thereafter eligible for any additional allocation of Employer contributions, the Participant's undistributed Employer Profit Sharing Account or Pension Account, if any, attributable to Employer contributions allocated as of a date before such Period of Severance of five (5) years and the Participant's new Employer Profit Sharing Account attributable to Employer contributions allocated as of a date after such Period of Severance of five (5) years shall be separately maintained for vesting purposes until the Participant is fully (100%) Vested.

5.2. **Other Accounts**. Each Participant's Retirement Savings Account, Roth Account, Employer Matching Account, ESOP Account, QNEC Account, Rollover Account, Roth Rollover Account, and After-Tax Account shall be fully (100%) vested at all times.

SECTION 6

MATURITY

6.1. **Events of Maturity**. A Participant's Vested Total Account shall mature and shall become distributable in accordance with Section 7 upon the earliest occurrence of any of the following events while in the employment of the Employer or an Affiliate:

(a)the Participant's death,

(b)the Participant's severance from employment, whether voluntary or involuntary,

(c)the attainment of age seventy and one-half (70½) years by a Participant who is a five percent (5%) owner (as defined in Appendix B) at any time during the year in which the Participant attained age seventy and one-half (70½) years and the crediting of any amounts to such a Participant's Account after such time, or

(d)the Participant's Disability;

provided, however, that a transfer from Recognized Employment to employment with the Employer that is other than Recognized Employment or a transfer from the employment of one Employer participating in the Plan to another such Employer or to any Affiliate shall not constitute an Event of Maturity.

6.2. **Forfeitures**.

6.2.1. **Forfeiture of Nonvested Portion of Accounts**. Following the occurrence of a Participant's Event of Maturity, the non-Vested portion of the Participant's Employer Profit Sharing Account or Pension Account, if any, shall be forfeited as soon as administratively practicable on or after the Participant's forfeiture event. A forfeiture event shall occur with respect to a Participant upon the earliest of:

(a)a Period of Severance of five (5) years,

(b)the distribution after an Event of Maturity to (or with respect to) a Participant of the entire Vested portion of the Total Account of the Participant,

(c)the death of the Participant at a time and under circumstances which do not entitle the Participant to be fully (100%) Vested in the Participant's Total Account, or

(d)the Event of Maturity of a Participant who has no Vested interest in the Participant's Total Account.

6.2.2. **Restoration Upon Rehire After Forfeiture**. If the Participant returns to Recognized Employment with the Employer or an Affiliate after the non-Vested portion of the Participant's Employer Profit Sharing Account or Pension Account has been forfeited and before the Participant has incurred a Period of Severance of five (5) years, the amount so forfeited shall be restored to the Participant's Employer Profit Sharing Account or Pension Account as of the Valuation Date coincident with or next following the date the Participant returns (without adjustment for gains or losses after such forfeiture).

6.2.3. **Use of Forfeitures**. Forfeitures shall be used to reduce Employer contributions and, to the extent remaining, to pay Plan expenses. Forfeitures shall not be used to increase benefits; provided, that any forfeitures remaining at the termination of the Plan shall be considered to be a discretionary contribution and shall be allocated pursuant to Section 3.4.

6.2.4. **Source of Restoration**. The amount necessary to make the restoration required under Section 6.2.2 shall come first from the forfeitures of Participants. If such forfeitures are not adequate for this purpose, the rehiring Employer shall make a contribution adequate to make the restoration (in addition to any contributions made under Section 3).

SECTION 7

DISTRIBUTIONS AND LOANS

7.1. **Distributions to Participants Upon Event of Maturity**.

7.1.1. **Application For Distribution Required**. No distribution shall be made from the Plan until the Committee has received an application for distribution from the Participant entitled to receive distribution. The Committee may prescribe rules regarding the form of such application, the method of filing such application (including telephonic, electronic or similar methods) and the information required to be furnished in connection with such application.

(a)**Exception for Small Amounts**. If a Participant whose Vested Total Account does not exceed One Thousand Dollars ($1,000) incurs an Event of Maturity, then such Vested Total Account shall be distributed automatically in a single lump sum as soon as administratively practicable following such Event of Maturity without an application for distribution. A Participant who has no Vested interest in the Participant's Total Account as of the Participant's Event of Maturity shall be deemed to have received an immediate distribution of the Participant's entire interest in the Plan as of such Event of Maturity.

(b)**Exception for Required Minimum Distributions**. Any Vested Total Account for which no application has been timely received on or before the required beginning date effective as to a Participant under Section 7.1.5 or Section 7.1.6, shall be distributed in accordance with Section 7.7 of the Plan without an application for distribution.

7.1.2. **Spousal Consent Not Required**. The consent of a Participant's spouse shall not be required to make distributions from the Plan (except for distributions from the Pension Account as set forth in Appendix E to the Plan).

7.1.3. **Form of Distribution**. The only form of distribution available under this Plan is a lump sum payment (except required minimum distributions made pursuant to Sections 7.1.1(b) and 7.7 of the Plan and distributions from the Pension Account as set forth in Appendix E to the Plan).

7.1.4. **Time of Distribution**. Upon the receipt of a proper application from the Participant requesting distribution after an Event of Maturity, and after the right of the Participant to receive a distribution has been established, the Committee shall cause the Trustee to determine the value of the Participant's Vested Total Account and to make distribution of such Vested Total Account in a single lump sum as soon as administratively practicable after the Participant requests a distribution. No distribution, however, shall be made as of a Valuation Date preceding the date the Participant's application is received by the Committee.

7.1.5. **Required Beginning Date for Non-Five Percent (5%) Owners** -. Notwithstanding the foregoing, distribution to the Participant shall be made not later than the required beginning date, which is the later of (i) the April 1 following the calendar year in which the Participant attains age seventy and one-half (70½) years, or (ii) the April 1 following the calendar year in which the Participant terminates employment.

7.1.6. **Required Beginning Date for Five Percent (5%) Owners**. Notwithstanding any other provision of the Plan, if the Participant is a five percent (5%) owner (as defined in Appendix B) at any time during the Plan Year in which such Participant attains age seventy and one-half (70½) years, distribution shall not be made later than the April 1 following the calendar year in which the Participant attains age seventy and one-half (70½) years.

7.1.7. **Effect of Reemployment**. If a Participant is reemployed by the Employer or an Affiliate before the Participant attains Normal Retirement Age and before distribution is completed, the Participant's Vested Total Account shall continue to be held in the Fund until the Participant incurs another Event of Maturity after the Participant's reemployment. It is the general intent of this Plan that no distributions shall be made before the Normal Retirement Age of a Participant while the Participant is employed by the Employer or an Affiliate.

7.1.8. **Death Prior to Distribution**. If a Participant dies after the Participant's Event of Maturity but before distribution of the Participant's Vested Total Account has been completed, the undistributed Vested Total Account shall be distributed to the Participant's Beneficiary as provided in Section 7.3 and Appendix E to the Plan.

7.2. **In-Service Distributions and Hardship Distributions** -.

7.2.1. **Age 59½ Distributions**. A Participant may receive a distribution while employed from the vested portion of the Accounts listed in (b) below if the Participant has attained age fifty-nine and one-half (59½) years. To receive such a distribution, the Participant must apply to the Committee. In the application, the Participant shall specify the dollar amount to be distributed. Such distribution shall be approved by the Committee and such distribution shall be made in a lump sum cash payment as soon as administratively practicable following the approval of the application by the Committee.

(a)**Spousal Consent Not Required**. Spousal consent shall not be required to make an age 59½ distribution to a married Participant.

(b)**Accounting for Age 59½ Distributions**. In the application, the Participant shall specify the extent to which the age 59½ distribution is to be made from his Roth Account. Except to the extent the Participant has specified that the age 59½ distribution is to be made from the Participant's Roth Account, any such distribution shall be taken pro rata from the following Accounts of the Participant:

Rollover Account
Employer Matching Account
Employer Profit Sharing Account
Retirement Savings Account
QNEC Account.

(c)**Coordination with Section 4.1**. If a distribution is made from an Account which is invested in more than one (1) Subfund authorized and established under Section 4.1, the amount distributed shall be charged to each Subfund in the same proportions as the Account is invested in each Subfund.

7.2.2. **Hardship Distributions**. A Participant may receive a hardship distribution while employed from the Accounts listed in (e) below if the Committee determines that such hardship distribution is for one of the purposes described in (a) below and the conditions in (b) and (d) below have been fulfilled. To receive such a distribution, the Participant must apply to the Committee. In the application, the Participant shall specify the dollar amount to be distributed. Such hardship distribution shall be approved by the Committee and such hardship distribution shall be made in a lump sum cash payment as soon as administratively practicable following the approval of the application by the Committee.

(a)**Purposes**. Hardship distributions shall be allowed under Section 7.2.2 of the Plan only if the Participant establishes that the hardship distribution is to be made for one of the following purposes:

(i)expenses for (or necessary to obtain) medical care for the Participant, the Participant's spouse or any dependents of the Participant (as defined in section 152 of the Code and without regard to sections 152(b)(1), 152(b)(2) and 152(d)(1)(B) of the Code) that would be deductible under section 213(d) of the Code (determined without regard to whether the expenses exceed seven and one-half (7.5%) of adjusted gross income),

(ii)costs directly related to the purchase of a principal residence for the Participant (excluding mortgage payments),

(iii)payment of tuition, room and board and related educational fees for the next twelve (12) months of post-secondary education for the Participant, or the Participant's spouse, children or dependents (as defined in section 152 of the Code and without regard to sections 152(b)(1), 152(b)(2) and 152(d)(1)(B) of the Code),

(iv) payments necessary to prevent the eviction of the Participant from the Participant's principal residence or foreclosure on the mortgage of that principal residence;

(v) payments for burial or funeral expenses of the Participant's deceased parent, spouse, children or dependents (as defined in section 152 of the Code and without regard to section 152(d)(1)(B) of the Code), or

(vi) expenses for the repair of damage to the Participant's principal residence that would qualify for the casualty deduction under section 165 of the Code (determined without regard to whether the loss exceeds ten percent (10%) of adjusted gross income).

Such purposes shall be considered to be an immediate and heavy financial need of the Participant.

(b) **Limitations**. In no event shall the cumulative amount of hardship distributions withdrawn exceed the amount of contributions to a Participant's Retirement Savings Account or Roth Account made pursuant to Section 3.2 (*i.e.*, hardship distributions shall not include any earnings on such contributions or any qualified nonelective contributions (as defined under section 401(m)(4)(C)) or earnings on such qualified nonelective contributions). The amount of the hardship distribution shall not exceed the amount of the Participant's immediate and heavy financial need; provided, however, that the amount of the immediate and heavy financial need may include amounts necessary to pay any federal, state, or local income taxes or penalties reasonably anticipated to result from the distribution. In addition, a hardship distribution which includes a portion of the Participant's Retirement Savings Account or Roth Account shall not be allowed unless the Participant has obtained all distributions, including distribution of ESOP dividends under section 404(k) of the Code but not including other hardship distributions, and all nontaxable loans (at the time of the loan) currently available under all plans maintained by the Employer and Affiliates. Other funds are not currently available unless the funds are available prior to or coincidently with the date the hardship distribution is available.

(c) **Spousal Consent Not Required**. Spousal consent shall not be required to make a hardship distribution to a married Participant.

(d) **Coordination with Other Plans**. The Participant's Retirement Savings Election and elective contributions and employee contributions under all other plans maintained by the Employer and Affiliates shall be canceled for six (6) months after receipt of a hardship distribution. Following the completion of that six (6) month period the Participant's Retirement Savings Election shall be automatically reinstated, provided the Participant is in Recognized Employment on that date. For the purposes of this Section 7.2.2(d), all other plans maintained by the Employer and Affiliates shall mean all qualified and nonqualified plans of deferred compensation maintained by the Employer and Affiliates (including stock option, stock purchase or similar plans).

(e) **Sequence of Accounts**. Each hardship distribution made pursuant to this Section 7.2.2 shall first be taken from and charged to the Participant's Accounts in the following sequence:

Retirement Savings Account
Roth Account.

(f) **Coordination with Section 4.1**. If the hardship distribution is made from a Retirement Savings Account or a Roth Account which is invested in more than one (1) Subfund authorized and established under Section 4.1, the amount withdrawn shall be charged to each Subfund in the same proportions as the Retirement Savings Account is invested in each Subfund.

7.2.3. **General In-Service Withdrawals-**. A Participant who is an employee may receive an in-service withdrawal from time to time from the Accounts listed in Section 7.2.3(b) of the Plan. To receive such a distribution, the Participant must apply to the Committee. In the application, the Participant shall specify the dollar amount to be distributed. Such distribution shall be approved by the Committee and such distribution shall be made in a lump sum cash payment as soon as administratively practicable following the approval of the application by the Committee.

(a) **Limitations**. The following rules and limitations shall apply to in-service withdrawals. No in-service withdrawal shall be made from any portion of a Participant's Total Account that is invested in a self-managed brokerage Subfund authorized and established under Section 4.1 of the Plan. No in-service withdrawal shall be made from any portion of a Participant's Total Account that consists of the unpaid balance of any outstanding loans of the Participant under Section 7 of the Plan.

(b)**Accounting for In-Service Distributions**. In the application, the Participant shall specify the extent to which the in-service distribution is to be made from the Participant's After-Tax Account. Except to the extent the Participant has specified that the in-service distribution is to be made from the Participant's After-Tax Account, any such distribution shall first be taken from and charged to the Participant's Accounts in the following sequence:

Rollover Account
Roth Rollover Account.

Any general in-service distribution shall be deemed to have been taken from a combination of (i) the Participant's after-tax contributions to the After-Tax Account, to the extent of the aggregate amount thereof not previously withdrawn, and (ii) the earnings in the After-Tax Account and all contributions and all earnings in all other Accounts. The portion of each such in-service withdrawal that is deemed to be earnings will be in the same ratio as the earnings in the After-Tax Account and all contributions and all earnings in all other Accounts bear to the Total Account.

(c)**Investment in More Than One Subfund**. If an in-service withdrawal is made from an Account which is invested in more than one (1) Subfund, the amount withdrawn shall be charged to each Subfund in the same proportions as the Account (minus any portion of the Account invested in a self-managed brokerage Subfund) is invested in each Subfund.

7.2.4.**Withdrawals During Military Leave**

(a)**30-Day Leave Withdrawal**. A Participant who is on active military duty (as defined under Code Section 3401(h)(2)(A)) for more than thirty (30) days ("Military Leave Participant") shall be eligible to elect to receive a distribution of all or a portion of his Retirement Savings Account, QNEC Account, Employer Matching Account, and Roth Account (in that order) pursuant to this Section 7.2.4.(a). In the event of an election by the Military Leave Participant under this section 7.2.4.(a), the Trustee shall, upon direction of the Plan Administrator, distribute all or a portion of such Participant's Retirement Savings Account, QNEC Account, Employer Matching Account, and Roth Account (in that order) during such leave. However, a Military Leave Participant who elects to receive a distribution under this Section 7.2.4.(a) shall be prohibited from making Elective Contributions to the Plan for the six (6) month period beginning on the date of the distribution. A distribution pursuant to this Section 7.2.4.(a) shall be made from the above-referenced accounts in the order listed.

(b)**Qualified Reservist Distribution**. A Participant who, by reason of being a member of a reserve component (as defined in Section 101 of Title 37 of the U.S. Code), is ordered or called to active duty for a period in excess of 179 days or for an indefinite period may request a distribution of all or a portion of his Retirement Savings Account and his Roth Account; provided that such distribution is made during the period that begins on the date of such order, and ends at the close of the active military duty period. A distribution pursuant to this Section 7.2.4.(b) shall be made first from the Participant's Retirement Savings Account, and then from his Roth Account.

7.3. **Distributions to Beneficiary**.

7.3.1. **Application For Distribution Required**. No distribution shall be made from the Plan until the Committee has received an application for distribution from the Beneficiary of a Participant entitled to receive distribution. The Committee may prescribe rules regarding the form of such application, the method of filing such application (including telephonic, electronic or similar methods) and the information required to be furnished in connection with such application.

(a)**Exception for Small Amounts**. Upon the death of a Participant whose Vested Total Account does not exceed One Thousand Dollars ($1,000), such Participant's Vested Total Account shall be distributed to the Beneficiary in a single lump sum as soon as administratively practicable following such Participant's death without an application for distribution.

(b)**Exception for Required Minimum Distributions**. Any Vested Total Account for which no application has been timely received on or before the required beginning date effective as to a Beneficiary under Section 7.3.4, shall be distributed in accordance with Section 7.7 of the Plan without an application for distribution.

7.3.2. **Form of Distribution**. The only form of distribution available under this Plan is a lump sum payment (except for required minimum distributions made pursuant to Section 7.3.1(b) and Section 7.7 of the Plan).

7.3.3. **Time of Distribution**. Upon the receipt of a proper application for distribution from the Beneficiary after the Participant's death, and after the right of the Beneficiary to receive a distribution has been established, the Committee shall cause the Trustee to determine the value of the Participant's Vested Total Account and to make distribution of such Vested Total Account in a single lump sum as soon as administratively practicable after the Beneficiary requests a distribution. No distribution, however, shall be made as of a Valuation Date preceding the date the Beneficiary's application is received by the Committee.

7.3.4. **Required Beginning Date**. Notwithstanding any other provision of the Plan, distribution to the Beneficiary of a Participant shall be made in accordance with Section 7.7 of the Plan.

7.4. **Designation of Beneficiaries**.

7.4.1. **Right To Designate**. Each Participant may designate, upon forms to be furnished by and filed with the Committee, one or more primary Beneficiaries or alternative Beneficiaries to receive all or a specified part of the Participant's Vested Total Account in the event of the Participant's death. The Participant may change or revoke any such designation from time to time without notice to or consent from any Beneficiary or spouse. No such designation, change or revocation shall be effective unless executed by the Participant and received by the Committee during the Participant's lifetime.

7.4.2. **Spousal Consent**. Notwithstanding the foregoing, a designation will not be valid for the purpose of paying benefits from the Plan to anyone other than a surviving spouse of the Participant (if there is a surviving spouse) unless that surviving spouse consents in writing to the designation of another person as Beneficiary. To be valid, the consent of such spouse must be in writing, must acknowledge the effect of the designation of the Beneficiary and must be witnessed by a notary public. The consent of the spouse must be to the designation of a specific named Beneficiary which may not be changed without further spousal consent, or alternatively, the consent of the spouse must expressly permit the Participant to make and to change the designation of Beneficiaries without any requirement of further spousal consent. The consent of the spouse to a Beneficiary is a waiver of the spouse's rights to death benefits under the Plan. The consent of the surviving spouse need not be given at the time the designation is made. The consent of the surviving spouse need not be given before the death of the Participant. The consent of the surviving spouse will be required, however, before benefits can be paid to any person other than the surviving spouse. The consent of a spouse shall be irrevocable and shall be effective only with respect to that spouse.

7.4.3. **Failure of Designation**. If a Participant:

(a)fails to designate a Beneficiary,

(b)designates a Beneficiary and thereafter such designation is revoked without another Beneficiary being named, or

(c)designates one or more Beneficiaries and all such Beneficiaries so designated fail to survive the Participant,

such Participant's Vested Total Account, or the part thereof as to which such Participant's designation fails, as the case may be, shall be payable to the first class of the following classes of automatic Beneficiaries with a member surviving the Participant and (except in the case of the Participant's surviving issue) in equal shares if there is more than one member in such class surviving the Participant:

Participant's surviving spouse
Participant's surviving issue per stirpes and not per capita
Participant's surviving parents
Participant's surviving brothers and sisters
Representative of Participant's estate.

7.4.4. **Disclaimers by Beneficiaries**. A Beneficiary entitled to a distribution of all or a portion of a deceased Participant's Vested Total Account may disclaim his or her interest therein subject to the following requirements. To be eligible to disclaim, a Beneficiary must be a natural person, must not have received a distribution of all or any portion of a Vested Total Account at the time such disclaimer is executed and delivered, and must have attained at least age twenty-one (21) years as of the date of the Participant's death. Any disclaimer must be in writing and must be executed personally by the Beneficiary before a notary public. A disclaimer shall state that the Beneficiary's entire interest in the undistributed Vested Total Account is disclaimed or shall specify what portion thereof is disclaimed. To be effective, duplicate original executed copies of the disclaimer must be both executed and actually delivered to both the Committee and to the Trustee after the date of the Participant's death but not later than nine (9) months after the date of the Participant's death. A disclaimer shall be irrevocable when delivered to both the Committee and the Trustee. A disclaimer shall be considered to be delivered to the Committee or the Trustee only when actually received by the Committee or the Trustee (and in the case of a corporate Trustee, shall be considered to be delivered only when actually received by a trust officer familiar with the affairs of the Plan). The Committee (and not the Trustee) shall be the sole judge of the content, interpretation and validity of a purported disclaimer. Upon the filing of a valid disclaimer, the Beneficiary shall be considered not to have survived the Participant as to the interest disclaimed. A disclaimer by a Beneficiary shall not be considered to be a transfer of an interest in violation of the provisions of Section 8 of the Plan and shall not be considered to be an assignment or alienation of benefits in violation of federal law prohibiting the assignment or alienation of benefits under this Plan. No other form of attempted disclaimer shall be recognized by either the Committee or the Trustee.

7.4.5. **Definitions**. When used herein and, unless the Participant has otherwise specified in the Participant's Beneficiary designation, when used in a Beneficiary designation, "issue" means all persons who are lineal descendants of the person whose issue are referred to, subject to the following:

(a)a legally adopted child and the adopted child's lineal descendants always shall be lineal descendants of each adoptive parent (and of each adoptive parent's lineal ancestors);

(b)a legally adopted child and the adopted child's lineal descendants never shall be lineal descendants of any former parent whose parental rights were terminated by the adoption (or of that former parent's lineal ancestors); except that if, after a child's parent has died, the child is legally adopted by a stepparent who is the spouse of the child's surviving parent, the child and the child's lineal descendants shall remain lineal descendants of the deceased parent (and the deceased parent's lineal ancestors);

(c)if the person (or a lineal descendant of the person) whose issue are referred to is the parent of a child (or is treated as such under applicable law) but never received the child into that parent's home and never openly held out the child as that parent's child (unless doing so was precluded solely by death), then neither the child nor the child's lineal descendants shall be issue of the person.

"Child" means an issue of the first generation; "per stirpes" means in equal shares among living children of the person whose issue are referred to and the issue (taken collectively) of each deceased child of such person, with such issue taking by right of representation of such deceased child; and "survive" and "surviving" mean living after the death of the Participant.

7.4.6. **Special Rules**. Unless the Participant has otherwise specified in the Participant's Beneficiary designation, the following rules shall apply:

(a)If there is not sufficient evidence that a Beneficiary was living at the time of the death of the Participant, it shall be deemed that the Beneficiary was not living at the time of the death of the Participant.

(b)The automatic Beneficiaries specified in Section 7.4.3 and the Beneficiaries designated by the Participant shall become fixed at the time of the Participant's death so that, if a Beneficiary survives the Participant but dies before the receipt of all payments due such Beneficiary hereunder, such remaining payments shall be payable to the representative of such Beneficiary's estate.

(c)If the Participant designates as a Beneficiary the person who is the Participant's spouse on the date of the designation, either by name or by relationship, or both, the dissolution, annulment or other legal termination of the marriage between the Participant and such person shall automatically revoke such designation. (The foregoing shall not prevent the Participant from designating a former spouse as a Beneficiary on a form executed by the Participant and received by the Committee after the date of the legal termination of the marriage between the Participant and such former spouse, and during the Participant's lifetime.)

(d)Any designation of a nonspouse Beneficiary by name that is accompanied by a description of relationship to the Participant shall be given effect without regard to whether the relationship to the Participant exists either then or at the Participant's death.

(e)Any designation of a Beneficiary only by statement of relationship to the Participant shall be effective only to designate the person or persons standing in such relationship to the Participant at the Participant's death.

A Beneficiary designation is permanently void if it either is executed or is filed by a Participant who, at the time of such execution or filing, is then a minor under the law of the state of the Participant's legal residence. The Committee (and not the Trustee) shall be the sole judge of the content, interpretation and validity of a purported Beneficiary designation.

7.5. **General Distribution Rules**.

7.5.1. **Notices**. The Committee will issue such notices as may be required under sections 402(f), 411(a)(11) and other sections of the Code in connection with distributions from the Plan. For all notices given in Plan Years beginning on or after January 1, 2007, such notification shall also include a description of the consequences of failing to defer receipt of a distribution. No distribution will be made unless it is consistent with such notice requirements. Generally, distributions may not commence as of a date that is more than ninety (90) days or less than thirty (30) days after such notices are given to the Participant. Distribution may commence less than thirty (30) days after the notice required under section 1.411(a)-11(c) of the income tax regulations or the notice required under section 1.402(f)-1 of the income tax regulations is given, provided however, that:

(a)the Committee clearly informs the distributee that the distributee has a right to a period of at least thirty (30) days after receiving such notices to consider whether or not to elect distribution;

(b)the distributee, after receiving the notice, affirmatively elects a distribution; and

(c)the distributee may revoke an affirmative distribution election by notifying the Committee of such revocation prior to the date as of which such distribution is to be made.

7.5.2. **Direct Rollover**. A distributee who is eligible to elect a direct rollover may elect, at the time and in the manner prescribed by the Committee, to have all or any portion of an eligible rollover distribution paid directly to an eligible retirement plan specified by the distributee in a direct rollover. A distributee who is eligible to elect a direct rollover includes a Participant, a Beneficiary, and a Participant's spouse or former spouse who is the Alternate Payee under a qualified domestic relations order.

(a)**Eligible rollover distribution** means any distribution of all or any portion of a Vested Total Account to a distributee who is eligible to elect a direct rollover except (i) any distribution that is one of a series of substantially equal installments payable monthly, quarterly or annually over a period of time not extending beyond the remaining life expectancy of such distributee or pursuant to the applicable table under section 1.401(a)(9)-9 of the income tax regulations, and (ii) any distribution that is one of a series of substantially equal installments payable not less frequently than annually over a specified period of ten (10) years or more, and (iii) any distribution to the extent of such distribution is required under section 401(a)(9) of the Code, and (iv) any hardship distribution, and (v) the portion of any distribution that is not includible in gross income (determined without regard to the exclusion for net unrealized appreciation with respect to employer securities).

(b)**Eligible retirement plan** means (i) an individual retirement account described in section 408(a) of the Code, or (ii) an individual retirement annuity described in section 408(b) of the Code, or (iii) a plan described in section 403(a) or section 403(b) of the Code, or (iv) a qualified trust described in section 401(a) of the Code that accepts the eligible rollover distribution, or (v) eligible plan under section 457(b) of the Code which is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state and which agrees to separately account for amounts transferred into such plan from this Plan. The definition of eligible retirement plan shall also apply in the case of a distribution to a Beneficiary who is the surviving spouse of a Participant or to a spouse or former spouse who is an Alternate Payee.

(c)**Direct rollover** means the payment of an eligible rollover distribution by the Plan to the eligible retirement plan specified by the distributee who is eligible to elect a direct rollover.

(d)**After-Tax Contributions and Roth Contributions**. To the extent a distribution consists in part of after-tax employee contributions which are not includible in gross income, such portion may be transferred only to an individual retirement account or annuity described in section 408(a) or 408(b) of the Code, or to a qualified trust described in section 401(a) of the Code or to an annuity contract described in section 403(b) of the Code, if such trust or contract provides for separate accounting for the portion of such distribution which is includible in gross income and the portion of such distribution which is not so includible. To the extent a distribution consists of Roth Contributions, such portion may be transferred only to a Roth IRA described in section 408A of the Code, or to another designated Roth account described in section 402A of the Code that agrees to separately account for amounts so transferred, including separately accounting for the portion of such distribution which is includible in gross income and the portion of such distribution which is not so includible.

(e)**Special Rule For Nonspouse Beneficiaries**. A distributee who is a Beneficiary and who is not the surviving spouse of a Participant or an alternate payee may elect, at the time and the manner prescribed by the Committee, to have all or any portion of such distributee's benefit paid directly in a trustee-to-trustee transfer to an individual retirement account or annuity described in sections 408(a) or (b) of the Code, which is treated as an inherited individual retirement account or annuity within the meaning of section 408(d)(3)(C) of the Code. Any distribution to a nonspouse Beneficiary which is payable prior to January 1, 2010, shall not be subject to the direct rollover requirements of section 401(a)(31) of the Code and the notice requirements of section 402(f) of the Code. Any distribution to a nonspouse Beneficiary which is payable on or after January 1, 2010, shall be subject to the direct rollover requirements of section 401(a)(31) of the Code and the notice requirements of section 402(f) of the Code.

(f)**Qualified Rollover Contribution to Roth IRA**. A distributee may elect to have all or a portion of an eligible rollover distribution rolled over to a Roth IRA described in section 408A of the Code.

7.5.3. **Distribution in Cash**. Except as provided in Appendix F, distribution of a Participant's Vested Total Account shall be made in cash. If, however, the Vested Total Account:

(a) consists in whole or in part of a Participant's unpaid promissory note and the distributee elects distribution in kind pursuant to a direct rollover to another tax-qualified plan; or

(b) is in whole or in part invested in investments for which the distributee elects distribution in kind pursuant to a direct rollover to another tax-qualified plan (to the extent that no administrative issues prevent such request from being accommodated), or

(c) is in whole or in part invested in an individual Subfund under Section 4.1.2 and the distributee elects distribution in kind (to the extent the investment provides for in-kind distributions),

the Trustee shall cause distribution of that portion of the Vested Total Account to be made in kind.

7.5.4. **Facility of Payment**. In case of the legal disability, including minority, of a Participant, Beneficiary or Alternate Payee entitled to receive any distribution under the Plan, payment shall be made, if the Committee shall be advised of the existence of such condition:

(a) to the duly appointed guardian, conservator or other legal representative of such Participant, Beneficiary or Alternate Payee, or

(b) to a person or institution entrusted with the care or maintenance of the incompetent or disabled Participant, Beneficiary or Alternate Payee, provided, however, such person or institution has satisfied the Committee that the payment will be used for the best interest and assist in the care of such Participant, Beneficiary or Alternate Payee, and provided further, that no prior claim for said payment has been made by a duly appointed guardian, conservator or other legal representative of such Participant, Beneficiary or Alternate Payee.

Any payment made in accordance with the foregoing provisions of this Section shall constitute a complete discharge of any liability or obligation of the Employer, the Committee, the Trustee and the Fund therefore.

7.6. **Loans**. The provisions of this Section shall be subject to the following rules, conditions and limitations:

7.6.1. **Availability**. Loans shall be made available to all Participants who are either actively employed by the Employer or an Affiliate or on an authorized leave of absence as determined by the Committee, subject to limitations and conditions established under this Section on a reasonably equivalent basis and shall not be made available to Highly Compensated Employees in an amount (expressed as a percentage of the Vested Total Account) greater than is made available to other employees.

7.6.2. **Spousal Consent Not Required**. Spousal consent shall not be required to make a loan to a married Participant.

7.6.3. **Administration**. Loan requests shall be granted or denied solely on the basis of this Section. There shall be no discretion to grant or deny a loan request. Denials shall be processed under the claims procedure rules of the Plan. Loans shall be approved (or denied) by the Committee. The Committee shall be contacted for this purpose at the address shown in the summary plan description. A copy of these rules, loan application forms, specimen promissory notes and any other information that is available concerning loans shall be made available at that address upon request. Loans under this Plan and any other plan maintained by the Employer and all Affiliates will be considered separate loans. Therefore, separate loan applications and promissory notes will need to be completed for loans from this Plan or any other plan. A loan will be made upon completion of a loan application, the execution of a promissory note and the completing of such other forms and the furnishing of such other information as may be required to comply with this Section. The promissory note will be a negotiable instrument. The Trustee will not, however, sell any note. The Committee may prescribe rules regarding the form of such application, the method of filing such application (including telephonic, electronic or similar methods) and the information required to be furnished in connection with such application.

7.6.4. **Loan Terms**. The total amount of such loans to any Participant shall not exceed the lesser of:

(a) Fifty percent (50%) of the Vested amount of that Participant’s Total Account, or

(b) Fifty Thousand Dollars ($50,000);

provided, however, that the Fifty Thousand Dollar ($50,000) limitation shall be reduced by the excess (if any) of: (i) the highest outstanding balance of loans from the Plan (and all other plans of the Employer and all Affiliates) to such Participant during the one-year period ending on the day before the new loan is made, over (ii) the outstanding balance of all loans from the Plan (and all other plans of the Employer and all Affiliates) to such Participant on the day the new loan is made.

Except for any permitted suspension of payments during a leave of absence, any such loan must be repaid at least monthly in substantially level amounts, including principal and interest, over the term of the loan. Any such loan shall provide that it shall be repaid within a definite period of time to be specified by the Participant in the loan application and the promissory note. That period shall not exceed five (5) years unless such loan is to a Participant and is used to acquire a principal residence for the Participant and then it shall not exceed ten (10) years.

7.6.5. **Collateral**. Every loan made under these rules shall be secured by that portion of the Participant’s Total Account which does not exceed fifty percent (50%) of the sum total of the Participant’s Vested Total Account. This dollar amount shall be determined immediately after the origination of the loan (and shall be reduced by the amount of any unpaid principal and interest on any earlier loan which is similarly secured). This security interest shall exist without regard to whether it is or is not referenced in the loan documents. The Plan shall be permitted to realize on this collateral (as hereinafter provided) by any means including (but not limited to) offset. No other collateral shall be permitted or required.

7.6.6. **Loan Rules**. The Committee may adopt rules for the administration of loans that are not inconsistent with the Plan, including the following rules:

(a) **Loan Amount**. Loans will not be made in a principal amount less than One Thousand Dollars ($1,000).

(b) **Interest Rate**. The interest rate on any loan shall be equal to the prime rate (the base rate on corporate loans at large United States money center commercial banks) as reported by Reuters or any comparable successor rate so reported on the first business day of the calendar month in which the loan is granted plus one percent (1%).

(c) **Accounting for Loan**. For the purpose of determining the extent to which a Total Account is entitled to share in income, gains or losses of the Fund under Section 4, the same shall be deemed to be reduced by the unpaid balance of any outstanding loans to the Participant, and the interest payments on such loans shall be credited to the Participant's Total Account. If a loan is made to a person who has assets in more than one Account, such loan shall be deemed to have been made from the Accounts pro rata (excluding any portion of the Participant's Pension Account and ESOP Account). Repayments of principal on loans and payments of interest shall be apportioned among the Accounts from which the loan was made in proportion to the amounts by which the Accounts were initially reduced in order to make the loan. If a loan is made from an Account which is invested in more than one Subfund authorized and established under Section 4.1, the amount withdrawn in order to make the loan shall be charged to each Subfund in the same proportions as the Account is invested in each Subfund. All repayments of principal and interest shall be reinvested in the same manner as contributions under the Participant's investment elections in effect at the time the repayment is received.

(d) **Payments**. All Participants who are actively employed by the Employer shall make payment of loans by monthly or more frequent payroll deduction. The making of the loan shall be considered an irrevocable authorization for payroll deduction. To the extent that the available payroll amount is not sufficient to satisfy the payment obligation, the Participant shall make monthly payment by personal check, cashier's check, certified check or money order delivered to the Trustee or to the Committee as agent for the Trustee (at the address shown in the Plan's summary plan description) by the due date for the payment. All payments by Participants who are not actively employed shall be made quarterly by personal check, cashier's check, certified check or money order delivered to the Trustee or to the Committee as agent for the Trustee at the address shown in the Plan's summary plan description by the due date for the payment.

(e) **Prepayments**. The loan may be prepaid in whole (but not in part) at any time.

(f) **Termination of Employment**. The entire outstanding principal and unpaid interest shall be due and payable on the date forty-five (45) days after the Participant's termination of employment with the Employer and all Affiliates.

(g) **Death of the Participant**. The death of the Participant shall terminate the loan. The unpaid principal and interest due and owing on the date of the Participant's death shall be offset against the Participant's Total Account. No payments shall be permitted after the Participant's death. The tax consequences of the offset shall be reported to the Participant's estate and not to the Beneficiary.

(h) **Event of Default**. Subject to subsection (i) below, nonpayment within thirty (30) days after a payment due date and the existence of a principal balance outstanding as of the term of the loan sixty (60) days after the due date shall be an event of default, unless the loan's promissory note is distributed in kind pursuant to Section 7.5.4. If a payment is not made by payroll deduction, then payment shall be considered made for this purpose only when the personal check, cashier's check, certified check or money order is received in fact by the Trustee or the Committee as agent for the Trustee. Upon the occurrence of an event of default, the Participant's Vested Accounts in the Plan given as security shall be offset by the amount of the then outstanding balance of the loan in default at the end of the calendar quarter following the calendar quarter in which loan payment was discontinued (including, to the extent required under the Code, interest on the amount in default from the time of the default until the time of the offset). In the case of a Participant who has not had an Event of Maturity, however, this offset shall be deferred until an Event of Maturity as to such Participant, but, in the interim, it shall not be possible to cure the default. Such offset shall be automatic. No notice shall be required prior to offset.

(i) **Suspension of Payments During Leave of Absence**. If the Participant is on an authorized leave of absence as determined by the Committee, and the Participant's wages during the leave are less than the amount of the loan payment, then loan payments shall be suspended for a period of up to one (1) year; provided, however, that the Participant's death while payments are suspended shall nevertheless terminate the loan as provided in subsection (g). Upon the Participant's return to active employment with the Employer or an

Affiliate, the Participant's loan shall be reamortized so that the unpaid balance of the Participant's loan will continue to be paid in equal periodic installments each payroll period in amounts sufficient to retire the entire loan indebtedness (principal and interest) by the latest permissible term of the loan (*i.e.*, five years from the date of the loan unless the loan is being applied toward the purchase of the Participant's principal residence), plus any period of suspension permitted pursuant to the leave of absence; provided, further, that the amount of each periodic installment shall not be less than the amount of each periodic installment prior to the leave of absence. Notwithstanding the foregoing, special rules apply to Participants on leaves of absence covered by the Uniformed Services Employment and Reemployment Rights Act of 1994.

(j) **Miscellaneous**. Loans will be made only as of a Valuation Date. No loan shall be made to any Participant who has any loan which is currently in default or any loan which was in default at any time during the preceding twelve (12) months. No Participant shall have more than two (2) loans outstanding.

(k) **Fees**. The loan shall be subject to any origination fees charged by the Trustee and approved by the Committee. No loan application shall be approved unless it is accompanied by any required origination fee.

(l) **Rollovers and Transfers of Loans**. Pursuant to Section 9.3, the Committee may agree to the transfer of outstanding participant loans under another tax-qualified plan to this Plan if the transfer is in connection with a corporate acquisition or merger by or with the Principal Sponsor or an Affiliate. The Committee may also authorize that any employee who was formerly employed by a business entity that was acquired by the Principal Sponsor or an Affiliate and who receives an eligible rollover distribution which includes one (1) or more outstanding participant loans shall be permitted to rollover such outstanding participant loans to this Plan. The transfer or direct rollover of an outstanding participant loan shall be permitted only if the participant loan is not in default and the Participant agrees to continue to make loan payments to the Trustee through payroll deductions. The transfer or direct rollover of an outstanding participant loan shall not be considered the issuance of a new loan or the renewal or rewriting of the original loan note. The terms of any outstanding participant loan that is transferred or rolled over to this Plan may differ from the loan provisions in this Section 7.6, including, but not limited to the number of loans and the period of amortization.

7.6.7. **Effect on Distributions**. If any distribution is to be made after an Event of Maturity when a loan is outstanding, the first asset distributed (after offset to satisfy any default) shall be the unpaid promissory note.

7.6.8. **Effect of Participant Bankruptcy**. To the extent required by bankruptcy laws, loans shall be subject to stay, discharge, reinstatement and other matters.

7.6.9. **ERISA Compliance — Loans Available to Parties in Interest**. Loans shall be available to Participants and Beneficiaries who are parties in interest as defined in section 3(14) of ERISA. An Alternate Payee shall be considered a Beneficiary for this purpose only after the domestic relations order has been finally determined to be a qualified domestic relations order.

7.7 **Required Minimum Distributions**. Notwithstanding any other provisions of the Plan,

7.7.1. A Participant's Vested Total Account shall be distributed, or begin to be distributed, to the Participant not later than the Participant's required beginning date.

7.7.2. If the Participant dies before attaining his required beginning date, the Participant's Vested Total Account shall be distributed to his Beneficiary by the December 31 of the calendar year which contains the fifth (5^{th}) anniversary of the Participant's death.

7.7.3. Unless the Participant's interest is distributed in the form of an annuity purchased from an insurance company or in a single sum on or before the required beginning date, as of the first distribution calendar year distributions will be made in accordance with Sections 7.7.4 and 7.7.5 of the Plan. If the Participant's interest is distributed in the form of an annuity purchased from an insurance company, distributions thereunder will be made in accordance with the requirements of Section 401(a)(9) of the Code and the Treasury Regulations.

7.7.4. **Amount of Required Minimum Distribution During Participant's Lifetime.**

(a) During the Participant's lifetime, the minimum amount that shall be distributed for each distribution calendar year is the lesser of:

(i) the quotient obtained by dividing the Participant's account balance by the distribution period in the Uniform Lifetime Table set forth in Section 1.401(a)(9)-9 of the Treasury Regulations, using the Participant's age as of the Participant's birthday in the distribution calendar year; or (ii)if the Participant's sole designated beneficiary for the distribution calendar year is the Participant's spouse, the quotient obtained by dividing the Participant's account balance by the number in the Joint and Last Survivor Table set forth in Section 1.401(a)(9)-9 of the Treasury Regulations, using the Participant's and spouse's attained ages as of the Participant's and spouse's birthday in the distribution calendar year.

(b) Required minimum distributions shall be determined under this Section 7.7.4 beginning with the first distribution calendar year and up to and including the distribution calendar year that includes the Participant's date of death.

7.7.5. **Participant Death On or After Attaining Required Beginning Date.**

(a)If the Participant dies on or after attaining his required beginning date and there is a designated beneficiary, the minimum amount that shall be distributed for each distribution calendar year after the year of the Participant's death is the quotient obtained by dividing the Participant's account balance by the longer of the remaining life expectancy of the Participant or the remaining life expectancy of the Participant's designated beneficiary, determined as follows:

(i)The Participant's remaining life expectancy is calculated using the age of the Participant in the year of death, reduced by one for each subsequent year.

(ii)If the Participant's surviving spouse is the Participant's sole designated beneficiary, the remaining life expectancy of the surviving spouse is calculated for each distribution calendar year after the year of the Participant's death using the surviving spouse's age as of the spouse's birthday in that year. For distribution calendar years after the year of the surviving spouse's death, the remaining life expectancy of the surviving spouse is calculated using the age of the surviving spouse as of the spouse's birthday in the calendar year of the spouse's death, reduced by one for each subsequent calendar year.

(iii)If the Participant's surviving spouse is not the Participant's sole designated beneficiary, the designated beneficiary's remaining life expectancy is calculated using the age of the designated beneficiary in the year following the year of the Participant's death, reduced by one for each subsequent year.

(b)If the Participant dies on or after attaining his required beginning date and there is no designated beneficiary as of September 30 of the year after the year of the Participant's death, the minimum amount that shall be distributed for each calendar year after the year of the Participant's death is the quotient obtained by dividing the Participant's account balance by the Participant's remaining life expectancy calculated using the age of the Participant in the year of death, reduced by one for each subsequent year.

7.7.6. **Temporary Waiver of 2009 Required Minimum Distributions.** Notwithstanding anything in the Plan to the contrary, pursuant to Code Section 401(a)(9)(H), a temporary waiver of required minimum distributions shall apply for the Plan Year ending December 31, 2009 (the "2009 Plan Year"), and accordingly the requirements of the remainder of the subsections of this Section 7.7 shall not apply for the 2009 Plan Year subject to the following:

(a)the required beginning date with respect to any individual shall be determined without regard to this Section 7.7 for Plan Years after 2009,

(b)the 5-year period described in Section 7.7.2 of the Plan shall be determined without regard to the 2009 Plan Year,

(c)a Participant or Beneficiary who would have been required to receive required minimum distributions for 2009 but for the enactment of Code Section 401(a)(9)(H) ("2009 RMDs"), and who would have satisfied that requirement by receiving distributions that are (A) equal to the 2009 RMDs or (B) one or more payments in a series of substantially equal distributions (that include 2009 RMDs) made at least annually and expected to last for the life (or the life expectancy) of the Member and the Member's Beneficiary, or for a period of at least ten years ("Extended 2009 RMDs"), will not receive those distributions unless the Participant chooses to receive such distributions by making a timely election (determined under the rules of the Plan Administrator), (d)the payment of 2009 RMDs and Extended 2009 RMDs shall be treated as an eligible rollover distribution for purposes of Code Sections 401(a)(31) and 402(f) or Subsection (a) of Section 8.5 of the Plan, but only to the extent that those amounts are paid with an additional amount that is an eligible rollover distribution without regard to Code Section 401(a)(9)(H), and

(e)this Section 7.7.6 shall not be construed as providing any waiver for a required minimum distribution for 2008 (even where the Participant or Beneficiary choose to delay receiving the required minimum distributions to April 1, 2009), or for 2010, but shall be construed as providing for a waiver of a required minimum distribution for 2009, even if the Participant or Beneficiary is eligible to postpone taking the required minimum distribution to April 1, 2010.

7.7.7. For purposes of this Section 7.7 of the Plan --

(a)"designated beneficiary" means the individual who is designated as the beneficiary under Section 1.1.4 of the Plan and is the designated beneficiary under Section 401(a)(9) of the Code and Treas. Reg. Section 1.401(a)(9)-4;

(b)"distribution calendar year" means a calendar year for which a minimum distribution is required. For distributions beginning before the Participant's death, the first distribution calendar year is the calendar year immediately preceding the calendar year which contains the Participant's required beginning date. For distributions beginning after the Participant's death, the first distribution calendar year is the calendar year in which distributions are required to begin under Section 7.7.2 of the Plan. The required minimum distribution for the Participant's first distribution calendar year shall be made on or before the Participant's required beginning date. The required minimum distribution for other distribution calendar years, including the required minimum distribution for the distribution calendar year in which the Participant's required beginning date occurs, shall be made on or before December 31 of that distribution calendar year;

(c)"life expectancy" means life expectancy as computed by use of the Single Life Table in Treas. Reg. Section 1.401(a)(9)-9;

(d)"Participant's account balance" means the account balance as of the last valuation date in the calendar year immediately preceding the distribution calendar year (valuation calendar year) increased by the amount of any contributions made and allocated or forfeitures allocated to the account balance as of dates in the valuation calendar year after the valuation date. The account balance for the valuation calendar year includes any amounts rolled over or transferred to the Plan either in the valuation calendar year or in the distribution calendar year if distributed or transferred in the valuation calendar year; and

(e)"required beginning date" means the required beginning date as defined in Section 7.1.5 and 7.1.6 of the Plan.

SECTION 8

SPENDTHRIFT PROVISIONS

No Participant or Beneficiary shall have any transmissible interest in any Account nor shall any Participant or Beneficiary have any power to anticipate, alienate, dispose of, pledge or encumber the same while in the possession or control of the Trustee, nor shall any Account be subject to attachment, garnishment, execution following judgment or other legal process while in the possession or control of the Trustee, nor shall the Trustee, the Employer or the Committee recognize any assignment thereof, either in whole or in part, except as is specifically permitted under section 401(a)(13) of the Code or the regulations thereunder.

The power to designate Beneficiaries to receive the Vested Total Account of a Participant in the event of death shall not permit or be construed to permit such power or right to be exercised by the Participant so as thereby to anticipate, pledge, mortgage or encumber the Participant's Account or any part thereof, and any attempt of a Participant so to exercise said power in violation of this provision shall be of no force and effect and shall be disregarded by the Employer, the Committee and the Trustee.

This Section shall not prevent the Employer or the Committee from exercising, in their discretion, any of the applicable powers and options granted to them upon the occurrence of an Event of Maturity, as such powers may be conferred upon them by any applicable provision hereof, nor prevent the Plan from offsetting a Participant's Vested Total Account by the amount of the then outstanding balance of the loan in default. This Section shall not prevent the Employer or the Committee from observing the terms of a qualified domestic relations order.

SECTION 9

AMENDMENT AND TERMINATION

9.1. **Amendment**. The Principal Sponsor reserves the power to amend the Plan in any respect and either prospectively or retroactively or both;

(a) in any respect by resolution of its Board of Directors; and

(b) in any respect that does not materially increase the cost of the Plan by action of the Committee;

provided that no amendment shall be effective to reduce or divest the Total Account of any Participant unless the same shall have been adopted with the consent of the Secretary of Labor pursuant to the provisions of ERISA, or in order to comply with the provisions of the Code and the regulations and rulings thereunder affecting the tax-qualified status of the Plan and the deductibility of Employer contributions thereto. Notwithstanding the foregoing, no amendment shall be effective to increase the duties of the Trustee without its consent. No oral or written statement shall be effective to amend the Plan unless it is duly authorized by the Board of Directors or the Committee. The power to amend the Plan may not be delegated. Notwithstanding anything in this Plan to the contrary, the Committee may adopt rules to facilitate compliance with the federal securities laws and all regulations and rules thereunder, including Section 16 of the Securities Exchange Act, which rules may limit rights under the Plan for certain Participants.

9.2. **Discontinuance of Contributions and Termination of Plan**. The Principal Sponsor reserves the right to reduce, suspend or discontinue its contributions to the Plan and to terminate the Plan herein embodied in its entirety. Notwithstanding anything in the Plan to the contrary, if the Principal Sponsor applies to the Internal Revenue Service for a ruling that the termination of the Plan does not adversely affect its qualified status, then all distributions (other than required distributions under Sections 7.1.1(b) and 7.3.1(b) of the Plan) and the making of new loans shall be suspended upon termination of the Plan pending the receipt of a favorable determination.

9.3. **Merger or Spinoff of Plans**.

9.3.1. **In General**. The Principal Sponsor may cause all or a part of this Plan to be merged with all or a part of any other plan and may cause all or a part of the assets and liabilities to be transferred from this Plan to another plan. In the case of merger or consolidation of this Plan with, or transfer of assets and liabilities of this Plan to, any other plan, each Participant shall (if such other plan were then terminated) receive a benefit immediately after the merger, consolidation or transfer which is not less than the benefit the Participant would have been entitled to receive immediately before the merger, consolidation or transfer (if this Plan had then terminated). If the Principal Sponsor agrees to a transfer of assets and liabilities to or from another plan, the agreement under which such transfer is concluded (or an amendment of or appendix to the Plan) shall specify the Accounts to which the transferred amounts are to be credited.

9.3.2. **Limitations**. For any asset transfer to this Plan from a tax-qualified plan which is subject to the joint and survivor annuity and pre-retirement annuity rules of section 401(a)(11) of the Code, the optional form of benefit requirements of section 411(d)(6)(B)(ii) of the Code or the distribution rules of section 401(k) of the Code, the Committee shall adopt rules to comply with section 411(d)(6)(B)(ii) of the Code. In no event shall assets be transferred from any other plan to this Plan unless this Plan complies (or has been amended to comply) with the optional form of benefit requirements of section 411(d)(6)(B)(ii) of the Code (or, where applicable, the distribution rules of section 401(k) of the Code) with respect to such transferred assets. In no event shall assets be transferred from this Plan to any other plan unless such other plan complies (or has been amended to comply) with the optional form of benefit requirements of section 411(d)(6)(B)(ii) of the Internal Revenue Code and the distribution rules of section 401(k) of the Internal Revenue Code with respect to such transferred assets.

9.3.3. **Beneficiary Designations**. If assets and liabilities are transferred from another plan to this Plan, Beneficiary designations made under that plan shall become void with respect to deaths occurring on or after the date as of which such transfer is made and the Beneficiary designation rules of the Plan shall apply beginning on such date.

9.4. **Adoption by Other Employers**.

9.4.1. **Adoption by Consent**. The Principal Sponsor may consent to the adoption of the Plan by any business entity subject to such conditions as the Principal Sponsor may impose.

9.4.2. **Procedure for Adoption**. Any such adopting business entity shall initiate its adoption of the Plan by delivery of a certified copy of the resolutions of its board of directors (or other authorized body or individual) adopting the Plan to the Principal Sponsor. Upon the consent by the Principal Sponsor to the adoption by the adopting business entity, and the delivery to the Trustee of written evidence of the Principal Sponsor's consent, the adoption of the Plan by the adopting business entity shall be effective as of the date specified by the Principal Sponsor. If such adopting business entity is not a corporation, any reference in the Plan to its board of directors shall be deemed to refer to such entity's governing body or other authorized individual.

9.4.3. **Effect of Adoption**. Upon the adoption of the Plan by an adopting business entity as heretofore provided, the adopting business entity shall be an Employer hereunder in all respects. Each adopting business entity, as a condition of continued participation in the Plan, delegates to the Principal Sponsor the sole power and authority over all Plan matters except that the board of directors of each adopting business entity shall have the power to amend the Plan as applied to it by establishing a successor plan to which assets and liabilities may be transferred as provided in Section 9.3 and to terminate the Plan as applied to it. Each reference herein to the Employer shall include the Principal Sponsor and all adopting business entities unless the context clearly requires otherwise.

SECTION 10

DETERMINATIONS — RULES AND REGULATIONS

10.1. **Determinations**. The Committee shall make such determinations as may be required from time to time in the administration of the Plan. The Committee shall have the sole discretion, authority and responsibility to interpret and construe the Plan and to determine all factual and legal questions under the Plan, including but not limited to the entitlement of employees, Participants and Beneficiaries and the amounts of their respective interests. The Trustee and other interested parties may act and rely upon all information reported to them hereunder and need not inquire into the accuracy thereof, nor be charged with any notice to the contrary.

10.2. **Rules and Regulations**. Any rule not in conflict or at variance with the provisions hereof may be adopted by the Committee.

10.3. **Method of Executing Instruments**.

10.3.1. **Employer or Committee**. Information to be supplied or written notices to be made or consents to be given by the Principal Sponsor, the Employer or the Committee pursuant to any provision of the Plan may be signed in the name of the Principal Sponsor or Employer by any officer or by any employee who has been authorized to make such certification or to give such notices or consents or by any Committee member.

10.3.2. **Trustee**. Any instrument or written notice required, necessary or advisable to be made or given by the Trustee may be signed by any Trustee, if all Trustees serving hereunder are individuals, or by any authorized officer or employee of the Trustee, if a corporate Trustee shall be acting hereunder as sole Trustee.

10.4. **Claims Procedure**. Until modified by the Committee, the claims procedure set forth in this Section 10.4 shall be the claims procedure for the resolution of disputes and disposition of claims arising under the Plan. An application for a distribution under Section 7 shall be considered as a claim for the purposes of this Section.

10.4.1. **Original Claim**. Any employee, former employee, or Beneficiary of such employee or former employee may, if the employee, former employee or Beneficiary so desires, file with the Committee a written claim for benefits under the Plan. Within ninety (90) days after the filing of such a claim, the Committee shall notify the claimant in writing whether the claim is upheld or denied in whole or in part or shall furnish the claimant a written notice describing specific special circumstances requiring a specified amount of additional time (but not more than one hundred eighty days from the date the claim was filed) to reach a decision on the claim. If the claim is denied in whole or in part, the Committee shall state in writing:

(a)the specific reasons for the denial,

(b)the specific references to the pertinent provisions of the Plan on which the denial is based,

(c)a description of any additional material or information necessary for the claimant to perfect the claim and an explanation of why such material or information is necessary, and

(d)an explanation of the claims review procedure set forth in this Section.

10.4.2. **Claims Review Procedure**. Within sixty (60) days after receipt of notice that the claim has been denied in whole or in part, the claimant may file with the Committee a written request for a review and may, in conjunction therewith, submit written issues and comments. Within sixty (60) days after the filing of such a request for review, the Committee shall notify the claimant in writing whether, upon review, the claim was upheld or denied in whole or in part or shall furnish the claimant a written notice describing specific special circumstances requiring a specified amount of additional time (but not more than one hundred twenty days from the date the request for review was filed) to reach a decision on the request for review.

10.4.3. **General Rules**.

(a)No inquiry or question shall be deemed to be a claim or a request for a review of a denied claim unless made in accordance with the claims procedure. The Committee may require that any claim for benefits and any request for a review of a denied claim be filed on forms to be furnished by the Committee upon request.

(b)All decisions on claims and on requests for a review of denied claims shall be made by the Committee unless delegated as provided in Section 11.2.

(c)The Committee may, in its discretion, hold one or more hearings on a claim or a request for a review of a denied claim.

(d)Claimants may be represented by a lawyer or other representative at their own expense, but the Committee reserves the right to require the claimant to furnish written authorization. A claimant's representative shall be entitled to copies of all notices given to the claimant.

(e)The decision of the Committee on a claim and on a request for a review of a denied claim shall be served on the claimant in writing. If a decision or notice is not received by a claimant within the time specified, the claim or request for a review of a denied claim shall be deemed to have been denied.

(f)Prior to filing a claim or a request for a review of a denied claim, the claimant or the claimant's representative shall have a reasonable opportunity to review a copy of the Plan and all other pertinent documents in the possession of the Employer, the Committee and the Trustee.

10.4.4. **Deadline to File Claim**. To be considered timely under the Plan's claim and review procedure, a claim must be filed with the Committee within one (1) year after the claimant knew or reasonably should have known of the principal facts upon which the claim is based. If or to the extent that the claim relates to a failure to effect a Participant's or Beneficiary's investment directions, the one (1) year period shall be thirty (30) days.

10.4.5. **Exhaustion of Administrative Remedies**. The exhaustion of the claims and review procedure is mandatory for resolving every claim and dispute arising under this Plan. As to such claims and disputes:

(a)no claimant shall be permitted to commence any legal action to recover Plan benefits or to enforce or clarify rights under the Plan under section 502 or section 510 of ERISA or under any other provision of law, whether or not statutory, until the claim and review procedure set forth herein have been exhausted in their entirety; and

(b)in any such legal action all explicit and all implicit determinations by the Committee (including, but not limited to, determinations as to whether the claim, or a request for a review of a denied claim, was timely filed) shall be afforded the maximum deference permitted by law.

10.4.6. **Deadline to File Legal Action**. No legal action to recover Plan benefits or to enforce or clarify rights under the Plan under section 502 or section 510 of ERISA or under any other provision of law, whether or not statutory, may be brought by any claimant on any matter pertaining to this Plan unless the legal action is commenced in the proper forum before the earlier of:

(a)thirty (30) months after the claimant knew or reasonably should have known of the principal facts on which the claim is based, or

(b)six (6) months after the claimant has exhausted the claim and review procedure.

If or to the extent that the claim relates to a failure to effect a Participant's or Beneficiary's investment directions or a Participant's election regarding contributions, the thirty (30) month period shall be nineteen (19) months.

10.4.7. **Knowledge of Fact by Participant Imputed to Beneficiary**. Knowledge of all facts that a Participant knew or reasonably should have known shall be imputed to every claimant who is or claims to be a Beneficiary of the Participant or otherwise claims to derive an entitlement by reference to the Participant for the purpose of applying the previously specified periods.

10.5. **Information Furnished by Participants**. Neither the Employer nor the Committee nor the Trustee shall be liable or responsible for any error in the computation of the Account of a Participant resulting from any misstatement of fact made by the Participant, directly or indirectly, to the Employer, the Committee or the Trustee and used by them in determining the Participant's Account. Neither the Employer nor the Committee nor the Trustee shall be obligated or required to increase the Account of such Participant which, on discovery of the misstatement, is found to be understated as a result of such misstatement of the Participant. However, the Account of any Participant which is overstated by reason of any such misstatement shall be reduced to the amount appropriate for the Participant in view of the truth. Any refund received upon reduction of an Account so made shall be used to reduce the next succeeding contribution of the Employer to the Plan.

SECTION 11

PLAN ADMINISTRATION

11.1. **Principal Sponsor**.

11.1.1. **Officers**. Except as hereinafter provided, functions generally assigned to the Principal Sponsor shall be discharged by its officers or delegated and allocated as provided herein.

11.1.2. **Chief Executive Officer**. Except as hereinafter provided, the Chief Executive Officer of the Principal Sponsor may delegate or redelegate and allocate or reallocate to one or more persons or to a committee of persons jointly or severally, and whether or not such persons are directors, officers or employees, such functions assigned to the Principal Sponsor hereunder as the Chief Executive Officer may from time to time deem advisable.

11.1.3. **Board of Directors**. Notwithstanding the foregoing, the Board of Directors of the Principal Sponsor shall have the exclusive authority, which may not be delegated, to act for the Principal Sponsor:

(a)to terminate the Plan,

(b)to consent to the adoption of the Plan by other business entities; to establish conditions and limitations upon such adoption of the Plan by other business entities; to designate Affiliates, and

(c)to cause the Plan to be merged with another plan and to transfer assets and liabilities between the Plan and another.

11.2. **Committee**.

11.2.1. **Appointment and Removal**. The Committee shall consist of such members as may be determined and appointed from time to time by the Chief Executive Officer of the Principal Sponsor and they shall serve at the pleasure of such Chief Executive Officer. Members of the Committee shall serve without compensation, but their reasonable expenses shall be an expense of the administration of the Fund and shall be paid by the Trustee from and out of the Fund except to the extent the Employer, in its discretion, directly pays such expenses.

11.2.2. **Automatic Removal**. If any individual who is a member of the Committee is a director, officer or employee when appointed as a member of the Committee, then such individual shall be automatically removed as a member of the Committee at the earliest time such individual ceases to be a director, officer or employee. This removal shall occur automatically and without any requirement for action by the Chief Executive Officer of the Principal Sponsor or any notice to the individual so removed.

11.2.3. **Authority**. The Committee may elect such officers as the Committee may decide upon. The Committee shall:

(a)establish rules for the functioning of the Committee, including the times and places for holding meetings, the notices to be given in respect of such meetings and the number of members who shall constitute a quorum for the transaction of business,

(b)organize and delegate to such of its members as it shall select authority to execute or authenticate rules, advisory opinions or instructions, and other instruments adopted or authorized by the Committee; adopt such bylaws or regulations as it deems desirable for the conduct of its affairs; appoint a secretary, who need not be a member of the Committee, to keep its records and otherwise assist the Committee in the performance of its duties; keep a record of all its proceedings and acts and keep all books of account, records and other data as may be necessary for the proper administration of the Plan; notify the Employer and the Trustee of any action taken by the Committee and, when required, notify any other interested person or persons,

(c)determine from the records of the Employer the compensation, service records, status and other facts regarding Participants and other employees,

(d)cause to be compiled at least annually, from the records of the Committee and the reports and accountings of the Trustee, a report or accounting of the status of the Plan and the Accounts of the Participants, and make it available to each Participant who shall have the right to examine that part of such report or accounting (or a true and correct copy of such part) which sets forth the Participant’s benefits and ratable interest in the Fund,

(e)prescribe forms, procedures and methods (including telephonic, electronic or similar methods) to be used for applications for participation, benefits, notifications, etc., as may be required in the administration of the Plan,

(f)set up such rules as are deemed necessary to carry out the terms of the Plan,

(g)resolve all questions of administration of the Plan not specifically referred to in this Section,

(h)delegate or redelegate to one or more persons, jointly or severally, and whether or not such persons are members of the Committee or employees of the Employer, such functions assigned to the Committee hereunder as it may from time to time deem advisable, and (i)perform all other acts reasonably necessary for administering the Plan and carrying out the provisions of the Plan and performing the duties imposed on it.

11.2.4. **Majority Decisions**. If there shall at any time be three (3) or more members of the Committee serving hereunder who are qualified to perform a particular act, the same may be performed, on behalf of all, by a majority of those qualified, with or without the concurrence of the minority. No person who failed to join or concur in such act shall be held liable for the consequences thereof, except to the extent that liability is imposed under ERISA.

11.3. **Limitation on Authority**.

11.3.1. **Fiduciaries Generally**. No action taken by any fiduciary, if authority to take such action has been delegated or redelegated to it, shall be the responsibility of any other fiduciary except as may be required by the provisions of ERISA. Except to the extent imposed by ERISA, no fiduciary shall have the duty to question whether any other fiduciary is fulfilling all of the responsibility imposed upon such other fiduciary by the Plan or by ERISA.

11.3.2. **Trustee**. The responsibilities and obligations of the Trustee shall be strictly limited to those set forth in the Trust Agreement.

11.4. **Conflict of Interest**. If any officer or employee of the Employer, any member of the board of directors of the Employer, any member of the Committee or any Trustee to whom authority has been delegated or redelegated hereunder shall also be a Participant, Beneficiary or Alternate Payee in the Plan, the individual shall have no authority as such officer, employee, member or Trustee with respect to any matter specially affecting his or her individual interest hereunder (as distinguished from the interests of all Participants, Beneficiaries or Alternate Payees or a broad class of Participants, Beneficiaries and Alternate Payees), all such authority being reserved exclusively to the other officers, employees, members or Trustees as the case may be, to the exclusion of such Participant, Beneficiary or Alternate Payee, and such Participant, Beneficiary or Alternate Payee shall act only in his or her individual capacity in connection with any such matter.

11.5. **Dual Capacity**. Individuals, firms, corporations or partnerships identified herein or delegated or allocated authority or responsibility hereunder may serve in more than one fiduciary capacity.

11.6. **Administrator**. The Principal Sponsor shall be the administrator for purposes of section 3(16)(A) of ERISA.

11.7. **Named Fiduciaries**. The Principal Sponsor shall be the named fiduciary for the purpose of section 402(a) of ERISA.

11.8. **Service of Process**. In the absence of any designation to the contrary by the Principal Sponsor, the general counsel of the Principal Sponsor is designated as the appropriate and exclusive agent for the receipt of service of process directed to the Plan in any legal proceeding, including arbitration, involving the Plan.

11.9. **Administrative Expenses**. The reasonable expenses of administering the Plan shall be payable out of the Fund except to the extent that the Employer, in its discretion, directly pays the expenses.

11.10. **Indemnity**. Each individual (as distinguished from corporate) trustee of the Plan or officer, director or employee of the Employer shall, except as prohibited by law, be indemnified and held harmless by the Employer from any and all liabilities, costs and expenses (including legal fees), to the extent not covered by liability insurance, arising out of any action taken by such individual with respect to the Plan, whether imposed under ERISA or otherwise. No such indemnification, however, shall be required or provided if such liability arises (i) from the individual’s claim for his own benefit, or (ii) from the proven gross negligence or the bad faith of the individual, or (iii) from the criminal misconduct of such individual if the individual had reason to believe the conduct was unlawful. This indemnification shall continue as to an individual who has ceased to be a trustee of the Plan or officer, director or employee of the Employer and shall inure to the benefit of the heirs, executors and administrators of such an individual.

11.11. **Plan Qualification**. This Plan is intended to qualify under section 401(a) of the Code as a defined contribution profit sharing plan; provided, however, that the Entegris Stock Subfund is intended to qualify as a stock bonus and employee stock ownership plan under sections 401(a) of the Code, 4975(e)(7) of the Code and 407(d)(6) of ERISA. Notwithstanding that the Entegris Stock Subfund of the Plan is intended to qualify as an employee stock ownership plan under section 4975(e)(7) of the Code, the Trustee shall not be permitted to borrow or use the proceeds of any exempt loan (as defined in section 54.4975-7 of the Treasury Regulations) for the purpose of acquiring Employer Securities.

SECTION 12

IN GENERAL

12.1. **Disclaimers**.

12.1.1. **Effect on Employment**. Neither the terms of the Plan nor the benefits hereunder nor the continuance thereof shall be a term of the employment of any employee, and the Employer shall not be obligated to continue the Plan. The terms of the Plan shall not give any employee the right to be retained in the employment of the Employer.

12.1.2. **Sole Source of Benefits**. Neither the Employer nor any of its officers nor any member of its board of directors nor any member of the Committee nor the Trustee in any way guarantee the Fund against loss or depreciation, nor do they guarantee the payment of any benefit or amount which may become due and payable hereunder to any Participant, Beneficiary, Alternate Payee or other person. Each Participant, Beneficiary, Alternate Payee or other person entitled at any time to payments hereunder shall look solely to the assets of the Fund for such payments. If a Vested Total Account shall have been distributed to a former Participant, Beneficiary, Alternate Payee or any other person entitled jointly to the receipt thereof (or shall have been transferred to the trustee of another tax qualified deferred compensation plan), such former Participant, Beneficiary, Alternate Payee or other person, as the case may be, shall have no further right or interest in the other assets of the Fund.

12.1.3. **Co-Fiduciary Matters** -. Neither the Employer nor any of its officers nor any member of its board of directors nor any member of the Committee shall be under any liability or responsibility (except to the extent that liability is imposed under ERISA) for failure to effect any of the objectives or purposes of the Plan by reason of loss or fluctuation in the value of the Fund or for the form, genuineness, validity, sufficiency or effect of any Fund asset at any time held hereunder, or for the failure of any person, firm or corporation indebted to the Fund to pay such indebtedness as and when the same shall become due or for any delay occasioned by reason of any applicable law, order or regulation or by reason of any restriction or provision contained in any security or other asset held by the Fund. Except as is otherwise provided in ERISA, the Employer and its officers, the members of its board of directors, the members of the Committee and other fiduciaries shall not be liable for an act or omission of another person with regard to a fiduciary responsibility that has been allocated to or delegated in whole or in part to such other person pursuant to the terms of this Plan or pursuant to procedures set forth in the Plan.

12.2. **Reversion of Fund Prohibited**. The Fund from time to time hereunder shall at all times be a trust fund separate and apart from the assets of the Employer, and no part thereof shall be or become available to the Employer or to creditors of the Employer under any circumstances other than those specified in Section 3.9 and Appendix A to the Plan. It shall be impossible for any part of the corpus or income of the Fund to be used for, or diverted to, purposes other than for the exclusive benefit of Participants and Beneficiaries (except as hereinbefore provided).

12.3. **Contingent Top Heavy Plan Rules**. The rules set forth in Appendix B to the Plan (concerning additional provisions that apply if the Plan becomes top heavy) are incorporated herein.

12.4. **Continuity**. The tenure and membership of any committee previously appointed, the rules of administration adopted and the Beneficiary designations in effect prior to the Effective Date shall, to the extent not inconsistent with the Plan, continue in full force and effect until altered as provided herein.

SCHEDULE I

CREDITING OF PRIOR SERVICE

As of October 1, 2014

All Hours of Service with the following entities and their predecessors prior to the time such entities became Affiliates of the Principal Sponsor shall be credited for Eligibility Service and Vesting Service purposes under this Plan in accordance with the rules under this Plan as if such Hours of Service had been credited with the Principal Sponsor.

1. Aeronex Incorporated

2. Extraction Systems, Inc.

3. Millipore Corporation

4. Mykrolis Corporation. Notwithstanding any provision in Section 2.2 to the contrary, each employee who was actively employed by Mykrolis Corporation as of August 6, 2005, shall have become a Participant as of the first payroll period coincident with or next following August 6, 2005, with respect to discretionary profit sharing contributions made pursuant to Section 3.4 if such employee was then in Recognized Employment.

5. Poco Graphite, Inc. Notwithstanding any provision in Section 2.2 to the contrary, for purposes of determining whether an employee has satisfied the requirement under Section 3.5 that the employee be credited with One Thousand (1,000) Hours of Service to receive a discretionary contribution, all service with Poco Graphite, Inc. earned from January 1, 2008 through August 11, 2008 shall be treated as service with the Principal Sponsor (for clarification purposes, compensation earned by

employees of Poco Graphite, Inc. during the period from January 1, 2008 through August 11, 2008 will not be included in any discretionary contribution calculation).

6. Surmet Corporation. With respect to former employees of Surmet Corporation hired by the Principal Sponsor prior to January 1, 2012, all service with Surmet Corporation (and its predecessors) shall be credited for purposes of determining Hours of Service under this Plan as if such Hours of Service had been with the Principal Sponsor.

7. Advanced Technology Materials, Inc., ATMI Packaging, Inc., ATMI Materials, Inc., Levtech, Inc., and ATMI Ecosys Corporation

APPENDIX A

LIMITATION ON ANNUAL ADDITIONS

Incorporating amendments of Code §415(c) regulation (T.D. 9313, April 5, 2007).
Effective for limitation years beginning on or after July 1, 2007.

SECTION 1

INTRODUCTION

Terms defined in the Plan shall have the same meanings when used in this Appendix. In addition, when used in this Appendix, the following terms shall have the following meanings:

1.1. **Annual Addition**. Annual addition means, with respect to any Participant for a limitation year, the sum of:

(i) all employer contributions (including employer contributions of the Participant's earnings reductions under section 401(k), section 403(b) and section 408(k) of the Code) allocable as of a date during such limitation year to the Participant under all defined contribution plans;

(ii) all forfeitures allocable as of a date during such limitation year to the Participant under all defined contribution plans; and

(iii) all Participant contributions made as of a date during such limitation year to all defined contribution plans.

Notwithstanding the foregoing, if an employer contribution is made not later than thirty (30) days after the due date, including extensions, of the employer's federal income tax return for the taxable year that includes the last day of the limitation year, the employer contribution shall be considered an annual addition for the limitation year in which the contribution is made. However, if the employer contribution is made pursuant to a corrective amendment that complies with the requirements of Treasury Regulations Section 1.401(a)(4)-11(g) to correct a nondiscrimination violation (e.g., section 401(a)(4) or section 410(b) of the Code) that date is extended until the fifteenth (15th) day of the tenth (10th) month following the end of the limitation year. A contribution made to restore an erroneous forfeiture in a prior limitation year or on behalf of a participant who was erroneously omitted from a prior limitation year's allocation shall be considered an annual addition for the limitation year to which it relates. If, in a particular limitation year, an amount is contributed with respect to a prior limitation year and such contribution is required by reason of such employee's rights under chapter 43 of title 38, United States Code (USERRA), resulting from qualified military service, as specified in section 414(u) of the Code, then such contribution is not considered an annual addition with respect to the employee for that limitation year in which the contribution is made, but, in accordance with section 414(u)(1)(B) of the Code, is considered an annual addition for the limitation year to which the contribution relates.

1.1.1. **Specific Inclusions**. With regard to a plan which contains a qualified cash or deferred arrangement or matching contributions or employee contributions, excess contributions and excess aggregate contributions (whether or not distributed during or after the limitation year) shall be considered annual additions in the year contributed. Excess deferrals that are not distributed in accordance with the regulations under section 402(g) of the Code are annual additions.

1.1.2. **Specific Exclusions**. The annual addition shall not, however, include any portion of a Participant's rollover contributions or any additions to accounts attributable to a plan merger or a transfer of plan assets or liabilities or any other amounts excludable under law. Excess deferrals that are distributed in accordance with the regulations under section 402(g) of the Code are not annual additions. The annual addition shall not include (i) any payments made to restore losses to a plan resulting from action that creates a reasonable risk of liability for breach of fiduciary duty under Title I of ERISA (or, in the case of Defined Contribution Plans not subject to ERISA, any other applicable federal or state law), any "catch-up" contributions made pursuant to section 414(v) of the Code, (ii) any previously forfeited amounts restored to an account in accordance with the plan terms, and (iii) any repayments of loans.

1.1.3. **ESOP Rules**. In the case of an employee stock ownership plan within the meaning of section 4975(e)(7) of the Code, annual additions shall not include any dividends or gains on sale of employer securities held by the employee stock ownership plan (regardless of whether such dividends or gains are (i) on securities which are allocated to Participants' accounts or (ii) on securities which are not allocated to Participants' accounts which, in the case of dividends used to pay principal on an employee stock ownership plan loan, result in employer securities being allocated to Participants' accounts or, in the case of a sale, result in sale proceeds being allocated to Participants' accounts). In the case of an employee stock ownership plan within the meaning of section 4975(e)(7) of the Code under which no more than one-third (1/3rd) of the employer contributions for a limitation year which are deductible under section 404(a)(9) of the Code are allocated to highly compensated employees (as defined in section 414(q) of the Code), annual additions shall not include forfeitures of employer securities under the employee stock ownership plan if such securities were acquired with the proceeds of an exempt loan or, if the Employer is not an S corporation as defined in section 1361(a)(1) of the Code, employer contributions to the employee stock ownership plan which are deductible by the employer under section 404(a)(9)(B) of the Code and charged against the Participant's account (*i.e.*, interest payments). The Committee may elect, in its sole discretion, to calculate annual additions using the fair market value of the Qualifying Employer Securities released from the suspense account due to an exempt loan repayment and allocated to Participants' Accounts for the limitation year, if that amount is less than the amount determined in accordance with Section 1.1(i).

1.2. **Controlled Group Member**. Controlled group member means the Employer and each member of a controlled group of corporations (as defined in section 414(b) of the Code and as modified by section 415(h) of the Code), all commonly controlled trades or businesses (as defined in section 414(c) of the Code and as modified by section 415(h) of the Code), affiliated service groups (as defined in section 414(m) of the Code) of which the Employer is a part and other organizations required to be aggregated for this purpose under section 414(o) of the Code.

1.3. **Defined Contribution Plans**. Defined contribution plan shall have the meaning assigned to that term by section 415(k)(1) of the Code. Whenever reference is made to defined contribution plans in this Appendix, it shall include all such plans maintained by the Employer and all controlled group members including terminated plans, plans maintained by predecessor employers and plans that were formerly maintained by the employer or a related employer but shall not include any multiemployer plan (as defined in section 414(f) of the Code).

1.4. **Individual Medical Account**. Individual medical account means an account, as defined in section 415(1)(2) of the Code maintained by the Employer or a controlled group member which provides an annual addition.

1.5. **Limitation Year**. Limitation year means the Plan Year.

1.6. **Maximum Permissible Addition**.

1.6.1. **General Rule**. Maximum permissible addition (a term that is relevant only with respect to defined contribution plans) means, for any one (1) limitation year, the lesser of

(a)$54,000 (for 2017), as adjusted automatically for increases in the cost of living by the Secretary of the Treasury pursuant to section 415(d) of the Code, or

(b)100% of the Participant's § 415 compensation for such limitation year.

However, the dollar limit in (a) shall be prorated if all defined contribution plans are terminated before the end of the limitation year.

1.6.2. **Medical Benefits**. The dollar limitation in Section 1.6.1(a), but not the amount determined in Section 1.6.1(b), shall be reduced by the amount of employer contributions which are allocated to a separate account established for the purpose of providing medical benefits or life insurance benefits with respect to a key employee (as defined in section 416 of the Code) under a welfare benefit fund or an individual medical account.

1.7. **Section 415 Compensation**. Section 415 compensation (sometimes, "§ 415 compensation") shall mean, with respect to any limitation year, the amount determined as follows:

(a) **General Definition.** Subject to the following rules, §415 compensation means the total wages, salaries, fees for professional services and other amounts received for personal services actually rendered in the course of employment with the Employer and all controlled group members to the extent that such amounts are includible in gross income. This shall include any amount which would have been received and includible in gross income but for an election under section 125(a), section 132(f)(4), section 402(e)(3), section 402(h)(1)(B), section 402(k) or section 457 of the Code. These amounts include, but are not limited to, commissions paid to salespersons, compensation for services on the basis of a percentage of profits, commissions on insurance premiums, tips, bonuses, fringe benefits and reimbursement or other expense allowances under a nonaccountable plan as described in Treasury Regulations Section 1.62-2(c).

(b) **Foreign Source Income.** Amounts paid as compensation for services do not fail to be treated as §415 compensation merely because those amounts are not includible in gross income on account of the location of the services or merely because those amounts are paid by an employer with respect to which all compensation paid by such employer is excluded from gross income. Thus, for example, the determination of whether an amount is §415 compensation shall be made without regard to the exclusions from gross income under sections 872, 893, 894, 911, 931 and 933 of the Code.

(c) **Cash Basis.** Section 415 compensation shall be included in the limitation year in which paid or made available (or would have been paid but for an election under section 125, 132(f)(4), 401(k), 403(b), 408(k), 408(p)(2)(A)(i) or 457(b) of the Code). Amounts received pursuant to a nonqualified unfunded deferred compensation plan are §415 compensation in the year actually received to the extent includible in gross income.

(d) **Compensation Cap.** Section 415 compensation for a limitation year shall not exceed the applicable dollar limit under section 401(a)(17) of the Code for that limitation year (e.g., $270,000 for a limitation year beginning in 2017).

(e) **Add-Backs.** Section 415 compensation shall also include any elective deferral as defined in section 402(g)(3) of the Code and any amount which would have been received and includible in gross income but for an election under sections 125, 132(f)(4), 402(e)(3), 402(h)(1)(B), 402(k), or 457 of the Code.

(f) **Constructively Received Income**. Amounts includible in federal taxable income under section 409A of the Code or section 457(f)(1)(A) of the Code and other amounts constructively received in income are §415 compensation at the time that they are so included in income. Section 415 compensation shall also include amounts includible in gross income upon making the election described in section 83(b) of the Code.

(g) **Miscellaneous**. Section 415 compensation shall also include, (i) in the case of an employee who is an employee within the meaning of section 401(c)(1) of the Code and regulations promulgated under section 401(c)(1) of the Code, the employee's earned income (as described in section 401(c)(2) of the Code and regulations promulgated under section 401(c)(2)) of the Code, plus amounts deferred at the election of the employee that would be includible in gross income but for the rules of section 402(e)(3), 402(h)(1)(B), 402(k), or 457(b) of the Code and (ii) amounts described in section 104(a)(3), 105(a), or 105(h) of the Code, but only to the extent that these amounts are includible in the gross income of the employee, and (iii) amounts paid or reimbursed by the employer for moving expenses incurred by an employee, but only to the extent that at the time of the payment it is reasonable to believe that these amounts are not deductible by the employee under section 217 of the Code, and (iv) the value of a nonstatutory option (which is an option other than a statutory option as defined in §1.421-1(b)) granted to an employee by the employer, but only to the extent that the value of the option is includible in the gross income of the employee for the taxable year in which it was granted.

(h) **Exclusions**. Notwithstanding the foregoing, §415 compensation shall not include any of the following.

(i) Contributions (other than elective deferrals) to a plan of deferred compensation to the extent the contributions are not includible in gross income for the year the contribution is added.

(ii) Amounts realized from the exercise of a nonstatutory option or when restricted stock or other property either becomes freely transferable or is no longer subject to a substantial risk of forfeiture.

(iii) Amounts realized from the sale, exchange or other disposition of stock acquired under a statutory stock option.

(iv) Other amounts receiving special tax benefits such as premiums for group-term life insurance (but only to the extent that the premiums are not includible in gross income and are not salary reduction amounts described in section 125 of the Code).

(i) **Post-Severance Pay**. Notwithstanding the foregoing, §415 compensation shall not include any amounts received after an employee's severance from employment except as follows:

(i) **Regular Pay**. Regular pay (e.g., regular base pay, overtime, shift differential pay, commissions, bonuses and other similar compensation) shall be included if (A) it is paid not later than the end of the limitation year that includes the severance from employment date or, if later, two and one-half (2½) months after the severance from employment date, and (B) it would have been paid if there had been no severance from employment.

(ii) **Unused Leave**. Payments of unused accrued bona fide sick leave, vacation or other leave shall be included if it is paid not later than the end of the limitation year that includes the severance from employment date or, if later, two and one-half (2½) months after severance from employment.

(iii) **NQDC**. Payments of nonqualified unfunded deferred compensation plan shall be included if (A) it is received not later than the end of the limitation year that includes the severance from employment date or, if later, two and one-half (2½) months after the severance from employment date, and (B) it would have been paid if there had been no severance from employment.

(iv) **Actual USERRA and Disability Pay**. Payments of compensation paid to employees performing qualified military service (e.g., "differential pay") and to employees who are totally and permanently disabled shall be included if the payments do not exceed the amounts the employee would have received if employment had continued.

(v) **Imputed Disability Pay**. The compensation an employee would have received for the limitation year shall be included if the following conditions are satisfied: (A) the employee is totally and permanently disabled within the meaning of section 22(e)(3) of the Code, and (B) either (x) the employee is not a highly compensated employee immediately before becoming disabled or (y) the terms of the plan provide for the continuation of contributions on behalf of all participants who are permanently and totally disabled for a fixed or determinable period, and (C) the plan provides that such amounts are taken into account for the purpose of making contributions, and (D) all contributions made with respect to such imputed compensation are nonforfeitable when made.

1.8. **Welfare Benefit Fund**. Welfare benefit fund means a fund as defined in section 419(e) of the Code which provides post-retirement medical benefits allocated to separate accounts for key employees as defined in section 419A(d)(3).

SECTION 2

DEFINED CONTRIBUTION LIMITATION

Notwithstanding anything to the contrary contained in the Plan, there shall not be allocated to the account of any Participant under a defined contribution plan for any limitation year an amount which would cause the annual addition for such Participant to exceed the maximum permissible addition. Subject to the provisions of this Appendix, the limitations of section 415(c) of the Code (and regulations issued pursuant thereto) are incorporated by reference in this Appendix.

SECTION 3

SUSPENSION OF ANNUAL ADDITIONS

3.1. **Temporary Suspension**. If as of any date during a limitation year it is determined that a Participant's annual additions that would be made then under other provisions of the Plan would exceed the maximum permissible addition as of that date, the contributions and allocations to that Participant's accounts shall be made only to the extent that they can be made without causing any such excess to occur. Therefore, the contributions and allocations to be made shall be made in the following sequence to the extent permitted.

(a) **Employer Contributions – Not Matching.**

(i) Employer contributions to defined contribution pension plans (e.g., money purchase pension plans including target benefit pension plans).

(ii) Employer fixed (non-discretionary, non-matching) contributions to defined contribution profit sharing plans and stock bonus plans.

(iii) Employer discretionary (non-matching) contributions to defined contribution profit sharing plans and stock bonus plans.

(b) **Employee Matched and Employer Matching Contributions**.

(i) Employee non-Roth matched elective deferrals (within the meaning of section 402(g)(3) of the Code) to defined contribution profit sharing plans and stock bonus plans.

(ii) Employee Roth matched elective deferrals (within the meaning of section 402(g)(3) of the Code) to defined contribution profit sharing plans and stock bonus plans.

(iii) Employee matched after-tax contributions to defined contribution profit sharing plans and stock bonus plans.

(iv) Employer non-discretionary fixed matching contributions to defined contribution profit sharing and plans and stock bonus plans.

(v) Employer discretionary matching contributions to defined contribution profit sharing plans and stock bonus plans.

(c)**Employee Contributions – Not Matched**.

(i)Employee non-Roth unmatched elective deferrals (within the meaning of section 402(g)(3) of the Code) to defined contribution profit sharing plans and stock bonus plans.

(ii)Employee Roth unmatched elective deferrals (within the meaning of section 402(g)(3) of the Code) to defined contribution profit sharing plans and stock bonus plans.

(iii)Employee unmatched after-tax contributions to defined contribution profit sharing plans and stock bonus plans.

(d)**Other**.

(i)All other contributions and allocations (but excluding forfeitures to be reallocated).

(ii)Forfeitures to be reallocated.

3.2. **Tie Breaker**. If a contribution or allocation that would be in two (2) or more plans in the same priority cannot be made because of the foregoing rules, the contribution or allocation shall be made among the plans in chronological order as determined by the effective date of each plan (using the original effective date of the plan) beginning with the plan that was first established.

APPENDIX B

CONTINGENT TOP HEAVY PLAN RULES

Incorporating amendments of Code §416 enacted by §613 of the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA; P.L. 107-16; June 4, 2001) effective for years beginning after December 31, 2001.

Notwithstanding any of the foregoing provisions of the Plan, if, after applying the special definitions set forth in Section 1 of this Appendix, this Plan is determined under Section 2 of this Appendix to be a top heavy plan for a Plan Year, then the special rules set forth in Section 3 of this Appendix shall apply. For so long as this Plan is not determined to be a top heavy plan, the special rules in Section 3 of this Appendix shall be inapplicable to this Plan.

SECTION 1

SPECIAL DEFINITIONS

Terms defined in the Plan shall have the same meanings when used in this Appendix. In addition, when used in this Appendix, the following terms shall have the following meanings:

1.1. **Aggregated Employers**. Aggregated employers means the Employer and each other corporation, partnership or proprietorship which is a "predecessor" to the Employer, or is under "common control" with the Employer, or is a member of an "affiliated service group" that includes the Employer, as those terms are defined in section 414(b), (c), (m) or (o) of the Code.

1.2. **Aggregation Group**. Aggregation group means a grouping of this Plan and:

(a)if any Participant in the Plan is a key employee, each other qualified pension, profit sharing or stock bonus plan of the aggregated employers in which a key employee is a Participant (and for this purpose, a key employee shall be considered a Participant only during periods when he is actually accruing benefits and not during periods when he has preserved accrued benefits attributable to periods of participation when he was not a key employee), and

(b)each other qualified pension, profit sharing or stock bonus plan of the aggregated employers which is required to be taken into account for this Plan or any plan described in paragraph (a) above to satisfy the qualification requirements under section 410 or section 401(a)(4) of the Code, and

(c)each other qualified pension, profit sharing or stock bonus plan of the aggregated employers which is not included in paragraph (a) or (b) above, but which the Employer elects to include in the aggregation group and which, when included, would not cause the aggregation group to fail to satisfy the qualification requirements under section 410 or section 401(a)(4) of the Code.

1.3. **Compensation**. Unless the context clearly requires otherwise, compensation means the wages, tips and other compensation paid to the Participant by the Employer and reportable in the box designated “wages, tips, other compensation” on Treasury Form W-2 (or any comparable successor box or form) for the applicable period but determined without regard to any rules that limit the remuneration included in wages based on the nature or location of the employment or the services performed (such as the exception for agricultural labor in section 3401(a)(2) of the Code). Compensation for this purpose shall include amounts contributed or deferred by the Employer on behalf of the Participant that are not includible in gross income under sections 125, 132(f), 402(e)(3), 402(h), 403(b), 414(h)(2) and 457 of the Code including contributions authorized by the Participant under a cafeteria plan or any qualified cash or deferred arrangement under section 401(k) of the Code. For the purposes of this Appendix (excluding Section 1.6 of this Appendix), compensation for a Plan Year shall not exceed the annual compensation limit under section 401(a)(17) of the Code (which is $270,000 for the Plan Year ending December 31, 2017, as adjusted under the Code for cost-of-living increases).

1.4. **Determination Date**. Determination date means, for the first (1st) Plan Year of a plan, the last day of such first (1st) Plan Year, and for each subsequent Plan Year, the last day of the immediately preceding Plan Year.

1.5. **Five Percent Owner**. Five percent owner means for each aggregated employer that is a corporation, any person who owns (or is considered to own within the meaning of the shareholder attribution rules) more than five percent (5%) of the value of the outstanding stock of the corporation or stock possessing more than five percent (5%) of the total combined voting power of the corporation, and, for each aggregated employer that is not a corporation, any person who owns more than five percent (5%) of the capital interest or the profits interest in such aggregated employer. For the purposes of determining ownership percentages, each corporation, partnership and proprietorship otherwise required to be aggregated shall be viewed as a separate entity.

1.6. **Key Employee**. Key employee means each Participant (whether or not then an employee) who at any time during the Plan Year is:

(a)an officer of any aggregated employer (excluding persons who have the title of an officer but not the authority and including persons who have the authority of an officer but not the title) having an annual compensation from all aggregated employers for such Plan Year in excess of $170,000 for the Plan Year ending December 31, 2016, (adjusted as provided in section 416(i)(1)(A) of the Code), or

(b)a five percent owner, or

(c)a one percent owner having an annual compensation from the aggregated employers of more than One Hundred Fifty Thousand Dollars ($150,000);

provided, however, that no more than fifty (50) employees (or, if lesser, the greater of three of all the aggregated employers’ employees or ten percent of all the aggregated employers’ employees) shall be treated as officers. For the purposes of determining ownership percentages, each corporation, partnership and proprietorship otherwise required to be aggregated shall be viewed as a separate entity. For the purpose of determining compensation, all compensation received from all aggregated employers shall be taken into account. The term “key employee” shall include the beneficiaries of a deceased key employee.

1.7. **One Percent Owner**. One percent owner means, for each aggregated employer that is a corporation, any person who owns (or is considered to own within the meaning of the shareholder attribution rules) more than one percent (1%) of the value of the outstanding stock of the corporation or stock possessing more than one percent (1%) of the total combined voting power of the corporation, and, for each aggregated employer that is not a corporation, any person who owns more than one percent (1%) of the capital or the profits interest in such aggregated employer. For the purposes of determining ownership percentages, each corporation, partnership and proprietorship otherwise required to be aggregated shall be viewed as a separate entity.

1.8. **Shareholder Attribution Rules**. Shareholder attribution rules means the rules of section 318 of the Code, (except that subparagraph (C) of section 318(a)(2) of the Code shall be applied by substituting “5 percent” for “50 percent”) or, if the Employer is not a corporation, the rules determining ownership in such Employer which shall be set forth in regulations prescribed by the Secretary of the Treasury.

1.9. **Top Heavy Aggregation Group**. Top heavy aggregation group means any aggregation group for which, as of the determination date, the sum of:

(i) the present value of the cumulative accrued benefits for key employees under all defined benefit plans included in such aggregation group, and

(ii) the aggregate of the accounts of key employees under all defined contribution plans included in such aggregation group,

exceed sixty percent (60%) of a similar sum determined for all employees. In applying the foregoing, the following rules shall be observed:

(a) For the purpose of determining the present value of the cumulative accrued benefit for any employee under a defined benefit plan, or the amount of the account of any employee under a defined contribution plan, such present value or amount shall be increased by the aggregate distributions made with respect to such employee under the plan on account of separation from service, death or disability during the one (1) year period ending on the determination date and the aggregate distributions made with respect to such employee under the plan for any other reason during the five (5) year period ending on the determination date.

(b) Any rollover contribution (or similar transfer) initiated by the employee, made from a plan maintained by one employer to a plan maintained by another employer and made after December 31, 1983, to a plan shall not be taken into account with respect to the transferee plan for the purpose of determining whether such transferee plan is a top heavy plan (or whether any aggregation group which includes such plan is a top heavy aggregation group). Any rollover contribution (or similar transfer) not described in the preceding sentence shall be taken into account with respect to the transferee plan for the purpose of determining whether such transferee plan is a top heavy plan (or whether any aggregation group which includes such plan is a top heavy aggregation group).

(c) If any individual is not a key employee with respect to a plan for any Plan Year, but such individual was a key employee with respect to a plan for any prior Plan Year, the cumulative accrued benefit of such employee and the account of such employee shall not be taken into account.

(d) The determination of whether a plan is a top heavy plan shall be made once for each Plan Year of the plan as of the determination date for that Plan Year.

(e) In determining the present value of the cumulative accrued benefits of employees under a defined benefit plan, the determination shall be made as of the actuarial valuation date last occurring during the twelve (12) months preceding the determination date and shall be determined on the assumption that the employees terminated employment on the valuation date except as provided in section 416 of the Code and the regulations thereunder for the first and second Plan Years of a defined benefit plan. The accrued benefit of any employee (other than a key employee) shall be determined under the method which is used for accrual purposes for all plans of the employer or if there is no method which is used for accrual purposes under all plans of the employer, as if such benefit accrued not more rapidly than the slowest accrual rate permitted under section 411(b)(1)(C) of the Code. In determining this present value, the mortality and interest assumptions shall be those which would be used by the Pension Benefit Guaranty Corporation in valuing the defined benefit plan if it terminated on such valuation date. The accrued benefit to be valued shall be the benefit expressed as a single life annuity.

(f) In determining the accounts of employees under a defined contribution plan, the account values determined as of the most recent asset valuation occurring within the twelve (12) month period ending on the determination date shall be used. In addition, amounts required to be contributed under either the minimum funding standards or the plan's contribution formula shall be included in determining the account. In the first year of the plan, contributions made or to be made as of the determination date shall be included even if such contributions are not required.

(g) If any individual has not performed any services for any employer maintaining the plan at any time during the one (1) year period ending on the determination date, any accrued benefit of the individual under a defined benefit plan and the account of the individual under a defined contribution plan shall not be taken into account.

(h) For this purpose, a terminated plan shall be treated like any other plan and must be aggregated with other plans of the employer if it was maintained within the last five (5) years ending on the determination date for the Plan Year in question and would, but for the fact that it terminated, be part of the aggregation group for such Plan Year.

1.10. **Top Heavy Plan**. Top heavy plan means a qualified plan under which (as of the determination date):

(i) if the plan is a defined benefit plan, the present value of the cumulative accrued benefits for key employees exceeds sixty percent (60%) of the present value of the cumulative accrued benefits for all employees, and

(ii) if the plan is a defined contribution plan, the aggregate of the accounts of key employees exceeds sixty percent (60%) of the aggregate of all of the accounts of all employees.

In applying the foregoing, the following rules shall be observed:

(a) Each plan of an Employer required to be included in an aggregation group shall be a top heavy plan if such aggregation group is a top heavy aggregation group.

(b) For the purpose of determining the present value of the cumulative accrued benefit for any employee under a defined benefit plan, or the amount of the account of any employee under a defined contribution plan, such present value or amount shall be increased by the aggregate distributions made with respect to such employee under the plan on account of severance from employment, death or disability during the one (1) year period ending on the determination date and the aggregate distributions made with respect to such employee under the plan for any other reason during the five (5) year period ending on the determination date.

(c) Any rollover contribution (or similar transfer) initiated by the employee, made from a plan maintained by one employer to a plan maintained by another employer and made after December 31, 1983, to a plan shall not be taken into account with respect to the transferee plan for the purpose of determining whether such transferee plan is a top heavy plan (or whether any aggregation group which includes such plan is a top heavy aggregation group). Any rollover contribution (or similar transfer) not described in the preceding sentence shall be taken into account with respect to the transferee plan for the purpose of determining whether such transferee plan is a top heavy plan (or whether any aggregation group which includes such plan is a top heavy aggregation group).

(d) If any individual is not a key employee with respect to a plan for any Plan Year, but such individual was a key employee with respect to the plan for any prior Plan Year, the cumulative accrued benefit of such employee and the account of such employee shall not be taken into account.

(e) The determination of whether a plan is a top heavy plan shall be made once for each Plan Year of the plan as of the determination date for that Plan Year.

(f) In determining the present value of the cumulative accrued benefits of employees under a defined benefit plan, the determination shall be made as of the actuarial valuation date last occurring during the twelve (12) months preceding the determination date and shall be determined on the assumption that the employees terminated employment on the valuation date except as provided in section 416 of the Code and the regulations thereunder for the first and second Plan Years of a defined benefit plan. The accrued benefit of any employee (other than a key employee) shall be determined under the method which is used for accrual purposes for all plans of the employer or if there is no method which is used for accrual purposes under all plans of the employer, as if such benefit accrued not more rapidly than the slowest accrual rate permitted under section 411(b)(1)(C) of the Code. In determining this present value, the mortality and interest assumptions shall be those which would be used by the Pension Benefit Guaranty Corporation in valuing the defined benefit plan if it terminated on such valuation date. The accrued benefit to be valued shall be the benefit expressed as a single life annuity.

(g) In determining the accounts of employees under a defined contribution plan, the account values determined as of the most recent asset valuation occurring within the twelve (12) month period ending on the determination date shall be used. In addition, amounts required to be contributed under either the minimum funding standards or the plan’s contribution formula shall be included in determining the account. In the first year of the plan, contributions made or to be made as of the determination date shall be included even if such contributions are not required.

(h) If any individual has not performed any services for any employer maintaining the plan at any time during the one (1) year period ending on the determination date, any accrued benefit of the individual under a defined benefit plan and the account of the individual under a defined contribution plan shall not be taken into account.

(i) For this purpose, a terminated plan shall be treated like any other plan and must be aggregated with other plans of the employer if it was maintained within the last five (5) years ending on the determination date for the Plan Year in question and would, but for the fact that it terminated, be part of the aggregation group for such Plan Year.

(j) A plan shall not be a top heavy plan if it consists solely of (i) a cash or deferred arrangement which meets the requirements of section 401(k)(12) or section 401(k)(13) of the Code, and (ii) matching contributions which meet the requirements of section 401(m)(11) or section 401(m)(12) of the Code. If, but for the preceding sentence, a plan would be treated as a top heavy plan because it is a member of an aggregation group which is a top heavy group, contributions under the Plan may be taken into account in determining whether any other plan in the group meets the requirements of Section 3.3.

SECTION 2

DETERMINATION OF TOP HEAVINESS

Once each Plan Year, as of the determination date for that Plan Year, the administrator of this Plan shall determine if this Plan is a top heavy plan.

SECTION 3

CONTINGENT PROVISIONS

3.1. **When Applicable**. If this Plan is determined to be a top heavy plan for any Plan Year, the following provisions shall apply for that Plan Year (and, to the extent hereinafter specified, for subsequent Plan Years), notwithstanding any provisions to the contrary in the Plan.

3.2. **Vesting Requirement**.

3.2.1. **General Rule**. During any Plan Year that the Plan is determined to be a Top Heavy Plan, then all accounts of all Participants in a defined contribution plan that is a top heavy plan and the accrued benefits of all Participants in a defined benefit plan that is a top heavy plan shall be vested and nonforfeitable in accordance with the following schedule if, and to the extent, that it is more favorable than other provisions of the Plan:

If the Participant Has Completed the Following <u>Years of Vesting Service:</u>	His Vested Percentage <u>Shall Be:</u>
Less than 2 years	0%
2 years but less than 3 years	20%
3 years but less than 4 years	40%
4 years but less than 5 years	60%
5 years but less than 6 years	80%
6 years or more	100%

3.2.2. **Subsequent Year**. In each subsequent Plan Year that the Plan is determined not to be a top heavy plan, the other nonforfeitability provisions of the Plan (and not this section) shall apply in determining the vested and nonforfeitable rights of Participants who do not have five (5) or more years of Vesting Service (three or more years of Vesting Service for Participants who have one or more Hours of Service in any Plan Year beginning after December 31, 1988) as of the beginning of such subsequent Plan Year; provided, however, that they shall not be applied in a manner which would reduce the vested and nonforfeitable percentage of any Participant.

3.2.3. **Cancellation of Benefit Service**. If this Plan is a defined benefit plan and if the Participant's vested percentage is determined under this Appendix and if a Participant receives a lump sum distribution of the present value of the vested portion of his accrued benefit, the Plan shall:

(a) thereafter disregard the Participant's service with respect to which he received such distribution in determining his accrued benefit, and

(b) permit the Participant who receives a distribution of less than the present value of his entire accrued benefit to restore this service by repaying (after returning to employment covered under the Plan) to the trustee the amount of such distribution together with interest at the interest rate of five percent (5%) per annum compounded annually (or such other interest rate as is provided by law for such repayment). If the distribution was on account of severance from employment such repayment must be made before the earlier of,

(i) five (5) years after the first date on which the Participant is subsequently reemployed by the employer, or

(ii) the close of the first period of five (5) consecutive one-year breaks in service commencing after the distribution.

If the distribution was on account of any other reason, such repayment must be made within five (5) years after the date of the distribution.

3.3. **Defined Contribution Plan Minimum Benefit Requirement**.

3.3.1. **General Rule**. If this Plan is a defined contribution plan, then for any Plan Year that this Plan is determined to be a top heavy plan, the Employer shall make a contribution for allocation to the account of each employee who is a Participant for that Plan Year and who is not a key employee in an amount (when combined with other Employer contributions and forfeited accounts allocated to his account, including matching contributions as defined in section 401(m)(4)(A) of the Code) which is at least equal to three percent (3%) of such Participant's compensation. (This minimum contribution amount shall be further reduced by all other Employer contributions to this Plan or any other defined contribution plans.) This contribution shall be made for each Participant who has not separated from service with the Employer at the end of the Plan Year (including for this purpose any Participant who is then on temporary layoff or authorized leave of absence or who, during such Plan Year, was inducted into the Armed Forces of the United States from employment with the Employer) including, for this purpose, each employee of the Employer who would have been a Participant if he had: (i) completed one thousand (1,000) Hours of Service (or the equivalent) during the Plan Year, and (ii) made any mandatory contributions to the Plan, and (iii) earned compensation in excess of the stated amount required for participation in the Plan.

3.3.2. **Special Rule**. Subject to the following rules, the percentage referred to in Section 3.3.1 of this Appendix shall not exceed the percentage at which contributions are made (or required to be made) under this Plan for the Plan Year for that key employee for whom that percentage is the highest for the Plan Year.

(a) The percentage referred to above shall be determined by dividing the Employer contributions for such key employee for such Plan Year by his compensation for such Plan Year.

(b) For the purposes of this Section 3.3, all defined contribution plans required to be included in an aggregation group shall be treated as one (1) plan.

(c) The exception contained in this Section 3.3.2 shall not apply to (be available to) this Plan if this Plan is required to be included in an aggregation group if including this Plan in an aggregation group enables a defined benefit plan to satisfy the qualification requirements of section 410 or section 401(a)(4) of the Code.

3.4. **Defined Benefit Plan Minimum Benefit Requirement**.

3.4.1. **General Rule**. If this Plan is a defined benefit plan, then for any Plan Year that the Plan is determined to be a top heavy plan, the accrued benefit for each Participant who is not a key employee shall not be less than one-twelfth (l/12th) of the applicable percentage of the Participant's average compensation for years in the testing period.

3.4.2. **Special Rules and Definitions**. In applying the general rule of Section 3.4.1 of this Appendix, the following special rules and definitions shall apply:

(a) The term "applicable percentage" means the lesser of:

(i) two percent (2%) multiplied by the number of years of service with the Employer, or

(ii) twenty percent (20%).

(b) For the purpose of this Section 3.4, a Participant's years of service with the Employer shall be equal to the Participant's Vesting Service except that a year of Vesting Service shall not be taken into account if:

(i) the Plan was not a top heavy plan for any Plan Year ending during such year of Vesting Service, or

(ii) such year of Vesting Service was completed in a Plan Year beginning before January 1, 1984, or

(iii) the service occurs during a Plan Year when the Plan benefits (within the meaning of section 410(b) of the Code) no key employee or former key employee.

(c) A Participant's "testing period" shall be the period of five (5) consecutive years during which the Participant had the greatest compensation from the Employer; provided, however, that:

(i) the years taken into account shall be properly adjusted for years not included in a year of service, and

(ii) a year shall not be taken into account if such year ends in a Plan Year beginning before January 1, 1984, or such year begins after the close of the last year in which the Plan was a top heavy plan.

(d) An individual shall be considered a Participant for the purpose of accruing the minimum benefit only if such individual has at least one thousand (1,000) Hours of Service during a benefit accrual computation period (or equivalent service determined under Department of Labor regulations). Furthermore, such individual shall accrue a minimum benefit only for a benefit accrual computation period in which such individual has one thousand (1,000) Hours of Service (or equivalent service). An individual shall not fail to accrue the minimum benefit merely because the individual: (i) was not employed on a specified date, or (ii) was excluded from participation (or otherwise failed to accrue a benefit) because the individual's compensation was less than a stated amount, or (iii) because the individual failed to make any mandatory contributions.

3.4.3. **Accruals Preserved**. In years subsequent to the last Plan Year in which this Plan is a top heavy plan, the other benefit accrual rules of the Plan shall be applied to determine the accrued benefit of each Participant, except that the application of such other rules shall not serve to reduce a Participant's accrued benefit as determined under this Section 3.4.

3.5. **Priorities Among Plans**. In applying the minimum benefit provisions of this Appendix in any Plan Year that this Plan is determined to be a top heavy plan, the following rules shall apply:

(a) If an employee participates only in this Plan, the employee shall receive the minimum benefit applicable to this Plan.

(b) If an employee participates in both a defined benefit plan and a defined contribution plan and only one (1) of such plans is a top heavy plan for the Plan Year, the employee shall receive the minimum benefit applicable to the plan which is a top heavy plan.

(c) If an employee participates in both a defined contribution plan and a defined benefit plan and both are top heavy plans, then the employee, for that Plan Year, shall receive the defined benefit plan minimum benefit unless for that Plan Year the employee has received employer contributions and forfeitures allocated to his account in the defined contribution plan in an amount which is at least equal to five percent (5%) of his compensation.

(d) If an employee participates in two (2) or more defined contribution plans which are top heavy plans, then the employee, for that Plan Year, shall receive the defined contribution plan minimum benefit in that defined contribution plan which has the earliest original effective date.

3.6. **Bargaining Units**. The requirements of Section 3.2 through Section 3.5 of this Appendix shall not apply with respect to any employee included in a unit of employees covered by an agreement which the Secretary of Labor finds to be a collective bargaining agreement between employee representatives and one (1) or more employers if there is evidence that retirement benefits are the subject of good faith bargaining between such employee representatives and such employer or employers.

APPENDIX C

[RESERVED]

APPENDIX D

401(k), 401(m) & 402(g) COMPLIANCE

Introduction. This Appendix D contains rules for complying with the nondiscrimination provisions of sections 401(k) and 401(m) of the Code and the limitations imposed under section 402(g) of the Code.

Priority. Determinations under this Appendix shall be made in the following order:

(1) Excess deferrals under Section 1,

(2) Excess contributions under Section 2,

(3) Excess aggregate contributions under Section 3.

The amount of excess contributions shall be reduced by excess deferrals previously distributed to such Participant for the Participant's taxable year ending with or within such Plan Year.

SECTION 1

SECTION 402(g) COMPLIANCE

1.1. **Excess Deferrals**.

1.1.1. **In General**. A Participant may attribute to this Plan any excess deferrals made during a taxable year of the Participant by notifying the Committee in writing not later than the March 1 following such taxable year of the amount of the excess deferral to be assigned to the Plan. A Participant shall be deemed to have notified the Plan of excess deferrals to the extent the Participant has excess deferrals for the taxable year calculated by taking into account only the amount of Elective Contributions (both Pre-Tax Elective Contributions and Roth Contributions) allocated to the Participant's Retirement Savings Account and, if applicable, Roth Account, and to any other plan of the Employer and Affiliates. Notwithstanding any other provision of the Plan, a Participant's excess deferrals, plus any income and minus any loss allocable thereto, shall be distributed to the Participant no later than the first April 15 following the close of the Participant's taxable year. If a Participant is eligible to make Catch-up Contributions pursuant to Section 2 of the Plan but such Participant does not make Catch-up Contributions or does not make the maximum allowable Catch-up Contributions for such taxable year, then the Participant's excess deferrals shall first be re-characterized as Catch-up Contributions, to the extent permitted under section 414(v) of the Code, and any remaining excess deferrals, plus any income and minus any loss allocable thereto, shall be distributed to the Participant no later than the first April 15 following the close of the Participant's taxable year.

1.1.2. **Definitions**. For purposes of this Appendix, excess deferrals shall mean the amount of Elective Contributions (both Pre-Tax Elective Contributions and Roth Contributions) allocated to the Participant's Retirement Savings Account and, if applicable, Roth Account, for a Participant's taxable year and which the Participant or the Employer, where applicable, allocates to this Plan pursuant to the claim procedure described below.

1.1.3. **Claims**. The Participant's claim shall be in writing; shall be submitted to the Committee not later than March 1 with respect to the immediately preceding taxable year; shall specify the amount of the Participant's excess deferrals for the preceding taxable year; and shall be accompanied by the Participant's written statement that if such amounts are not distributed, such excess deferrals, when added to amounts deferred under other plans or arrangements described in sections 401(k), 402A. 408(k), 408(p), 457, 501(c)(18) or 403(b) of the Code, will exceed the limit imposed on the Participant by section 402(g) of the Code for the taxable year in which the deferral occurred. If the Participant made any Roth Contributions during the preceding taxable year, the Participant's claim shall also specify the extent to which, if any, the excess deferrals are comprised of Roth Contributions. The Employer shall notify the Plan on behalf of the Participant where the excess deferrals occur in the Plan or the combined plans of the Employer and Affiliates. Such notification shall provide that distribution of the excess deferrals shall be made first from the Participant's Retirement Savings Account, to the extent Pre-Tax Elective Contributions were made for the taxable year, and then from the Participant's Roth Account to the extent Roth Contributions were made for the taxable year, unless the Participant elects otherwise.

1.1.4. **Determination of Income or Loss**. The excess deferrals shall be adjusted for income or loss for the taxable year (but not the gap period). Unless the Committee and the recordkeeper for the Plan agree otherwise in writing, the income or loss allocable to excess deferrals shall be determined by multiplying the income or loss allocable to the Participant's Elective Contributions for the Plan Year ending within such taxable year by a fraction, the numerator of which is the excess deferrals on behalf of the Participant for such taxable year and the denominator of which is the sum of the Participant's account balances attributable to Elective Contributions (both Pre-Tax Elective Contributions and Roth Contributions) as of the beginning of the taxable year plus Elective Contributions (both Pre-Tax Elective Contributions and Roth Contributions) for the taxable year.

1.1.5. **Accounting for Excess Deferrals**. Excess deferrals shall be distributed from the Participant's Retirement Savings Account, and, if applicable, the Participant's Roth Account.

1.1.6. **Orphaned Matching Contributions**. If excess deferrals are distributed pursuant to this Section 1.1, applicable matching contributions under Section 3.3 of the Plan shall be treated as forfeitures and reallocated as provided in Section 6.2 of the Plan.

SECTION 2

SECTION 401(k) COMPLIANCE

This Plan satisfies the nondiscrimination requirements of section 401(k) of the Code using the alternative method set forth in section 401(k)(12) of the Code.

SECTION 3

SECTION 401(m) COMPLIANCE

This Plan satisfies the nondiscrimination requirements of section 401(m) of the Code using the alternative method set forth in section 401(m)(11) of the Code.

APPENDIX E
DISTRIBUTION OF PENSION ACCOUNTS

SECTION 1

INTRODUCTION

If a distribution is requested from a Participant's Pension Account, the distribution rules of Section 7 of the Plan shall apply, as modified by this Appendix E. Terms defined in the Plan shall have the same meaning when used in this Appendix. In addition, when used in this Appendix, the following terms shall have the following meanings:

1.1. **Life Annuity Contract**. A Life Annuity contract is an immediate annuity contract issued as an individual policy or under a group or master contract which provides for a monthly annuity payable to and for (i) the lifetime of an unmarried Participant beginning as of the date of distribution, or (ii) the lifetime of the surviving spouse of a Participant beginning as of the date of distribution. The contract shall be a Life Annuity contract only if it is issued on a premium basis which does not discriminate on the basis of the sex of the Participant or the surviving spouse.

1.2. **QJ&SA Contract**. A QJ&SA contract is an immediate annuity contract issued as an individual policy or under a master or group contract which provides for a monthly annuity payable to and for the lifetime of the Participant beginning as of the date as of which it is purchased with a survivor annuity payable monthly after the death of the Participant to and for the lifetime of the surviving spouse of the Participant (to whom the Participant was married on the date as of which the first payment is due) in an amount equal to fifty percent (50%) (unless the Participant elects an alternative seventy-five percent (75%)) of the amount payable during the joint lives of the Participant and the surviving spouse. The seventy-five percent (75%) QJ&SA contract shall be equal to the value of the fifty percent (50%) QJ&SA contract. The contract shall be a QJ&SA contract only if it is issued on a premium basis which does not discriminate on the basis of the sex of the Participant or the surviving spouse.

SECTION 2

DISTRIBUTIONS TO PARTICIPANTS

2.1. **Spousal Consent Required**. If a Participant's Vested Pension Account exceeds Five Thousand Dollars ($5,000) at the time of distribution, the consent of such Participant's spouse shall be required to make distributions from the Plan in any form other than a QJ&SA Contract.

2.2. **Forms of Distribution**. At the direction of the Committee (subject to Section 2.3 of this Appendix E), the Trustee shall make distribution of the Participant's Vested Pension Account to the Participant in one of the following ways as the Participant shall designate:

(a)**Lump Sum**. Distribution of a Participant's Vested Total Account shall be made in a single lump sum.

(b)**Life Annuities**. Distribution of a Participant's Vested Total Account shall be made in a lump sum, and with respect to a Participant's Vested Pension Account, by purchasing and distributing a single premium, immediate (not deferred), fixed (not variable) annuity contract which shall be nontransferable to anyone but the issuer, and which shall provide for benefits which are hereinafter defined as a QJ&SA contract in the case of a married Participant, or a Life Annuity contract in the case of an unmarried Participant.

2.3. **Presumptive Form**. The selection of a form of distribution shall be subject, however, to the following rules:

(a)**Required Lump Sum**. If the value of the Participant's Vested Pension Account does not exceed Five Thousand Dollars ($5,000), the only form of distribution available is a single lump sum. If the value of the Participant's

Vested Total Account does not exceed One Thousand Dollars ($1,000), the distribution shall be made in a single lump sum without an application for distribution as provided in Section 7.1.1(a).

(b)**Married Participant**. In the case of any distribution which is to be made:

(i)when paragraph (a) above is not applicable, and

(ii)to a Participant who is married on the date when such distribution is to be made, and

(iii)to a Participant who has not rejected distribution in the form of a QJ&SA contract,

distribution shall be effected for such Participant by applying the entire Vested Pension Account to purchase and distribute to such Participant a QJ&SA contract. A Participant may reject distribution in the form of a QJ&SA contract by filing with the Committee an affirmative written rejection of distribution in that form and an election of a lump sum form of distribution not more than ninety (90) days before the date of distribution. Such a rejection may be made or revoked at any time and any number of times until the date of distribution. A rejection shall not be effective unless the Participant's spouse consents. To be valid, the consent of the spouse must be in writing, must acknowledge the effect of the distribution, must be witnessed by a notary public, must be given during the ninety (90) day period before the date of distribution and must relate to that specific distribution. The consent of the spouse must be to a lump sum form of distribution. The Participant may elect to change the form of distribution to the QJ&SA contract without any requirement of further spousal consent. The consent of the spouse shall be irrevocable and shall be effective only with respect to that spouse. Distribution shall not commence more than ninety (90) days after nor, subject to Section 4.1 of this Appendix E, less than thirty (30) days after the date the Participant is furnished with a written explanation of the terms and conditions of the QJ&SA contract, the Participant's right to reject, and the effect of rejecting distribution in the form of the QJ&SA contract, the requirement for the consent of the Participant's spouse, the right to revoke a prior rejection of distribution in the form of a QJ&SA contract, and the right to make any number of further revocations or rejections until the date of distribution.

(c)**Unmarried Participant**. In the case of any distribution which is to be made:

(i)when paragraph (a) above is not applicable, and

(ii)to a Participant who is not married on the date when such distribution is to be made, and

(iii)to a Participant who has not rejected distribution in the form of a Life Annuity contract,

distribution shall be effected for such Participant by applying the entire Vested Pension Account to purchase and distribute to such Participant a Life Annuity contract. A Participant may reject distribution in the form of a Life Annuity contract by filing with the Committee an affirmative written rejection of distribution in that form and an election of a lump sum form of distribution permitted not more than ninety (90) days before the date of distribution. Such a rejection may be made or revoked at any time and any number of times until the date of distribution. Distribution shall not commence more than ninety (90) days after nor, subject to Section 4.1 of this Appendix E, less than thirty (30) days after the date the Participant is furnished with a written explanation of the terms and conditions of the Life Annuity contract, the Participant's right to reject, and the effect of rejecting distribution in the form of the Life Annuity contract, the right to revoke a prior rejection of distribution in the form of a Life Annuity contract, and the right to make any number of further revocations or rejections until the date of distribution.

SECTION 3

DISTRIBUTIONS TO BENEFICIARIES

3.1. **Form of Distribution**. At the direction of the Committee (subject to Section 3.2 of this Appendix E), the Trustee shall make distribution of the Participant's Vested Pension Account to the Beneficiary in one the following ways as the Beneficiary shall designate:

(a)**Lump Sum**. Distribution of a Participant's Vested Total Account shall be made in a single lump sum payment.

(b)**Life Annuities for Surviving Spouse**. If the Beneficiary is the surviving spouse of a Participant, distribution of the Participant's Vested Total Account shall be made in a lump sum, and with respect to the Participant's Vested Pension Account, by purchasing and distributing a single premium, immediate (not deferred), fixed (not variable), annuity contract which shall be nontransferable to anyone but the issuer, and which shall provide for benefits which are hereinafter defined as a Life Annuity contract.

3.2. **Presumptive Form**. The selection of a form of distribution shall be subject, however, to the following rules:

(a)**Required Lump Sum**. If the value of the Participant's Vested Pension Account does not exceed Five Thousand Dollars ($5,000), the only form of distribution available is a single lump sum. If the value of the Participant's Vested Total Account does not exceed One Thousand Dollars ($1,000), the distribution shall be made in a single lump sum without an application for distribution as provided in Section 7.3.1(a) of the Plan.

(b)**Surviving Spouse Beneficiary**. In the case of a distribution which is made:

(i)when paragraph (a) above is not applicable, and

(ii)to the surviving spouse of a Participant, and

(iii)when such surviving spouse has not rejected distribution in the form of a Life Annuity contract,

distribution shall be effected for such surviving spouse by applying the entire Vested Pension Account to purchase and distribute to such surviving spouse a Life Annuity contract. A surviving spouse may reject distribution in the form of a Life Annuity contract by filing with the Committee an affirmative written rejection of distribution in that form and an election of a lump sum form of distribution not more than ninety (90) days before the date of distribution. Such a rejection may be made or revoked at any time and any number of times until the date of distribution. Distribution shall not commence more than ninety (90) days after nor, subject to Section 4.1 of this Appendix E, less than thirty (30) days after the date the surviving spouse is furnished a written explanation of the terms and conditions of the Life Annuity contract, the surviving spouse's right to reject, and the effect of a rejection of distribution in the form of the Life Annuity contract, the right to revoke a prior rejection of distribution in the form of a Life Annuity contract, and the right to make any number of further revocations or rejections until the date of distribution.

SECTION 4

NOTICE REQUIREMENTS

Section 7.5.1 of the Plan is modified to read as follows for all distributions made to a Participant or a Beneficiary from the Participant's Vested Pension Account:

4.1. **Notices**. The Committee will issue such notices as may be required under sections 402(f), 411(a)(11), 417(a)(3) and other sections of the Code in connection with distributions from the Plan, and no distribution will be made unless it is consistent with such notice requirements. For all notices given in Plan Years beginning on or after January 1, 2007, such notification shall also include a description of the consequences of failing to defer receipt of a distribution. Generally, distributions may not commence as of a date that is more than ninety (90) days or less than thirty (30) days after such notices are given to the Participant. Distribution may commence less than thirty (30) days after the notice required under section 1.411(a)-11(c) of the income tax regulations or the notice required under section 1.402(f)-1 of the income tax regulations is given, provided however, that:

(a)the Committee clearly informs the distributee that the distributee has a right to a period of at least thirty (30) days after receiving such notices to consider whether or not to elect distribution and, if applicable, to elect a particular distribution option; and

(b)the distributee, after receiving the notice, affirmatively elects a distribution; and

(c)the distributee may revoke an affirmative distribution election by notifying the Committee of such revocation prior to the date as of which such distribution is to be made; and

(d)the date of distribution is at least seven (7) days after the date the distributee received the notice required under section 417(a)(3) of the Code.

SECTION 5

BENEFICIARY DESIGNATION

5.1. **Right to Designate**. Each Participant may designate, upon forms to be furnished by and filed with the Committee, one or more primary Beneficiaries or alternative Beneficiaries to receive all or a specified part of the Participant's Vested Pension Account in the event of the Participant's death. The Participant may change or revoke any such designation from time to time without notice to or consent from any Beneficiary or spouse. No such designation, change or revocation shall be effective unless executed by the

Participant and received by the Committee during the Participant's lifetime. If, however, such designation of a Beneficiary is made before the first day of the Plan Year in which the Participant attains age thirty-five (35) years and the Participant dies on or after that date while married, the Beneficiary designation with respect to the Vested Pension Account is void.

APPENDIX F

DISTRIBUTION OF ESOP ACCOUNTS

SECTION 1

INTRODUCTION

If a distribution is requested from a Participant's ESOP Account, the distribution rules of Section 7 of the Plan shall apply, as modified by this Appendix F. Terms defined in the Plan shall have the same meaning when used in this Appendix.

SECTION 2

IN-SERVICE DISTRIBUTIONS

2.1. **In-Service Distributions**. Effective, October 15, 2005, a Participant may receive a distribution while employed from all or a portion of such Participant's Vested ESOP Account. To receive such a distribution, the Participant must apply to the Committee. In the application, the Participant shall specify the amount to be distributed. Such distribution shall be approved by the Committee and such distribution shall be made in a lump sum payment as soon as administratively practicable following the approval of the application by the Committee. The Committee may prescribe rules regarding the form of such application, the method of filing such application (including telephonic, electronic or similar methods) and the information required to be furnished in connection with such application.

2.2. **Spousal Consent Not Required**. Spousal consent shall not be required to make an in-service distribution to a married Participant.

2.3. **Coordination with Section 4.1**. If a distribution is made from an ESOP Account which is invested in more than one (1) Subfund authorized and established under Section 4.1, the amount distributed shall be charged to each Subfund in the same proportions as the ESOP Account is invested in each Subfund.

SECTION 3

DISTRIBUTIONS IN KIND OR IN CASH

The Participant (or Beneficiary) may elect distribution of the Participant's Vested ESOP Account in one of the following ways:

(a)entirely in Employer Securities (and such cash as may be necessary to represent fractional shares of such stock),

(b)Employer Securities solely for the portion of the Participant's Vested ESOP Account invested in the Entegris Stock Subfund and the remainder in cash (including cash as may be necessary to represent fractional shares), or

(c)entirely in cash.

In the absence of an election to receive Employer Securities, the portion of the Participant's Vested ESOP Account invested in the Entegris Stock Subfund shall be distributed in Employer Securities solely for the portion of the Participant's Vested ESOP Account invested in the Entegris Stock Subfund and the remainder in cash (including cash as may be necessary to represent fractional shares). In the case of cash distributions in lieu of shares or fractional shares of Employer Securities, such shares or fractional shares shall be valued as of the Valuation Date as of which distribution is made.

APPENDIX G

CERTAIN PROTECTED BENEFITS FOR

FORMER PARTICIPANTS IN THE
ATMI, INC. 401(K) PROFIT SHARING PLAN

AND

EMPLOYEES EMPLOYED BY
ADVANCED TECHNOLOGY MATERIALS, INC.,
ATMI PACKAGING, INC., AND
ATMI MATERIALS, INC.

Notwithstanding anything to the contrary in the Plan,

(1) The eligible automatic contribution arrangement under the ATMI, Inc. 401(k) Profit Sharing Plan (the “ATMI Plan”) shall remain in effect through December 31, 2014, and shall apply to all employees employed by Advanced Technology Materials, Inc., ATMI Packaging, Inc., and ATMI Materials, Inc. (collectively “ATMI”) who are hired prior to that date. Accordingly, effective October 1, 2014, employees employed by ATMI will be eligible to enroll in the Plan in accordance with Section 2 of the Plan, but if such an employee has not made an affirmative election regarding the reduction of his Recognized Compensation under Section 2.4 of the Plan by his 60th Day of Service (as such term is defined in the ATMI Plan), he shall automatically have his Recognized Compensation reduced by five percent (5%) effective as soon as administratively feasible following his completion of 60 Days of Service. Notwithstanding the foregoing, the “eligible automatic contribution arrangement” described in this paragraph shall cease to apply effective January 1, 2015, and no employee will be automatically enrolled in the Plan pursuant to this Appendix G on or after January 1, 2015; and

(2) Any Participant for whom the Plan holds contributions made pursuant to the “eligible automatic contribution arrangement” under the ATMI Plan or under Section (1) of this Appendix G, may elect to withdraw amounts contributed pursuant to such “eligible automatic contribution arrangement” as permitted under Section 414(w) of the Code.

EXHIBIT 10.2

ENTEGRIS, INC.

2016 Performance Share Award Agreement

In consideration of services rendered to Entegris, Inc. (the "Company"), the Company may periodically make equity incentive awards consisting of performance based restricted stock units with respect to the Company's Common Stock $0.01 par value ("Stock") to certain key employees, non-employee directors, consultants or advisors of the Company under the Company's 2010 Stock Plan (the "Plan"). Any key employee, non-employee director, consultant or advisor (a "Participant") who receives a performance based restricted stock unit award (the "Award") is notified either in writing or via email and the Award is credited to the Participant's account as reflected on the Participant's Overview tab under the Restricted Stock Plan section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com. By clicking on the "Accept" button for the Award in the Restricted Stock Plan section on the Overview tab or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company's most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I - PERFORMANCE BASED RESTRICTED STOCK UNIT AWARD

1.1. *Award Date*. This Agreement shall take effect as of the date specified in the Restricted Stock Plan section on the Overview tab as the Award Date provided to you online at www.stockplanconnect.com (the "Award Date").

1.2. *Performance Based Restricted Stock Units Subject to Award*. The Award consists of that number of performance based restricted stock units (the "PRSU") with respect to the Stock that has been approved for the Award to Participant by the Administrator as the target number of PSRUs ("Target PRSUs"); as noted above, the Award is reflected in the "My Awards" section of the Morgan Stanley Smith Barney Benefit Access web page. The Target PRSUs shall be subject to increase or decrease in accordance with Sections 1.3 and 1.4 below. Each PRSU is equivalent to one share of the Stock. The Participant's rights to the PRSU are subject to the restrictions described in this Agreement and in the Plan (which is incorporated herein by reference with the same effect as if set forth herein in full) in addition to such other restrictions, if any, as may be imposed by law.

1.3. *Earned Performance Based Restricted Stock Units*. The number of PRSUs earned under this Agreement (the "Earned PRSUs") shall be equal to the Target PRSUs multiplied by the TSR Performance Multiplier (as defined herein). The "TSR Performance Multiplier" will be determined by comparing the Company's total stockholder return to the total stockholder return of each of the companies in the Comparator Peer Group (as set forth below) over the period commencing on the Award Date and ending on the third anniversary of the Award Date (the "Performance Period") to determine the Company's TSR ranking against the Comparator Group. For purposes of computing total stockholder return: **(i)**, any dividends paid by the Company or the companies in the Comparator Group shall be treated as having been reinvested; and **(ii)** the beginning stock price will be the average stock price over the 20 trading days ending on the Award Date and the ending stock price will be the average stock price over the 20 trading days period ending on the last day of the Performance Period.

1.4. *Calculation of the TSR Performance Multiplier*. The TSR Performance Multiplier will be calculated as set forth in the following table based upon the Company's total stockholder return over the Performance Period when ranked against the total stockholder return over the Performance Period of each of the companies in the Comparator Peer Group:

Company TSR Percentile Rank	**TSR Performance Multiplier**
Below 25th percentile	0
25th percentile	50%
50th percentile	100%
75th percentile or above	150%

If the Company's total stockholder return percentile rank during the Performance Period is between the 25th and the 50th percentiles or 50th and 75th percentiles, the TSR Performance Multiplier will be determined using straight line interpolation based on the actual percentile ranking. As used herein, the "Comparator Peer Group" consists of those companies that are in the Philadelphia Semiconductor Index on the Award Date. The Award shall be subject to the following limitations: **(i)** if the Company's absolute total shareholder return is negative then the maximum number of shares that may be earned is the Target PRSUs; and **(ii)** in no event may the value of the Award at vesting exceed 300% of the value of the Target PRSUs on the Award Date; the number of PRSUs vested shall be reduced to meet the foregoing absolute dollar cap.

1.5. *Vesting of PRSUs*. The term "vest" as used herein with respect to any PRSU means the lapsing of the restrictions described herein with respect to such PRSU. The Award shall not be vested as of the Award Date and shall be forfeitable by the Participant without consideration or compensation in accordance with Section 1.6 below unless and until otherwise vested pursuant to the terms of this Agreement. The Participant has no rights, partial or otherwise, in the Award and/or any Stock subject thereto unless and until the Award has been earned pursuant to Section 1.3 and vested pursuant to this Section 1.5. A number of PRSUs equal to the Earned PSRUs will become 100% vested (referred to as "Vested Units") on the last day of the Performance Period (the "Maturity Date"), provided that the Participant remains continuously employed by the Company, an Affiliate, or a Subsidiary through the Maturity Date**.** Each Vested Unit shall be settled by the delivery of one share of Stock (subject to adjustment under the Plan). Settlement will occur as soon as practicable following certification by the Administrator of the number of Earned PRSUs and passage of the Maturity Date (or, if earlier, the date the Award becomes vested pursuant to the terms of Section 1.7 below), but in no event later than the earlier of (i) 90 days following the Maturity Date (or such earlier date that the Award becomes vested), or (ii) March 15th of the year following the year in which the Award becomes vested. No fractional Shares shall be issued pursuant to this Agreement.

1.6. *Forfeiture Risk*. If the Participant ceases to be employed or retained by the Company or an Affiliate for any reason any then outstanding and PRSU that is not a Vested Unit acquired by the Participant hereunder shall be automatically and immediately forfeited. The Participant hereby appoints the Company as the attorney-in-fact of the Participant to take such actions as may be necessary or appropriate to effectuate the cancellation of a forfeited PRSU.

1.7. *Early Vesting of PRSUs*. This Section sets forth the exclusive circumstances under which the Participant may become entitled to Vested Units even though he or she is not employed through the Maturity Date: **(i)** If the Participant dies, incurs a total and permanent disability (as that term is defined in the company's disability insurance policy in effect on the award date), or terminates employment on account of retirement from employment with the Company or an Affiliate at age 65 with ten consecutive years of employment with the Company or an Affiliate, prior to the Maturity Date, he or she shall continue to be entitled to receive the Earned PRSUs hereunder, to the extent earned, but the amount otherwise payable shall be prorated to reflect the portion of the Performance Period during which the Participant was employed. **(ii)** In the event of a Change in Control where the Award is not continued or assumed by a public company, the Earned PRSU, to the extent earned pursuant to the next sentence shall be fully vested immediately prior to the Change in Control. The number of Earned PRSUs at the time of a Change in Control shall be determined as of the date such Change in Control is consummated, rather than the Maturity Date (as defined in Section 1.5), with the number of Earned PRSUs determined as set forth in Section 1.4 above, based upon the Company's total stockholder return and the total stockholder return of each of the companies in the Comparator Peer Group through the date of the Change in Control (and, with respect to the Company, instead of the 20-business day average, taking into account the consideration per share to be paid in the Change in Control transaction). **(iii)** In the event of a Change in Control where the Award is continued or assumed by a public company, then payment of the Earned PRSUs calculated in accordance with clause (ii) above, shall continue to be contingent on the Participant's employment through the Maturity Date unless there is a Qualifying Termination within two years following the Change in Control. If a Qualifying Termination occurs, the restrictions on all unvested Earned PRSUs shall immediately lapse. The provisions of clauses (ii) and (iii) shall govern the Award notwithstanding the provisions of any Executive Change In Control Termination Agreement that may exist between the Company or an Affiliate and the Participant. **[**The distribution of any Vested Units occurring by reason of this Section 1.7 shall be settled by the delivery of one share of Stock (subject to adjustment under the Plan) per Vested Unit. Settlement will occur as soon as practicable following certification by the Administrator of the number of Earned PRSUs as of the date the Award becomes vested pursuant to the terms of this Section 1.7, but in no event later than the earlier of (A) 90 days following the date the Award becomes vested, or (B) March 15th of the year following the year in which the Award becomes vested.**]** No fractional Shares shall be issued pursuant to this Agreement.

1.8. *Nontransferability of PRSUs*. The PRSU acquired by the Participant pursuant to this Agreement shall not be sold, transferred, pledged, assigned or otherwise encumbered or disposed of except as provided below and in the Plan.

1.9. *Dividends, etc.*. The Participant shall not be entitled: **(i)** to receive any dividends or other distributions paid with respect to the Stock to which the PRSU relates, or **(ii)** to vote any Stock with respect to which the PRSU relates. Notwithstanding the foregoing, the number of Target PRSUs in the Award shall be deemed increased to the extent that dividends are paid on the Stock during the term of the Award and any dividend payments will be deemed reinvested on the ex-dividend date in additional Stock and dividends on such additional Stock shall be deemed reinvested in the same manner, with respect only to Earned PRSUs.

1.10. *Sale of Vested Shares*. The Participant understands that Participant will be free to sell any Stock with respect to which the PRSU relates once the PRSU has vested, subject to **(i)** satisfaction of any applicable tax withholding requirements with respect to the vesting of such RSU; **(ii)** the completion of any administrative steps (for example, but without limitation, the transfer of certificates) that the Company may reasonably impose; and **(iii)** applicable requirements of federal and state securities laws.

1.11. *Certain Tax Matters*. The Participant expressly acknowledges that the award or vesting of the PRSU acquired hereunder, may give rise to "wages" subject to withholding. The Participant expressly acknowledges and agrees that Participant's rights hereunder are subject to Participant promptly paying to the Company all taxes required to be withheld in connection with such award, vesting or payment. Until the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the vesting shares needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of vest) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account. The value of any Stock withheld for tax withholding may not exceed the amount allowed consistent with fixed plan accounting in accordance with generally accepted accounting practices in effect in the U.S., to the extent applicable.

Article II - GENERAL PROVISIONS

2.1. *Definitions*. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan. The following terms shall have the indicated meanings:

"Administrator" means the Management Development & Compensation Committee of the Company's Board of Directors.

"Affiliate" means a corporation or other legal entity that is controlled by, controls or is under common control with the Company.

"Cause" means the Company's termination of the Participant's employment with the Company or any Affiliate following the occurrence of any one or more of the following: (a) the Participant's conviction of, or plea of guilty or nolo contendere to, a felony; (b) the Participant's willful and continual failure to substantially perform the Participant's duties after written notification by the Company; (c) the Participant's willful engagement in conduct that is materially injurious to the Company or an Affiliate monetarily or otherwise; (d) the Participant's commission of an act of gross misconduct in connection with the performance of the Participant's duties; or (e) the Participant's material breach of any employment, confidentiality, or other similar agreement between the Company or an Affiliates and the Participant.

"Change in Control" means, with respect to the Company, a change in control of a nature that would be required to be reported in response to Item 6(e) of Schedule 14A of Regulation 14A under the Securities Exchange Act of 1934, as amended (the "1934 Act"), provided that such a change in control shall be deemed to have occurred at such time as (a) any "person" (as that term is used in Sections 13(d) and 14(d)(2) of the 1934 Act) is or becomes the "beneficial owner" (as defined in Rule 13d-3 under the 1934

Act), directly or indirectly, of securities representing 30% or more of the combined voting power for election of Directors of the then outstanding securities of the Company or any successor of the Company; (b) during any period of two (2) consecutive years or less, individuals who at the beginning of such period constituted the Board cease, for any reason, to constitute at least a majority of the Board, unless the election or nomination for election of each new Director was approved by a vote of at least two-thirds of the Directors then still in office who were Directors at the beginning of the period; (c) the consummation of any merger or consolidation as a result of which the Common Stock shall be changed, converted, or exchanged (other than by merger with a wholly owned subsidiary of the Company) or any liquidation of the Company or any sale or other disposition of 50% or more of the assets or earning power of the Company; or (d) the consummation of any merger or consolidation to which the Company is a party as a result of which the persons who were stockholders of the Company immediately prior to the effective date of the merger or consolidation shall have beneficial ownership of less than 50% of the combined voting power for election of directors of the surviving corporation following the effective date of such merger or consolidation; provided, however, that no Change in Control shall be deemed to have occurred if, prior to such time as a Change in Control would otherwise be deemed to have occurred, the Board determines otherwise. Notwithstanding the foregoing, with respect to an Award that is (i) subject to Section 409A of the Code and (ii) if a Change in Control would accelerate the timing of payment thereunder, then the term "Change in Control" shall mean a change in the ownership or effective control of the Company, or in the ownership of a substantial portion of the assets of the Company as defined in Section 409A of the Code and the authoritative guidance issued thereunder, but only to the extent inconsistent with the above definition, and only to the minimum extent necessary to comply with Section 409A of the Code as determined by the Committee

"Qualifying Termination" means the termination of a Participant's employment with the Company or an Affiliate (a) by the Company for any reason other than Cause, death, or total and permanent disability (as that term is defined in the Company's disability insurance policy in effect on the Award Date); or (b) by the Participant because of the occurrence, without the Participant's consent, of (a) a material reduction in the position, duties, or responsibilities of the Participant from those in effect immediately prior to such change; (b) a reduction in the Participant's base salary; (c) a relocation of the Participant's primary work location to a distance of more than 50 miles from its location as of immediately prior to such change; or (d) a material breach by the Company or an Affiliate of any employment agreement with the Participant.

2.2. *No Understandings as to Employment etc*. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to employ or retain the Participant for any period or with respect to the terms of the Participant's employment or to give rise to any right to remain in the service of the Company or of any subsidiary or affiliate of the Company, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.3. *Compliance with Section 409A of the Code.* Notwithstanding any other provision of the Plan or this Agreement to the contrary, the Plan and this Agreement shall be construed or deemed to be amended as necessary to remain exempt from or comply with the requirements of Section 409A of the Code and to avoid the imposition of any additional or accelerated taxes or other penalties under Section 409A of the Code. The Committee, in its sole discretion, shall determine the requirements of Section 409A of the Code applicable to the Plan and this Agreement and shall interpret the terms of each consistently therewith. Under no circumstances, however, shall the Company, an Affiliate, or a Subsidiary have any liability under the Plan or this Agreement for any taxes, penalties, or interest due on amounts paid or payable pursuant to the Plan and/or this Agreement, including any taxes, penalties, or interest imposed under Section 409A of the Code.

2.4. *Data Protection Waiver.* Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant's participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country, in which Participant works or is employed, and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant's personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant's participation under the Plan and/or void the Award.

2.5. *Savings Clause*. In the event that Participant is employed or provides services in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company, then any such term or provision shall be null, void and of no effect.

2.6. *Amendment*. This Agreement may be amended only by an instrument in writing executed and delivered by the Participant and the Company or by the Company and accepted by the Participant in accordance with the procedures specified in the introductory paragraph hereto.

EXHIBIT 10.3

ENTEGRIS, INC.

2016 RSU Award Agreement

In consideration of services rendered to Entegris, Inc. (the “Company”), the Company periodically makes equity incentive awards consisting of restricted stock units with respect to the Company’s Common Stock $0.01 par value (“Stock”) to certain key employees, non-employee directors, consultants or advisors of the Company under the Company’s 2010 Stock Plan (the “Plan”). Any key employee, non-employee director, consultant or advisor (a ”Participant”) who receives a restricted stock unit award (the “Award”) is notified either in writing or via email and the Award is credited to the Participant’s account as reflected on the Participant’s Overview tab under the Restricted Stock Plan section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com. By clicking on the “Accept” button for the Award on the Restricted Stock Plan section in the Overview tab or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company’s most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I - RSU Award

1.1. *Award Date*. This Agreement shall take effect as of the date specified in the Restricted Stock Plan section on the Overview tab as the Award Date provided to you online at www.stockplanconnect.com (the “Award Date”).

1.2. *Restricted Stock Units Subject to Award*. The Award consists of that number of restricted stock units (the “RSU”) with respect to the Stock that has been approved for the Award to Participant by the Plan Administrator. Each RSU is equivalent to one share of the Stock. The Participant’s rights to the RSU are subject to the restrictions described in this Agreement and in the Plan (which is incorporated herein by reference with the same effect as if set forth herein in full) in addition to such other restrictions, if any, as may be imposed by law.

1.3. *Meaning of Certain Terms*. The term "vest" as used herein with respect to any RSU means the lapsing of the restrictions described herein with respect to such RSU.

1.4. *Nontransferability of RSUs*. The RSU acquired by the Participant pursuant to this Agreement shall not be sold, transferred, pledged, assigned or otherwise encumbered or disposed of except as provided below and in the Plan.

1.5. *Forfeiture Risk*. If the Participant ceases to be employed or retained by the Company and/or its subsidiaries for any reason any then outstanding and unvested RSU acquired by the Participant hereunder shall be automatically and immediately forfeited. The Participant hereby appoints the Company as the attorney-in-fact of the Participant to take such actions as may be necessary or appropriate to effectuate the cancellation of a forfeited RSU.

1.6. *Vesting of RSUs*. The RSU acquired hereunder shall vest in accordance with the provisions of this Article I, Section 1.6 and applicable provisions of the Plan, as follows:

- 25% of the RSUs vest on and after February 19, 2017;
- an additional 25% of the RSUs vest on and after February 19, 2018;
- an additional 25% of the RSUs vest on and after February 19, 2019; and
- the final 25% of the RSUs vest on and after February 19, 2020.

Notwithstanding the foregoing, no RSU shall vest on any vesting date specified above unless: **(A)** the Participant is then, and since the Award Date has continuously been, employed or retained by the Company or its subsidiaries; and **(B)** the Participant has fulfilled the obligations specified in Section 1.9 below. Upon vesting each RSU shall entitle Participant to receive one share of Stock.

1.7. *No Dividends, etc.*. The Participant shall not be entitled: **(i)** to receive any dividends or other distributions paid with respect to the Stock to which the RSU relates, or **(ii)** to vote any Stock with respect to which the RSU relates.

1.8. *Sale of Vested Shares*. The Participant understands that Participant will be free to sell any Stock with respect to which the RSU relates once the RSU has vested, subject to **(i)** satisfaction of any applicable tax withholding requirements with respect to the vesting of such RSU; **(ii)** the completion of any administrative steps (for example, but without limitation, the transfer of certificates) that the Company may reasonably impose; and **(iii)** applicable requirements of federal and state securities laws.

1.9. *Certain Tax Matters*. The Participant expressly acknowledges that the award or vesting of the RSU acquired hereunder, may give rise to "wages" subject to withholding. The Participant expressly acknowledges and agrees that Participant's rights hereunder are subject to Participant promptly paying to the Company all taxes required to be withheld in connection with such award, vesting or payment. Until the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the vesting shares needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of vest) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account.

Article II - GENERAL PROVISIONS

2.1. *Definitions*. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan. The term "Administrator" means the Management Development & Compensation Committee of the Company's Board of Directors.

2.2. *Mergers, etc*. To the extent that the Participant is not covered by a separate Executive Change In Control Termination Agreement with the Company which contains provisions specifying the treatment of the Award in the event of a change in control as defined therein or in any of the events listed in clauses (i) through (iii) below, in the event of any of **(i)** a consolidation or merger in which the Company is not the surviving corporation or which results in the acquisition of all or substantially all of the Company's then outstanding common stock by a single person or entity or by a group of persons and/or entities acting in concert, **(ii)** a sale or transfer of all or substantially all the Company's assets, or **(iii)** a dissolution or liquidation of the Company (a "Covered Transaction"), all outstanding Awards pursuant to Article I above shall vest and if relevant become exercisable and all deferrals, other than deferrals of amounts that are neither measured by reference to nor payable in shares of Stock, shall be accelerated, immediately prior to the Covered Transaction and upon consummation of such Covered Transaction all Awards then outstanding and requiring exercise shall be forfeited unless assumed by an acquiring or surviving entity or its affiliate as provided in the following sentence. In the event of a Covered Transaction, unless otherwise determined by the Administrator, all Awards that are payable in shares of Stock and that have not been exercised, exchanged or converted, as applicable, shall be converted into and represent the right to receive the consideration to be paid in such Covered Transaction for each share of Stock into which such Award is exercisable, exchangeable or convertible, less the applicable exercise price or purchase price for such Award. In connection with any Covered Transaction in which there is an acquiring or surviving entity, the Administrator may provide for substitute or replacement Awards from, or the assumption of Awards by, the acquiring or surviving entity or its affiliates, any such substitution, replacement or assumption to be on such terms as the Administrator determines, provided that no such replacement or substitution shall diminish in any way the acceleration of Awards provided for in this section.

2.3. *Retirement, etc*. If Participant is an employee of the Company and ceases to be an employee due to retirement with the consent of the Administrator, Participant will be entitled to immediate Vesting of all unvested RSUs awarded pursuant to this Agreement. As used herein the term "retirement with the consent of the Administrator" means that Participant's retirement must be with the consent of the Administrator, which consent may be granted or withheld in the discretion of the Administrator. In the event that Participant ceases to be an employee under circumstances that would otherwise qualify for retirement but the consent of the Administrator has not been granted, then Participant shall not be entitled to the benefits of this Section 2.3.

2.4. *No Understandings as to Employment etc*. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to employ or retain the Participant for any period or with respect to the terms of the Participant's employment or to give rise to any right to remain in the service of the Company or of any subsidiary or affiliate of the Company, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.5. *Data Protection Waiver.* Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant's participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country, in which Participant works or is employed, and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant's personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant's participation under the Plan and/or void the Award.

2.6. *Savings Clause*. In the event that Participant is employed or provides services in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company, then any such term or provision shall be null, void and of no effect.

2.7. *Amendment*. This Agreement may be amended only by an instrument in writing executed and delivered by the Participant and the Company or by the Company and accepted by the Participant in accordance with the procedures specified in the introductory paragraph hereto.

EXHIBIT 10.4

ENTEGRIS, INC.

2016 Stock Option Award Agreement

In consideration of services rendered to Entegris, Inc. (the “Company”), the Company periodically makes equity incentive awards consisting of stock options with respect to the Company’s Common Stock $0.01 par value (“Stock”) to certain key employees, non-employee directors, consultants or advisors of the Company under the Company’s 2010 Stock Plan (the “Plan”). Any key employee, non-employee director, consultant or advisor (a “Participant”) who receives a stock option award (the “Award”) is notified in writing or via email and the Award is credited to the Participant’s account as reflected on the Participant’s Overview tab under the Stock Options Plan section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com. By clicking on the “Accept” button for the Award in the Stock Options Plan section on the Overview tab or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company’s most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I -Stock Option Grant

1.1. *Option Grant*. Effective as of the date specified in the Stock Options Plan section provided to you online (the “Grant Date”), the Company hereby grants Participant a non-qualified option to purchase that number of shares of Stock that has been approved for the Award to the Participant by the Plan Administrator (“Option”). The shares of Stock awarded are specified in the Stock Options Plan section in the Granted column online at www.stockplanconnect.com. The Option is not intended to be an incentive stock option under Section 422 of the Internal Revenue Code of 1986, as amended (the “Code”) and will be interpreted accordingly.

1.2. *Option Exercise Price*. The exercise (grant) price of the Option shall be 100% of the closing price of the Stock on the NASDAQ stock market on the Grant Date. The exercise price is provided to Participant online at www.stockplanconnect.com.

1.3. *Option Vesting Schedule*. This Option shall vest and become exercisable, except as hereinafter provided, in whole or in part, at any time and from time to time as follows:

- 1/4 on and after February 19, 2017;
- an additional 1/4 on and after February 19, 2018;
- an additional 1/4 on and after February 19, 2019;
- the final 1/4 on and after February 19, 2020.

In the event that any of the above vesting dates falls on a day that the Company is not open for business, then vesting of the applicable portion shall occur on the next succeeding day that the Company is open for business.

1.4. *Expiration of Option*. To the extent that the Option shall not have been exercised, this Option shall expire at 5:00 p.m. local time at the Company’s headquarters on February 19, 2023 and no part of the Option may be exercised thereafter. If an expiration, termination or forfeiture date described herein falls on a weekday, Participant must exercise the Option before 5:00 p.m. local time at the Company’s headquarters on that date. If an expiration, termination or forfeiture date described herein falls on a weekend or any other day on which the NASDAQ stock market is not open, Participant must exercise the Options before 5:00 p.m. local time at the Company’s headquarters on the last NASDAQ business day prior to the expiration, termination or forfeiture date.

1.5. *Exercise of Option*. When and as vested, this Option may be exercised up to the number of shares of Stock specified in Section 1.1 above only by serving written notice on the designated stock plan administrator. Until the Administrator determines otherwise, payment of the Option exercise price specified in Section 1.2 above shall be made through net share settlement procedures whereby that number of the Option shares being exercised that are needed to cover the payment of the Option exercise price (calculated using the Fair Market Value of the Company’s stock on the date of exercise) shall be cancelled to fund the payment of the Option Exercise price and the net shares remaining after such cancellation shall be credited to Participant's account. Participant will have the rights of a stockholder only after the shares of Stock have been issued to the Participant in accordance with this Agreement.

1.6. _No Assignment of Option_. This Option may not be assigned or transferred except as may otherwise be provided by the terms of this Agreement.

1.7. _Basic Adjustments for Changes in Capital Structure_. The Administrator shall make adjustments from time to time in the number of shares of Stock covered by the Option in such reasonable manner as the Administrator may determine to reflect any increase or decrease in the number of issued shares of Stock of the Company resulting from a subdivision or consolidation of shares or any other capital adjustment, the payment of stock dividends or other increases or decreases in such Stock effected without receipt of consideration by the Company.

1.8. _Termination of Employment or Service with the Company_. All exercisable Options granted herein must be exercised within ninety (90) days following the date on which the employment or services of Participant with the Company or one of its subsidiaries terminates (i.e., last day worked, excluding any severance period) ("Termination Date"), or be forfeited, except as provided in Section 2.3 below and as follows:

(a) In the event of Participant's death during employment/services, each Option granted hereunder will be exercisable, whether or not vested on the date of Participant's death, until the earlier of: **(1)** the first anniversary of Participant's date of death; or **(2)** the original expiration date of the option. In the event of Participant's death during a Special Exercise Period as specified in Section 2.3 below, each Option will continue to be exercisable in accordance with the provisions of that Section.

(b) In the event of the termination of employment/services of Participant due to Disablement, Participant may exercise the Option, to the extent not previously exercised and whether or not the option had vested on or prior to the date of employment or service termination, at any time prior to 365 days following the later of the date of Participant's separation from service due to Participant's Disablement or the date of determination of Participant's Disablement, _provided_, _however_, that while the claim of Disablement is pending, Options that were unvested at termination of services may not be exercised and Options that were vested at termination of services may be exercised only during the period set forth in the introductory clause to this Section 1.8. The Option shall terminate on the 365th day from the date of determination of Disablement, to the extent that it is unexercised. For these purposes "Disablement" shall be determined in accordance with the standards and procedures of the then-current Long Term Disability policies maintained by the Company, which is generally a physical condition arising from an illness or injury, which renders an individual incapable of performing work in any occupation, as determined by the Company.

(c) If Participant's employment/services is terminated for "Cause", all granted but unexercised stock Options shall be forfeited on Participant's Termination Date.

1.9. _Suspension of Option Exercises_. For administrative or other reasons, the Company may, from time to time, suspend the ability of Participants to exercise options for limited periods of time. Notwithstanding the above, the Company shall not be obligated to deliver any shares of Stock during any period when the Company determines that the exerciseability of the Option or the delivery of shares hereunder would violate any federal, state or other applicable laws.

1.10. _Withholding of Income Taxes_. Nonqualified stock options are subject to withholding tax upon exercise. Until the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the Option shares being exercised needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of exercise) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account.

Article II - GENERAL PROVISIONS

2.1. *Definitions*. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan. The term "Administrator" means the Management Development & Compensation Committee of the Company's Board of Directors.

2.2. *Mergers, etc*. To the extent that the Participant is not covered by a separate Executive Change In Control Termination Agreement with the Company which contains provisions specifying the treatment of the Award in the event of a change in control as defined therein or in any of the events listed in clauses (i) through (iii) below, in the event of any of **(i)** a consolidation or merger in which the Company is not the surviving corporation or which results in the acquisition of all or substantially all of the Company's then outstanding common stock by a single person or entity or by a group of persons and/or entities acting in concert, **(ii)** a sale or transfer of all or substantially all the Company's assets, or **(iii)** a dissolution or liquidation of the Company (a "Covered Transaction"), the vesting of all Options under each outstanding Award pursuant to Article I above will be accelerated and such shares will become fully exercisable prior to the Covered Transaction on a basis that gives the Participant a reasonable opportunity, as determined by the Administrator, following delivery of the shares, to participate as a stockholder in the Covered Transaction. In connection with any Covered Transaction in which there is an acquiring or surviving entity, the Administrator may provide for substitute or replacement Awards from, or the assumption of Awards by, the acquiring or surviving entity or its affiliates, any such substitution, replacement or assumption to be on such terms as the Administrator determines, provided that no such replacement or substitution shall diminish in any way the acceleration of Options provided for in this section.

2.3. *Retirement, etc*. If Participant is an employee of the Company and ceases to be an employee due to retirement with the consent of the Administrator, Participant will be entitled to a special exercise period with respect to the Option (the "Special Exercise Period") which will begin on Participant's Retirement Date and will end on the earlier of the 4th anniversary of Participant's Retirement Date or the expiration date specified in Section 1.4 above. During the Special Exercise Period, the Option will continue to vest in accordance with the schedule specified in Section 1.3 above and will be exercisable to the same extent that it would have been exercisable had Participant remained in service with the Company or one of its subsidiaries. As used herein the term "retirement with the consent of the Administrator" means that Participant's retirement must be with the consent of the Administrator, which consent may be granted or withheld in the discretion of the Administrator. In the event that Participant ceases to be an employee under circumstances that would otherwise qualify for retirement but the consent of the Administrator has not been granted, then Participant shall not be entitled to the benefits of this Section 2.3.

2.4. *No Understandings as to Employment, etc*. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to continue the employment or services of the Participant for any period or to give rise to any right to remain in the service of the Company or of any subsidiary or affiliate of the Company, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.5. *Acts of Misconduct*. If Participant has allegedly committed an act of serious misconduct, including, but not limited to, embezzlement, fraud, dishonesty, unauthorized disclosure of trade secrets or confidential information, breach of fiduciary duty or nonpayment of an obligation owed to the Company, an Executive Officer of the Company may suspend Participant's rights under the Award, including the vesting of Options and the exercise of vested Options, pending a decision by the Administrator or an Executive Officer of the Company to terminate the Award. No rights under the Award may be exercised during such suspension or after such termination.

2.6. *Data Protection Waiver.* Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant's participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country, in which Participant works, is employed, or provides services, and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant's personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant's participation under the Plan and/or void the Award.

2.7. *Disputes*. The Administrator designated in the Plan or its delegate shall finally and conclusively determine any disagreement concerning the Award.

2.8. *Savings Clause*. In the event that Participant is employed or provides services, in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company, then any such term or provision shall be null, void and of no effect.

2.9. *Amendment*. This Agreement may be amended only by an instrument in writing executed and delivered by the Participant and the Company or by the Company and accepted by the Participant in accordance with the procedures specified in the introductory paragraph hereto.

EXHIBIT 10.5

AGREEMENT TO TERMINATE
EXECUTIVE CHANGE IN CONTROL TERMINATION AGREEMENT

This agreement (“Agreement”) between ENTEGRIS, INC., a Delaware corporation with headquarters offices at 129 Concord Road, Billerica, MA 01821, (“Entegris” or the “Company”) and William Shaner (the “Executive,” and together with the Company, the “Parties”) dated January 16, 2017 (the “Effective Date”).

RECITALS

A. The Executive and the Company entered into an Executive Change in Control Termination Agreement as of February 24, 2010 (the “Original Agreement”).

B. The Executive continues to be employed by the Company as of the Effective Date.

C. In recognition of a modification to the role and responsibilities of the Executive within the Company, the Executive and the Company wish to terminate the Original Agreement.

NOW THEREFORE, in consideration of the foregoing premises, of the mutual promises of the Parties made herein and of other consideration, the receipt and adequacy of which is hereby acknowledged, the Parties hereby agree as follows:

1. Effective as of the Effective Date, the Original Agreement is hereby terminated in its entirety and is of no further force and effect.

2. The validity, interpretation, construction and enforcement of this Agreement shall be governed by the laws of the State of Delaware as applied to transactions taking place wholly within Delaware between Delaware residents.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

Entegris, Inc.	Executive:
By: /s/ Christine A. Wilkinson	/s/ William Shaner
Name: Christine A. Wilkinson	William Shaner
Title: HR Manager COS	

Subsidiaries of Entegris, Inc.

Name of Subsidiary	Jurisdiction
ATMI Belgium LLC	Delaware
ATMI Clean Technologies (Shanghai) Company Limited	China
ATMI International Trading Co. Ltd.	China
ATMI Semiconductor New Materials Xi'an Co., Ltd.	China
Entegris Asia LLC	Delaware
Entegris Asia Pte. Ltd.	Singapore
Entegris Cleaning Process SAS	France
Entegris Ecosys LLC	Delaware
Entegris GmbH	Germany
Entegris International Holdings B.V.	The Netherlands
Entegris International Holdings II B.V.	The Netherlands
Entegris International Holdings III B.V.	The Netherlands
Entegris International Holdings IV LLC	Delaware
Entegris International Holdings V LLC	Delaware
Entegris International Holdings VI LLC	Delaware
Entegris International Holdings, Inc.	Delaware
Entegris Ireland Unlimited Company	Ireland
Entegris Israel Ltd.	Israel
Entegris Japan Co. Ltd.	Japan
Entegris Korea II Ltd.	South Korea
Entegris Korea Ltd.	South Korea
Entegris Malaysia Sdn. Bhd.	Malaysia
Entegris (Shanghai) Microelectronics Trading Company Ltd.	China
Entegris Pacific Ltd.	Delaware
Entegris Professional Solutions, Inc.	Delaware
Entegris Sarl	Luxembourg
Entegris SAS	France
Entegris Singapore Pte. Ltd.	Singapore
Entegris Specialty Materials, LLC	Delaware
Entegris Taiwan Enterprises Partnership	Taiwan
Entegris Taiwan Holdings, Inc.	Delaware
Entegris Taiwan Technologies Co. Ltd.	Taiwan
Nihon Entegris K.K.	Japan
Poco Graphite SARL	France
Poco Graphite, Inc.	Delaware
Pureline Co., Ltd.	South Korea

EXHIBIT 23

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Entegris, Inc.:

We consent to the incorporation by reference in the registration statements (No. 333-160212 and 333-105962) on Form S-3 and registration statements (Nos. 333-167178, 333-127599, 333-53382, 333-203789, 333-203790 and 333-211444) on Form S-8 of Entegris, Inc. of our reports dated February 17, 2017, with respect to the consolidated balance sheets of Entegris, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), equity, and cash flows for each of the years in the three-year period ended December 31, 2016 and the effectiveness of internal control over financial reporting as of December 31, 2016, which reports appears in the December 31, 2016 Annual Report on Form 10-K of Entegris, Inc. and subsidiaries.

/s/ KPMG LLP

Minneapolis, Minnesota
February 17, 2017

Exhibit 24

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that the undersigned Directors and Officers of **Entegris, Inc.** (the “Corporation”), do hereby constitute and appoint Bertrand Loy, Gregory B. Graves and Sue Lee and each of them individually, their true and lawful attorneys and agents to execute on behalf of the Corporation the Form 10-K Annual Report of the Corporation for the fiscal year ended December 31, 2016, together with all such amendments thereto on Form 10-K/A as well as additional instruments related thereto which such attorneys and agents may deem to be necessary and desirable to enable the Corporation to comply with the requirements of the Securities Exchange Act of 1934, as amended, and any regulations, orders, or other requirements of the United States Securities and Exchange Commission thereunder in connection with the preparation and filing of said documents, including specifically, but without limitation of the foregoing, power and authority to sign the names of each of such Directors and Officers on his behalf, as such Director or Officer, as indicated below to the said Form 10-K Annual Report or documents filed or to be filed as a part of or in connection with such Form 10-K Annual Report; and each of the undersigned hereby ratifies and confirms all that said attorneys and agents shall do or cause to be done by virtue thereof.

SIGNATURE	TITLE	DATE
/s/ Bertrand Loy Bertrand Loy	President, Chief Executive Officer and Director	February 15, 2017
/s/ Paul L. H. Olson Paul L. H. Olson	Chairman of the Board, Director	February 15, 2017
/s/ Michael A. Bradley Michael A. Bradley	Director	February 15, 2017
/s/ Marvin D. Burkett Marvin D. Burkett	Director	February 15, 2017
/s/ R. Nicholas Burns Nicholas Burns	Director	February 15, 2017
/s/ Daniel W. Christman Daniel W. Christman	Director	February 15, 2017
/s/ James F. Gentilcore James F. Gentilcore	Director	February 15, 2017
/s/ James P. Lederer James P. Lederer	Director	February 15, 2017
/s/ Brian F. Sullivan Brian F. Sullivan	Director	February 15, 2017

Exhibit 31.1

CERTIFICATIONS

I, Bertrand Loy, certify that:

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

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

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

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

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

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

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

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

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

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

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

Date: February 17, 2017

/s/ Bertrand Loy

Bertrand Loy
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Gregory B. Graves, certify that:

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

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

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

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

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

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

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

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

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

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

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

Date: February 17, 2017

/s/ Gregory B. Graves

Gregory B. Graves

Chief Financial Officer

(Principal Financial Officer)

EXHIBIT 32.1

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

In connection with the Annual Report on Form 10-K (the "Report") of Entegris, Inc, a Delaware corporation (the "Company"), for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof, I, Bertrand Loy, President and Chief Executive Officer of the Company, hereby certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 that:

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

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

Date: February 17, 2017	/s/ Bertrand Loy
	Bertrand Loy
	Chief Executive Officer

EXHIBIT 32.2

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

In connection with the Annual Report on Form 10-K (the "Report") of Entegris, Inc, a Delaware corporation (the "Company"), for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof, I, Gregory B. Graves, Chief Financial Officer of the Company, hereby certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 that:

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

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

Date: February 17, 2017

/s/ Gregory B. Graves

Gregory B. Graves
Chief Financial Officer