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

FORM 10-K

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

For the fiscal year ended December 31, 2020

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

For the transition period from ________ to _________

Commission file number 1-11430

MINERALS TECHNOLOGIES INC.

(Exact name of registrant as specified in its charter)

Delaware	25-1190717
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)
622 THIRD AVENUE, 38th Floor **New York, New York**	10017-6707
(Address of principal executive office)	(Zip Code)

(212) 878-1800
(Registrant's telephone number, including area code)

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

Title of each class	**Trading Symbol**	**Name of each exchange on which registered**
Common Stock, $0.10 par value	MTX	New York Stock Exchange

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.
Yes ☒ **No** ☐

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

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

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

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

Large Accelerated Filer ☒	**Accelerated Filer** ☐	**Emerging Growth Company** ☐
Non-accelerated Filer ☐	**Smaller Reporting Company** ☐	

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management’s assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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

As of June 26, 2020, the aggregate market value of the voting stock held by non-affiliates of the Registrant (based upon the closing price at which the stock was sold as of June 26, 2020) was approximately $1.3 billion. Solely for the purposes of this calculation, shares of common stock held by officers, directors and beneficial owners of 10% or more of the outstanding common stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 3, 2021, the Registrant had outstanding 33,847,751 shares of common stock, all of one class.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s Proxy Statement for its 2021 Annual Meeting of Stockholders are incorporated herein by reference in Part III of this Annual Report on Form 10-K.

MINERALS TECHNOLOGIES INC.
2020 FORM 10-K ANNUAL REPORT
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PART I

Item 1. Business

Minerals Technologies Inc. (together with its subsidiaries, the "Company", "we", "us" or "our") is a resource- and technology-based company that develops, produces, and markets on a worldwide basis a broad range of specialty mineral, mineral-based and synthetic mineral products and supporting systems and services.

The Company has four reportable segments: Performance Materials, Specialty Minerals, Refractories and Energy Services.

- The Performance Materials segment is a leading supplier of bentonite and bentonite-related products, chromite and leonardite. This segment also provides products for non-residential construction, environmental and infrastructure projects worldwide, serving customers engaged in a broad range of construction projects.

- The Specialty Minerals segment produces and sells the synthetic mineral product precipitated calcium carbonate ("PCC") and processed mineral product quicklime ("lime"), and mines mineral ores then processes and sells natural mineral products, primarily limestone and talc. This segment is a leading supplier globally of PCC products to the paper industry. This segment's products are used principally in the paper, building materials, paint and coatings, glass, ceramic, polymer, food, automotive and pharmaceutical industries.

- The Refractories segment produces monolithic and shaped refractory materials and specialty products. It also provides services and sells application and measurement equipment, calcium metal and metallurgical wire products. Refractories segment products are primarily used in high-temperature applications in the steel, non-ferrous metal and glass industries.

- The Energy Services segment provides services to improve the production, costs, compliance, and environmental impact of activities performed in the oil and gas industry. This segment offers a range of services for off-shore filtration and well testing to the worldwide oil and gas industry.

The following table sets forth the percentage of our revenues generated from each segment for each of our last three fiscal years:

	2020	2019	2018
Percentage of Net Sales			
Performance Materials	47%	46%	46%
Specialty Minerals	32%	32%	33%
Refractories	16%	17%	17%
Energy Services	5%	5%	4%
Total	100%	100%	100%

The Company maintains a research and development focus. The Company's research and development capability for developing and introducing technologically advanced new products has enabled the Company to anticipate and satisfy changing customer requirements, creating market opportunities through new product development and product application innovations.

Performance Materials Segment

The Performance Materials segment is a leading supplier of bentonite and bentonite-related products. Bentonite is a sedimentary deposit containing greater than 50% montmorillonite and is volcanic in origin. It is surface mined and then dried, crushed, sent through grinding mills where it is sized to customer requirements, and transferred to silos for automatic bagging or bulk shipment. The processed bentonite may be chemically modified. Bentonite's unique chemical structure gives it a diverse range of capabilities, enabling it to act as a thickener, sealant, binder, lubricant or absorption agent. There are two primary types of natural bentonite utilized by the business, sodium and calcium. Sodium-bentonite is characterized by its ability to absorb large amounts of water and form viscous, thixotropic suspensions. Calcium-bentonite, in contrast, is characterized by its low water absorption and swelling capabilities and its inability to stay suspended in water. Each type of bentonite has its own unique applications. This segment also supplies chromite and leonardite, which is primarily used in metalcasting, drilling fluid additive, and agricultural applications. The principal products of this segment are marketed under various registered trade names, including VOLCLAY®, PANTHER CREEK®, PREMIUM GEL®, ADDITROL®, PREMIUM CHOICE®, ENERSOL®, RAFINOL® and Hevi-Sand®.

In addition, the segment provides products for non-residential construction, environmental and infrastructure projects worldwide. It serves customers engaged in a broad range of construction projects, including site remediation, concrete waterproofing for underground structures, liquid containment on projects ranging from landfills to flood control, and drilling applications including foundation, slurry wall, tunneling, water well, and horizontal drilling.

In the third quarter of 2020, the Company acquired the assets of a mining and hauling company in the western United States to support our bentonite clay mining operations.

Metalcasting – Products and Markets

The metalcasting product line produces custom-blended mineral and non-mineral products to strengthen sand molds for casting auto parts, farm and construction equipment, oil and gas production equipment, power generation turbine castings and rail car components. These products help our customers in the foundry and casting industry to improve productivity by reducing scrap from metalcasting defects and poor surface quality. The ADDITROL® blends also improve the efficiency and recycling of sand blends in mold sand systems by lowering clay consumption and improve air quality by reducing volatile organic compound emissions. Our mine to mold operational capability has resulted in providing a consistent high-quality product, technical support and reliable on-time delivery service valued by our customers.

In the ferrous casting market, the Company specializes in blending bentonite of various grades by themselves or with mineral binders containing sodium bentonite, calcium bentonite, seacoal and other ingredients. In the steel alloy casting market, the Company sells chromite products with a particle size distribution specific to customers' needs. One of chromite's qualities is its ability to conduct heat. The Company markets the product for use in making very large, high integrity, steel alloy castings where the chromite is better suited to withstand the high heat and pressure associated with the casting process.

The Company is the exclusive distributor of certain specialty sand chromite products supplied by the Glencore-Merafe joint venture in select territories, including the Americas. This product line was originally sold into the U.S. by the American Colloid Company (ACC) and over the past 90 years has grown in its use throughout the world including China, Thailand, Korea, Australia and Southeast Asia. Over the past three years, the Company has focused on further investment in China and India.

The Company's metalcasting product line net sales were $258.1 million, $291.2 million and $328.9 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Household, Personal Care & Specialty Products – Products and Markets

The household, personal care & specialty products product line contains pet litter, fabric care, health and beauty, basic minerals and agricultural and industrial specialty products.

The pet litter products include sodium bentonite-based scoopable (clumping), traditional and alternative cat litters sold to grocery and drug stores, mass merchandisers, wholesale clubs and pet specialty stores throughout North America, Europe and Asia. The Company's scoopable products' clump-forming capability traps urine, thereby reducing waste by allowing for easy removal of only the odor-producing elements from the litter box. The Company is a provider of private-label cat litter to retail partners, as well as a provider of bulk cat litter to national brands and other private label packaging companies. In North America, these products are sold from three principal sites from which we package and distribute finished goods, as well as ship bulk material via rail cars. The Company's internal transportation group provides logistics services and is a key component of our capability in supplying customers on a national basis. In Europe, these products are produced and sold by the Company's subsidiary, Sivomatic Holding, B.V. ("Sivomatic"). Sivomatic is a leading European supplier of premium pet litter products and is a vertically integrated manufacturer with production facilities in the Netherlands, Austria and Turkey. Sivomatic is a certified CO_2 neutral producer of cat litter.

The Company supplies fabric care products and additives consisting of high-grade, agglomerated bentonite and other mineral additives that perform as softening agents in certain powdered-detergent formulations or act as carriers for colorants, surfactants and fragrances. These fabric care products are formulated to adapt to our customers' changing technical requirements.

The Company manufactures personal care products consisting of polymer delivery systems and purified grades of bentonite ingredients for sale to manufacturers of skin care products. The polymers are used to deliver high-value active ingredients and the bentonite-based materials act as thickening, suspension and dispersion agent emollients for topical skin care formulations. The personal care products range from ingredient sales to fully formulated finished goods.

Specialty Materials include bentonite and leonardite based proprietary solutions for agricultural and industrial applications. Agricultural uses include crop harvest enhancements, natural animal heath feed additives and vegetable cooking oil clarification.

Basic minerals contains the sale of bentonite and leonardite to a variety of end markets and industrial applications, including Drilling Fluid Additives, Drilling Products and Other Industrial Products.

Drilling Fluid Additives are used in oil and gas well drilling. Bentonite imparts thickening and suspension properties that facilitate the transport of rock cuttings to the surface during the drilling process. It also contributes to a drilling fluid’s ability to lubricate the drill bit and coat the underground formations to prevent hole collapse and drill-bit seizing. Our primary trademark for this application is the trade name PREMIUM GEL®.

Drilling products are used in environmental and geotechnical drilling applications, horizontal directional drilling, mineral exploration and foundation construction. The products are used to install monitoring wells, facilitate horizontal and water well drilling, and to seal abandoned exploration drill holes. The end-users for these products are typically small well drilling companies and general contractors.

The Company produces other industrial products utilizing bentonite and bentonite blends for the construction industry to be used as a plasticizing agent in cement, and plaster and bricks. The Company also supplies bentonite to help pelletize other materials for ease of use. An example of this application includes the pelletizing of iron ore.

This product line also includes sales from our internal transportation and logistics group.

The Company’s household, personal care & specialty products product line net sales were $380.2 million, $376.6 million and $348.5 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Environmental Products – Products and Markets

The environmental product line includes bentonite and polymer lining technologies, as well as, other environmental remediation applications.

The Company helps customers protect ground water and soil through the sale of geosynthetic clay liner products containing bentonite. These products are marketed under the RESISTEX® and BENTOMAT® trade names principally for lining and capping landfills, mine waste disposal sites and industrial waste storage sites, such as, bauxite residue and coal ash waste. The Company also provides associated geosynthetic materials for these applications, including geotextiles and drainage geocomposites.

Environmental Products also includes specialized technologies to mitigate vapor intrusion in new building construction. The Company’s innovative vapor barrier systems prevent potentially harmful vapors from entering occupied spaces, thus facilitating low-risk redevelopment. The Company also provides reactive capping technologies and solutions to effectively contain residual contamination, to reduce costs associated with ex-situ remedies, and aid in environmental protection. Products offered include Liquid Boot®, a liquid applied vapor barrier system; REACTIVE CORE-MAT™, an in-situ sediment capping material and QUIK-SOLID®, a super absorbent media. The Company specializes within the remediation market providing technologies to treat a variety of hazardous compounds in soil, groundwater, leachate and sediment. These products are marketed under the ORGANOCLAY® trade name. The Company also specializes in treating soil, groundwater, surface water and drinking water contaminated with Per-and polyfluoroalkyl substances (PFAS) and Perfluorooctane sulfonate (PFOS) under the FLUORO-SORB® trade name.

The Company’s environmental product line net sales were $58.6 million, $86.6 million and $80.3 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Building Materials – Products and Markets

The building materials product line includes various active and passive products for waterproofing of underground structures, commercial building envelopes and tunnels.

The Company offers a wide variety of active and passive waterproofing and greenroof technologies for use in protecting the building envelope of non-residential construction, including buildings, subways, and parkway systems. Our products include VOLTEX®, a waterproofing composite comprised of two polypropylene geotextiles filled with sodium bentonite; ULTRASEAL®, an advanced membrane using a unique active polymer core; and COREFLEX®, featuring heat-welded seams for protection of critical infrastructure. In addition to these membrane materials, we also provide a variety of sealants and other accessories required to create a functional waterproofing system. The end-users of these products are generally building sub-contractors who are responsible for installing the products.

The Company’s building materials product line net sales were $55.9 million, $68.9 million and $70.4 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Specialty Minerals Segment

PCC Products and Markets

The Company's PCC product line net sales were $377.7 million, $434.0 million and $445.4 million for the years ended December 31, 2020, 2019 and 2018, respectively. The Company's sales of PCC have been, and are expected to continue to be, made primarily to the printing and writing papers segment of the paper industry and also into the packaging industry. The Company also produces PCC for sale to companies in the polymer, food and pharmaceutical industries.

PCC Products – Paper

In the paper industry, the Company's PCC is used:

- as a filler in the production of coated and uncoated wood-free printing and writing papers, such as office papers;
- as a filler in the production of coated and uncoated groundwood (wood-containing) paper such as magazine and catalog papers; and
- as a coating pigment for both wood-free and groundwood papers and packaging.

The Company's Paper PCC product line net sales were $308.4 million, $364.9 million and $378.5 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Approximately 19% of the Company's sales consist of PCC sold to papermakers from "satellite" PCC plants. A satellite PCC plant is a PCC manufacturing facility located near a paper mill, thereby eliminating costs of transporting PCC from remote production sites to the paper mill. The Company believes the competitive advantages offered by improved economics and superior optical characteristics of paper produced with PCC manufactured by the Company's satellite PCC plants resulted in substantial growth in the number of the Company's satellite PCC plants since the first such plant was built in 1986. For information with respect to the locations of the Company's PCC plants as of December 31, 2020, see Item 2, "Properties," below.

The Company currently manufactures several customized PCC product forms using proprietary processes. Each product form is designed to provide optimum balance of paper properties including brightness, opacity, bulk, strength and improved printability. The Company's research and development and technical service staff focuses on expanding sales from its existing and potential new satellite PCC plants, as well as, developing new technologies for new applications. These technologies include, among others, acid-tolerant ("AT®") PCC, which allows PCC to be introduced to the large wood-containing segment of the printing and writing paper market, OPACARB® PCC, a family of products for paper coating, our FulFill® family of products, a system of high-filler technologies that offers papermakers a variety of efficient, flexible solutions which decrease dependency on natural fibers, and NewYield® and ENVIROFIL®, innovative technologies that convert a paper and pulp mill waste stream into functional pigments for filling paper.

The Company owns, staffs, operates and maintains all of its satellite PCC facilities, and owns or licenses the related technology. Generally, the Company and its paper mill customers enter into long-term evergreen agreements, initially ten years in length, pursuant to which the Company supplies substantially all of the customer's precipitated calcium carbonate filler requirements. The Company is generally permitted to sell to third-parties PCC produced at a satellite plant in excess of the host paper mill's requirement.

The Company also sells a range of PCC products to paper manufacturers from production sites not associated with paper mills. These merchant facilities are located at Adams, Massachusetts and Lifford, United Kingdom.

PCC Markets – Paper

Uncoated Wood-Free Printing and Writing Papers – North America. Beginning in the mid-1980's, as a result of a concentrated research and development effort, the Company's satellite PCC plants facilitated the conversion of a substantial percentage of North American uncoated wood-free printing and writing paper producers to lower-cost alkaline papermaking technology. The Company estimates that during 2020, more than 90% of North American uncoated wood-free paper was produced employing alkaline technology. Presently, the Company owns and operates 15 commercial satellite PCC plants located at paper mills that produce uncoated wood-free printing and writing papers in North America.

Uncoated Wood-Free Printing and Writing Papers – Outside North America. The Company estimates the amount of uncoated wood-free printing and writing papers produced outside of North America at facilities that can be served by satellite and merchant PCC plants is more than twice as large (measured in tons of paper produced) as the North American uncoated wood-free paper market currently served by the Company. The Company believes that the superior brightness, opacity and bulking characteristics offered by its PCC products allow it to compete with suppliers of ground limestone and other filler products outside of North America. Presently, the Company owns and operates 38 commercial satellite PCC plants located at paper mills that produce uncoated wood-free printing and writing papers outside of North America. In addition, there is 1 plant currently under construction that will begin production in 2021.

Uncoated Groundwood Paper. The uncoated groundwood paper market, including newsprint, represents approximately 24% of worldwide paper production. Paper mills producing wood-containing paper still generally employ acid papermaking technology. The conversion to alkaline technology by these mills has been hampered by the tendency of wood-containing papers to darken in an alkaline environment. The Company has developed proprietary application technology for the manufacture of high-quality groundwood paper in an acidic environment using PCC (AT® PCC). Furthermore, as groundwood or wood-containing paper mills use larger quantities of recycled fiber, there is a trend toward the use of neutral papermaking technology in this segment for which the Company presently supplies traditional PCC chemistries. The Company now supplies PCC at 4 groundwood paper mills around the world and licenses its technology to a ground calcium carbonate producer to help accelerate the conversion from acid to alkaline papermaking.

Coated Paper. The Company continues to pursue satellite PCC opportunities in coated paper markets where our products provide unique performance and/or cost reduction benefits to papermakers and printers. Our Opacarb® product line is designed to create value to the papermaker and can be used alone or in combination with other coating pigments. PCC coating products are produced at 7 of the Company's PCC plants worldwide.

Specialty PCC Products and Markets

The Company also produces and sells a full range of dry PCC products on a merchant basis for non-paper applications. The Company's Specialty PCC product line net sales were $69.3 million, $69.1 million and $66.9 million for the years ended December 31, 2020, 2019 and 2018, respectively. The Company sells surface-treated and untreated grades of PCC to the polymer industry for use in automotive and construction applications, and to the adhesives and printing inks industries. The Company's PCC is also used by the food and pharmaceutical industries as a source of calcium in tablets and food applications, as a buffering agent in tablets, and as a mild abrasive in toothpaste. The Company produces PCC for specialty applications from production sites at Adams, Massachusetts and Lifford, England.

Processed Minerals – Products and Markets

The Company mines and processes natural mineral products, primarily limestone and talc. The Company also manufactures lime, a limestone-based product. The Company's net sales of processed mineral products were $133.2 million, $140.4 million and $143.9 million for the years ended December 31, 2020, 2019 and 2018, respectively. Net sales of ground calcium carbonate ("GCC") products, which are principally lime and limestone, were $89.3 million, $91.3 million and $91.0 million for the years ended December 31, 2020, 2019 and 2018, respectively. Net sales of talc products were $43.9 million, $49.1 million and $52.9 million for the years ended December 31, 2020, 2019 and 2018, respectively.

The Company mines and processes GCC products at its reserves in the eastern and western parts of the United States. GCC is used and sold in the construction, automotive and consumer markets.

Lime produced at the Company's Adams, Massachusetts, and Lifford, United Kingdom, facilities is used primarily as a raw material for the manufacture of PCC at these sites and is sold commercially to various chemical and other industries.

The Company mines, beneficiates and processes talc at its Barretts site, located near Dillon, Montana. Talc is sold worldwide in finely ground form for ceramic applications and in North America for paint and coatings and polymer applications. Because of the exceptional chemical purity of the Barretts ore, a significant portion of worldwide automotive catalytic converter ceramic substrates contain the Company's Barretts talc.

Our high-quality limestone, dolomitic limestone, and talc products are defined primarily by the chemistry and color characteristics of the ore bodies. Ore samples are analyzed by x-ray fluorescence (XRF) and other techniques to determine purity and more generally by Hunter brightness measurement to determine dry brightness and the Hunter yellowness (b) value. We serve multiple markets from each of our operations, each of which has different requirements relating to a combination of chemical and physical properties.

Refractories Segment

Refractory – Products and Markets

The Company offers a broad range of monolithic and pre-cast refractory products and related systems and services. The Company's Refractory segment net sales were $258.1 million, $298.1 million and $311.9 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Refractory product sales are often supported by Company-supplied proprietary application equipment, laser measurement systems and on-site technical service support. The Company's proprietary application equipment is used to apply refractory materials to the walls of steel-making furnaces and other high temperature vessels to maintain and extend their useful life. Net sales of refractory products, including those for non-ferrous applications, were $212.3 million, $244.8 million and $261.1 million for the years ended December 31, 2020, 2019 and 2018, respectively. The Company's proprietary application systems, such as its MINSCAN®, allow for remote-controlled application of the Company's refractory products in steel-making furnaces, as well as, in steel ladles. Since the steel-making industry is characterized by intense price competition, which results in a continuing emphasis on increased productivity, these application systems and the technologically advanced refractory materials developed in the Company's research laboratories have been well accepted by the Company's customers. These products allow steel makers to improve their performance through, among other things, the application of monolithic refractories to furnace linings while the furnace is at operating temperature, thereby eliminating the need for furnace cool-down periods and steel-production interruption. The result is a lower overall cost for steel produced by steel makers.

The Company's technical service staff and application equipment assist customers to achieve desired productivity objectives. The Company's technicians are also able to conduct laser measurement of refractory wear, sometimes in conjunction with robotic application tools, to improve refractory performance at many customer locations. The Company believes that these services, together with its refractory product offerings, provide it with a strategic marketing advantage.

Over the past several years, the Refractories segment has continued to develop, reformulate, and optimize its products and application technology to maintain its competitive advantage in the marketplace. Some of the products the Company has developed and optimized in the past include:

- HOTCRETE®: High durability shotcrete products for applications at high temperatures in ferrous applications, such as, steel ladles, electric arc furnaces (EAF) and basic oxygen furnaces (BOF).
- FASTFIRE®: High durability castable and shotcrete products in the non-ferrous and ferrous industries with the added benefit of rapid dry-out capabilities.
- OPTIFORM®: A system of products and equipment for the rapid continuous casting of refractories for applications, such as, steel ladle safety linings.
- ENDURATEQ®: A high durability refractory shape for glass contact applications, such as, plungers and orifice rings.
- DECTEQ™: A system for the automatic control of electrical power feeding electrodes used in electric arc steel making furnaces.
- LACAM® Torpedo: A laser scanning system that measures the refractory lining thickness inside a Hot Iron (Torpedo) Ladle. The torpedo ladles transport liquid iron from a blast furnace to the steel plant.
- LACAM® LI Explorer: A laser scanning system that measures the refractory lining thickness from the interior of a Hot Steel Ladle. By entering the interior, the explorer provides the ability to see all areas of the ladle and identify the smallest flaws in the refractory lining.
- LACAM®: A new, fourth generation Lacam® laser measurement device for use in the worldwide steel industry that is 17 times faster than the previous version. This new technology provides the fastest and most accurate laser scanning for hot surfaces available today.

The principal market for the Company's refractory products is the steel industry. Management believes that certain trends in the steel industry will provide growth opportunities for the Company. These trends include growth and quality improvements regarding the development of improved manufacturing processes, such as, thin-slab casting, the trend in North America to shift production from integrated mills to electric arc furnaces (mini-mills) and the ever-increasing need for improved productivity and longer lasting refractories.

The Company sells its refractory products in the following markets:

Steel Furnace. The Company sells gunnable monolithic refractory products and application systems to users of basic oxygen furnaces and electric arc furnaces for application on furnace walls to prolong the life of furnace linings.

Other Iron and Steel. The Company sells monolithic refractory materials and pre-cast refractory shapes for iron and steel ladles, vacuum degassers, continuous casting tundishes, blast furnaces and reheating furnaces. The Company offers a full line of materials to satisfy most continuous casting refractory applications. This full line consists of gunnable materials, refractory shapes and permanent linings.

Industrial Refractory Systems. The Company sells refractory shapes and linings to the glass, cement, aluminum, petrochemicals, power generation and other non-steel industries. The Company also produces a specialized line of carbon composites and pyrolitic graphite sold under the PYROID® trademark, primarily to the aerospace and electronics industries.

Metallurgical Products and Markets

The Company produces a number of other technologically advanced products for the steel industry, including calcium metal, metallurgical wire products and a number of metal treatment specialty products. Net sales of metallurgical products were $45.8 million, $53.3 million and $50.8 million for the years ended December 31, 2020, 2019 and 2018, respectively. The Company manufactures calcium metal at its Canaan, Connecticut facility and purchases calcium to meet global production requirements. Calcium metal is used in the manufacture of the Company's PFERROCAL® solid-core calcium wire and is also sold for use in the manufacture of batteries and magnets. We also manufacture cored wires at our Canaan, Connecticut and Hengelo, Netherlands, manufacturing sites. The Company sells metallurgical wire products and associated wire-injection equipment, including SURECAL®, for use in the production of high-quality steel. These metallurgical wire products are injected into molten steel to improve castability and reduce imperfections.

Energy Services Segment

The Energy Services segment provides services to improve the production, cost, compliance, and environmental impact of activities performed in the oil and gas industry. The composition of customers within this segment varies from year to year and is significantly dependent on the type of activities each customer is undertaking within the year, regulations, and overall dynamics of the oil and gas industry. The Company provides services for offshore filtration and well testing to the worldwide oil and gas industry. Services are provided through subsidiaries located in Australia, Brazil, Malaysia, Nigeria, Mexico, Indonesia, Saudi Arabia, the United Kingdom, and the U.S., in the Gulf of Mexico. Energy Services segment’s net sales were $73.0 million, $95.2 million and $78.3 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Principal Services

The Company provides the following principal services:

Water Treatment / Filtration: The Company helps customers comply with regulatory requirements by providing equipment, technologies, personnel and filtration media to treat wastewater generated during oil production.

The Company specializes in water treatment processes and technologies to remove oil, hydrocarbons, heavy metals, solids, toxic materials and other contaminants from customers’ operation wastewater stream through mechanical and chemical means.

Well Testing: The Company provides equipment and personnel to help customers control well production, as well as, to clean up, unload, separate, measure component flow, and capture fluids from oil and gas wells.

The Company delivers complete well testing solutions and effective operations in all testing environments.

Marketing and Sales

The Company relies principally on its worldwide direct sales force to market its products. The direct sales force is augmented by technical service teams that are familiar with the industries to which the Company markets its products, and by several regional distributors. The Company's sales force works closely with the Company's technical service staff to solve technical and other issues faced by the Company's customers.

In the Performance Materials segment, the Company relies on industry-specialized technically oriented salespersons. In Metalcasting, these sales teams provide expertise to educate our customers on the bentonite blend properties and to aid them in producing castings efficiently. Certain other products are distributed through networks of distributors and representatives, who warehouse specific products at strategic locations. In addition, the sales and distribution of environmental products and building materials are primarily performed through the Company’s own personnel and facilities. Our staff includes sales professionals and technical support engineers who analyze the suitability of our products in relation to the customer’s specific application and the conditions that products will endure or the environment in which they will operate.

In the Specialty Minerals segment, the Company's sales team and technical services staff assist paper producers in ongoing evaluations of the use of PCC for paper coating and filling applications as well as PCC, GCC and talc use in the automotive, construction and household goods markets.

In the Refractories segment, the Company's technical service personnel advise on the use of refractory materials, and, in many cases pursuant to service agreements, apply the refractory materials to the customers' furnaces and other vessels.

In the Energy Services segment, the Company’s sales team sell the services on a direct basis.

Continued use of skilled technical service teams is an important component of the Company's business strategy. The Company works closely with its customers to ensure that their requirements are satisfied, and it often trains and supports customer personnel in the use of the Company's products. The Company oversees domestic marketing and sales activities principally from Bethlehem, Pennsylvania and Hoffman Estates, Illinois, and from regional sales offices located elsewhere in the United States. The Company's international marketing and sales efforts are directed from regional centers located in India, the United Kingdom, Brazil, and China. The Company believes that its worldwide network of sales personnel and manufacturing sites facilitates continued international expansion.

Raw Materials

The Company depends in part on having an adequate supply of raw materials for its manufacturing operations, particularly lime and carbon dioxide for the PCC product line, and magnesia and alumina for its Refractory operations. We also depend on having an adequate supply of bentonite and leonardite for our Performance Materials segment and limestone and talc for our Processed Minerals product line. Supplies of bentonite, leonardite, limestone and talc are provided through the Company’s own mining operations and we depend on having adequate access to ore reserves of appropriate quality at such mining operations.

The Company uses lime in the production of PCC and is a significant purchaser of lime worldwide. Generally, the lime utilized in our business is readily available from numerous sources and we purchase lime under long-term supply contracts from unaffiliated suppliers located in close geographic proximity to the Company's PCC plants. We also produce lime at our Adams, Massachusetts facility and our Lifford, UK facility, although most of the lime produced at our Adams facility and all of the lime produced at our Lifford facility is consumed in the production of Specialty PCC at the plant. We currently supply some quantities of lime to third parties that are in close proximity to our Adams plant and could supply small quantities of lime to certain of our PCC satellite facilities that are in close geographic proximity to the Adams plant. Carbon dioxide is readily available in exhaust gas from the host paper mills, or other operations at our merchant facilities.

The principal raw materials used in the Company's monolithic refractory products are refractory-grade magnesia and various forms of alumina silicates. Approximately 49% percent of the Company’s magnesia requirements were purchased from sources in China over the past five years. The price and availability of bulk raw materials from China are subject to fluctuations that could affect the Company's sales to its customers. In addition, the volatility of transportation costs has also affected the delivered cost of raw materials imported from China to North America and Europe. The Company has developed alternate sources of magnesia over the past few years that have reduced our reliance on China-sourced magnesia. The amount sourced from China and other locations can vary from year to year depending upon price and availability from each source. The alumina we utilize in our business is readily available from numerous sources. The Company also purchases calcium metal, calcium silicide, graphite, calcium carbide and various alloys for use in the production of metallurgical wire products and uses lime and aluminum in the production of calcium metal.

In addition to bentonite and leonardite provided through our mining operations, our Performance Materials segment's principal raw materials are coal, soda ash, chromite, and woven and unwoven polyester material, all of which are readily available from numerous sources.

Mineral Reserves and Mining Process

The Company relies on access to bentonite reserves to support its Performance Materials segment. The Company has reserves of sodium and calcium bentonite at various locations in the U.S., including Wyoming, South Dakota, Montana and Alabama, as well as in Australia, China, and Turkey. Through the Company's affiliations and joint ventures, the Company also has access to bentonite deposits in India, and Mexico. Assuming the continuation of 2020 annualized usage rates, the Company has reserves of commercially usable sodium bentonite for the next 51 years. Under the same assumptions, the Company has reserves of commercially usable calcium bentonite for the next 27 years. The Company owns or controls the properties on which the bentonite reserves are located through long-term leases, royalty agreements (including easement and right of way agreements) and patented and unpatented mining claims. No single or group of mining claims or leases is significant or material to the financial condition or operations of our Company or our segments. The majority of our current bentonite mining in the U.S. occurs on reserves where our rights to such reserves accrue to us through over 80 mining leases and royalty agreements and 2,000 mining claims. A majority of these are with private parties and located in Montana, South Dakota and Wyoming. The bentonite deposits underlying these claims and leases generally lie in parcels of land varying between 20 and 40 acres.

In general, our bentonite reserves are immediately adjacent to, or within sixty miles of, one of the related processing plants. All of the properties on which our reserves are located are either physically accessible for the purposes of mining and hauling or the cost of obtaining physical access would not be material. Access to processing facilities from the mining areas is generally by private road, public highways, or railroads. For most of our leased properties and mining claims, there are multiple means of access.

Bentonite is surface mined, generally with large earthmoving bulldozers and scrapers, and then loaded into trucks and off-highway-haul wagons for movement to processing plants. The mining and hauling of our bentonite is done by us and by independent contractors. At the processing plants, bentonite is dried, crushed and sent through grinding mills, where it is sized to customer requirements, then chemically modified, where needed, and transferred to silos for automatic bagging or bulk shipment. Most of the production is shipped as processed rather than stored for inventory.

For our Performance Materials segment, we also mine leonardite, a form of oxidized lignite, in North Dakota, and transport it to nearby processing facilities. Assuming the continuation of 2020 annualized usage rates, the Company has reserves of commercially usable leonardite for more than 30 years.

The Processed Minerals product line of our Specialty Minerals segment is supported by the Company's limestone reserves located in the western and eastern parts of the United States, and talc reserves located in Montana. The Company generally owns and surface mines these reserves and processes its products at nearby processing plants. The Company estimates these reserves, at current usage levels, to be in excess of 36 years at its limestone production facilities and in excess of 15 years at its talc production facility.

The Company has ongoing exploration and development activities for all of its mineral interests with the intent to increase its proven and probable reserves.

See Item 2, "Properties," for more information with respect to these facilities and mines.

The Company relies on shipping bulk cargos of bentonite within and from the United States, Turkey and China to customers, as well as our own subsidiaries, and we are sensitive to our ability to recover these shipping costs. In the last few years, bulk cargo shipping rates have been very volatile, and, to a lesser extent, the availability of bulk cargo containers has been sporadic.

Competition

The Company is continually engaged in efforts to develop new products and technologies and refine existing products and technologies in order to remain competitive and to position itself as a market leader.

For the Performance Materials segment, the Company competes on the basis of product quality, service, technical support, price, product availability and logistics. There are numerous major producers of competing products and various regional suppliers in the areas the Company serves. The Company is the world leader in bentonite, including number one positions in metalcasting and pet litter. With respect to the environmental products product line, the Company competes with geosynthetic clay liner manufacturers worldwide, several suppliers of alternative lining technologies, and providers of soil and environmental remediation solutions and products. The building materials product line competes in a highly fragmented market comprised of a wide variety of alternative technologies. A number of integrated bentonite companies compete with our drilling products.

With respect to its PCC products, the Company competes for sales to the paper industry with other minerals, such as GCC and kaolin, based in large part upon technological know-how, patents and processes that allow the Company to deliver PCC that it believes imparts gloss, brightness, opacity and other properties to paper on an economical basis. The Company is the leading manufacturer and supplier of PCC to the paper industry.

The Company competes in sales of its limestone and talc based primarily upon quality, price, and geographic location.

With respect to the Company's refractory products, competitive conditions vary by geographic region. Competition is based upon the performance characteristics of the product (including strength, consistency and ease of application), price, and the availability of technical support.

The Energy Services segment competes with other oil and gas services companies. However, the Company believes that the Company offers several competitive advantages, especially in the area of water treatment services, due to superior and innovative technologies that the Company has developed internally and the combination of services that the Company can provide.

Seasonality

Some of our products in the Performance Materials segment within the environmental and building materials product lines are impacted by weather and soil conditions. Many of the products cannot be applied in wet or winter weather conditions and, as such, sales and profits tend to be greater during the period from April through October. As a result, we consider the business of this segment to be seasonal. Our Processed Minerals product line of our Specialty Minerals segment is subject to similar seasonal patterns.

Much of the business in the Energy Services segment can be impacted by weather conditions. Our business is concentrated in the Gulf of Mexico where our customers’ oil and gas production facilities are subject to natural disasters, such as hurricanes. Given this, our Energy Services sales could be lower in the June to November months.

Research and Development

Many of the Company's product lines are technologically advanced. The Company’s internal research team has dedicated years of experience into analyzing properties of minerals and synthetic materials while developing processes and applications to enhance their performance. Our expertise in inorganic chemistry, crystallography and structural analysis, fine particle technology and other aspects of materials science apply to and support all of our product lines. The Company's business strategy for growth in sales and profitability depends, to a large extent, on the continued success of its research and development activities.

The Company’s Performance Materials segment also offers a strong portfolio of custom blended compounds, formulations and technology, which have been primarily developed internally by the Company’s research and development efforts. The ADDITROL® formulation, a custom blend, meets the need of both ferrous and non-ferrous applications. The Volclay® application is used in green sand molding applications ranging from the production of iron and steel castings to the production of non-ferrous castings. The Hevi-Sand® specialty chromite blend prevents metal penetration and can be used with most foundry binders in molds and cores. In addition, the Company’s RESISTEX™ and CONTINUUM® formulation enables withstanding aggressive leachates. The ORGANOCLAY® technology offers highly effective solutions in effective in removing oils, greases and other high molecular weight, low solubility organic compounds from aqueous streams. The Company will also continue to seek out promising compounds and innovative technologies, developed mainly by our internal research team, to incorporate into our product lines.

In the Specialty Minerals segment, the significant achievements of the Company's research and development efforts include: the satellite PCC plant concept; PCC crystal morphologies for paper filling and coating; FulFill® high filler technology systems; NewYield® Waste Stream Process Technology; ENVIROFIL® Waste Stream Process Technology; Thixocarb® PCC, Vicality® USP PCC, EMforce®, and Optibloc® for the Processed Minerals and Specialty PCC product lines.

The FulFill® brand High Filler Technology is a portfolio of high-filler technologies that offers papermakers a variety of efficient, flexible solutions that decreases dependency on natural fiber and reduces costs. The FulFill® E and V series allows papermakers to increase filler loading levels of precipitated calcium carbonate (PCC), which replaces higher cost pulp, and increases PCC usage. Depending on paper grades, this PCC volume increase may range from 15 to 30 percent. NewYield® Waste Stream Process Technology cost-effectively converts a problematic pulp mill waste stream into a functional pigment for filling paper, eliminating the cost of environmental disposal and remediation of certain waste streams to papermakers. The product and technology have been validated on a commercial scale in a pulping operation and papermaking system in China, with several current projects underway. ENVIROFIL® Waste Stream Process Technology cost-effectively converts a problematic de-inked sludge waste into a functional pigment for filling paper, eliminating the cost of environmental disposal and remediation.

In the Refractories segment, the Company's achievements include the development of FASTFIRE® and OPTIFORM® shotcrete refractory products; LACAM® laser-based refractory measurement systems; and the MINSCAN® and HOTCRETE® application systems. The Company will continue to reformulate its refractory materials to be more competitive.

For the years ended December 31, 2020, 2019 and 2018, the Company spent approximately $19.9 million, $20.3 million and $22.7 million, respectively, on research and development. The Company's research and development spending for 2020, 2019 and 2018 was approximately 1.2%, 1.1% and 1.3% of net sales, respectively.

The Company maintains its primary research facilities in Bethlehem and Easton, Pennsylvania; Houston, Texas; and Hoffman Estates, Illinois. It also has research and development facilities in China, England, Germany, Ireland, Japan and Turkey. Approximately 190 employees worldwide are engaged in research and development. In addition, the Company has access to some of the world's most advanced papermaking and paper coating pilot facilities.

Patents and Trademarks

The Company owns or has the right to use approximately 338 patents and approximately 1,706 trademarks related to its business. Our patents expire between 2021 and 2037. Our trademarks continue indefinitely. The Company believes that its rights under its existing patents, patent applications and trademarks are of value to its operations, but no one patent, application or trademark is material to the conduct of the Company's business as a whole.

Insurance

The Company maintains liability and property insurance and insurance for business interruption in the event of damage to its production facilities and certain other insurance covering risks associated with its business. The Company believes such insurance is adequate for the operation of its business. There is no assurance that in the future the Company will be able to maintain the coverage currently in place or that the premiums will not increase substantially.

Human Capital Resources

Our people are the most important part of MTI. They are the cornerstone of our operational excellence and safety-first culture, key to our ability to execute on our growth strategies, and vital to our success. Our core values — people, excellence, honesty, customer focus and accountability — guide our actions.

Workforce Demographics

At December 31, 2020, the Company employed 3,566 persons globally, located in over 33 countries. Of these, 1,601 (45%) were located in North America, 895 (25%) were located in Europe, 903 (25%) were located in Asia and 167 (5%) were located in Latin America.

Diversity and Inclusion

As a global company, we are committed to a company culture that unconditionally accepts all colleagues. We are committed to reflecting the diversity of the communities where we live and work. By promoting and accepting our differences, we create an environment that supports better decision making, drives mutual respect and inspires collaboration. We believe in the power of an environment where everyone feels involved, respected, valued and connected, where everyone is free to be their authentic selves and share ideas. We also view diversity as key to leadership development. When selecting participants for internal development programs, we ensure that groups are balanced across a number of factors, including gender, ethnicity, tenure, function, geography and experience.

Compensation and Benefits

We strive to hire, develop and retain the top talent in all areas of the company. MTI's total rewards, values and philosophy is to provide competitive total rewards that include pay and benefits consistent with the varied practices in different regions of the world. We provide an array of programs to recognize individual and team achievements, and to enable us to appropriately reward performance consistent with employee contributions. MTI has a strong commitment to pay for performance at all levels. This commitment is embodied through merit increases, incentive compensation and our variable pay plans. We offer competitive compensation to attract and retain the best people. Our benefits are designed to help employees and their families stay healthy, meet their financial goals, protect their income and help them balance their work and personal lives. These benefits include health and wellness, paid time off, employee assistance, competitive pay, tuition reimbursement, career growth opportunities, and a culture of recognition.

Focus on Safety

The health and safety of our employees is our number one core value. We are committed to the health and safety of our employees, contractors, customers, and members of the communities in which we operate. Our "safety first" culture has been built through dedication, continuous improvement and active engagement. We continue to enhance our safety culture and our top priority is for all employees and contractors to return home in the same condition they arrived to work. While we believe zero-injuries across all our operations is attainable, we have set goals of 1.00 for Total Recordable Incident Rate (TRIR, which is the number of recordable injuries per 100 employees) and 0.10 for Lost Workday Injury Rate (LWIR, which is the number of lost workday injuries per 100 employees), and we continue to make strides to drive incidents below these levels. In 2020, our TRIR was 0.60 and our LWIR was 0.22. This safety-first mindset helps us attract and retain top talent from around the world and drives continuous improvement in our manufacturing operations.

The COVID-19 pandemic continues to impact lives and businesses around the world. Protecting the health and safety of our employees is one of our core values. Since the onset of the pandemic, we put in place a robust series of protocols to protect our employees while ensuring the safe and efficient operations of our facilities, including temporarily closing certain of our facilities; enhanced screening at entry to our facilities; restricting access at all facilities to business-critical visits; increasing cleaning and disinfecting protocols; use of personal protection equipment and additional hygiene supplies; adhering to social distancing guidelines; instituting remote work; restricting travel, and quarantining certain personnel. Employees are continuing to work from home where possible.

Operational Excellence Culture

Our Operational Excellence (OE) journey, rooted in the active engagement of our employees, began more than a decade ago when we developed a comprehensive and highly structured business system of lean principles closely integrated with safe and reliable work practices. We've significantly advanced OE across all aspects of our company, fostering a culture of continuous improvement where each employee recognizes the importance of applying these people-focused principles and tools to solve challenges, constantly refine our processes, identify and remove risk and waste, and deliver value to our customers. Every day, MTI employees show their engagement and apply their skills in ways that deliver measurable outcomes and create both business and social value.

Talent Management

Our people are essential to the successful delivery of the MTI strategy and to sustaining superior business performance. We believe our employees are at the core of everything we do. The work environment at MTI continually evolves to maximize the employee experience and drive high performance. We accelerate the development of our employees, strengthen our leadership capabilities, and enhance employee performance through engagement. Our culture of training and development motivates employees at all levels of the organization to work safely and efficiently. We employ several methods to engage, train and develop employees, yielding higher levels of performance year after year. Investment in skills and acceleration of employees' professional and personal development are essential components of our people strategy. We leverage both formal and informal programs to identify, develop and retain talent across the organization. Through the MTI Internship Program, we identify new talent and prepare them for success within our organization upon graduation. We also provide mentoring opportunities for rising talent in order to accelerate their development and improve our bench strength. On a quarterly basis, the Leadership Council and Chief Executive Officer conduct an organizational and leadership review of all segments, business units and functional areas focusing on high performing and high potential talent, diverse talent and the succession plans for our most critical roles. The various internship programs, development programs and succession planning sessions demonstrate the Company's ongoing commitment towards accelerating development of our future leaders.

We use a variety of human capital measures in managing our business, including: workforce demographics; diversity metrics with respect to representation, attrition, hiring, promotions and leadership; and talent management metrics including retention rates of top talent and hiring metrics.

Environmental, Health and Safety Matters and Government Regulation

The Company's operations are subject to federal, state, local and foreign laws and regulations relating to the environment and health and safety. In particular, we are subject to certain requirements under the Clean Air Act. In addition, certain of the Company's operations involve and have involved the use and release of substances that have been and are classified as toxic or hazardous within the meaning of these laws and regulations. Environmental operating permits are, or may be, required for certain of the Company's operations and such permits are subject to modification, renewal and revocation. We are also subject to land reclamation requirements relating to our mining operations. In addition to environmental and health and safety laws and regulations, we are subject to a wide variety of other federal, state, local and foreign laws and regulations in the countries where we conduct business. The Company regularly monitors and reviews its operations, procedures and policies for compliance with these laws and regulations. Compliance with these laws and regulations often requires the dedication of time and effort of employees, as well as financial resources. The Company believes its operations are in substantial compliance with these laws and regulations and that there are no violations that would have a material effect on the Company. Despite these compliance efforts, some risk of environmental and other damage is inherent in the Company's operations, as it is with other companies engaged in similar businesses, and there can be no assurance that material violations will not occur in the future. In fiscal 2020, compliance with the regulations applicable to us did not have a material effect on our capital expenditures, earnings, or competitive position, and the cost of compliance with these laws and regulations is not expected to have a material adverse effect on the Company in the future.

Sustainability is core to who we are and the foundation of how we operate our company. At MTI, we are focused on providing the safest workplace for our employees, creating innovative technologies tailored to our customers' evolving demands, reducing our environmental impact, preserving natural resources and making positive contributions to our local communities — all of which are ingrained in our values. For the past 12 years, MTI has published an annual Corporate Responsibility and Sustainability Report that describes our efforts in continuous improvement regarding our safety culture, environmental performance, social impact, new product development, and community engagement. Over the past several years, we've taken meaningful steps to advance our broad range of sustainability initiatives, including establishing 2025 environmental reduction targets in six focus areas: Scope 1 and Scope 2 CO_2 emissions, airborne pollutants, water used, water discharged, and process waste landfilled.

Laws and regulations are subject to change. See Item 1A, Risk Factors, for information regarding the possible effects that compliance with new laws and regulations, including those relating to climate change, may have on our businesses and operating results.

Under the terms of certain agreements entered into in connection with the Company's initial public offering in 1992, Pfizer Inc. ("Pfizer") agreed to indemnify the Company against certain liabilities being retained by Pfizer and its subsidiaries including, but not limited to, pending lawsuits and claims, and any lawsuits or claims brought at any time in the future alleging damages or injury from the use, handling of or exposure to any product sold by Pfizer's specialty minerals business prior to the closing of the initial public offering.

Available Information

The Company maintains an internet website located at http://www.mineralstech.com. Its reports on Forms 10-K, 10-Q and 8-K, and amendments to those reports, as well as its Proxy Statement and filings under Section 16 of the Securities Exchange Act of 1934 are available free of charge through the Investor Relations page of its website, as soon as reasonably practicable after they are filed with the Securities and Exchange Commission ("SEC"). Investors may access these reports through the Company's website by navigating to "Investor Relations" and then to "SEC Filings."

Item 1A. Risk Factors

Our business faces significant risks. Set forth below are all risks that we believe are material at this time. Our business, financial condition and results of operations could be materially adversely affected by any of these risks. These risks should be read in conjunction with the other information in this Annual Report on Form 10-K.

<u>COVID-19 Pandemic Risk</u>

We have been and expect to continue to be adversely affected by the COVID-19 pandemic.

The COVID-19 outbreak, declared a pandemic by the World Health Organization, has surfaced in nearly all regions around the world. Governments around the world have taken preventative measures to contain or mitigate the outbreak, including travel restrictions, border closings, restrictions on public gatherings, shelter-in-place restrictions and limitations on business. This has affected, and is continuing to affect, the global economy, the United States economy and the global financial markets. The outbreak and resulting preventative measures have disrupted our operations and affected our business, and we expect this to continue. The impacts include, but are not limited to, the following:

- We have experienced, and may experience in the future, temporary facility closures in response to government mandates in certain jurisdictions in which we operate. We may also be required to close certain of our facilities for the safety of our employees in response to positive diagnoses for COVID-19. Even in facilities that are not closed, we could be affected by reductions in employee availability and effectiveness, changes in operating procedures, and increased costs.
- Our customers have been, and may continue to be, affected by COVID-19 and the business slowdown caused by preventative measures, resulting in decreased demand for our products and services, delayed payments from customers and uncollectable accounts.
- Our supply chain could be disrupted. This could materially adversely impact our ability to secure raw materials and supplies for our facilities, which could materially adversely affect our operations.
- Significant disruption of global financial markets could have a negative impact on our ability to access capital in the future.
- Further or prolonged impact from COVID-19 could result in impairment of asset charges, including long-lived or intangible assets, inventory or bad debt charges.

We cannot predict the degree to which, or the time period that, global economic conditions and our business, sales, liquidity, financial condition and results of operations will continue to be affected by the COVID-19 pandemic and the resulting preventative measures. The extent to which we are affected will depend on future developments, including the duration of the outbreak, travel restrictions, business and workforce disruptions, and the effectiveness of actions taken to contain and treat the disease. The effects on our business, sales, liquidity, financial condition and results of operations could be material.

Industry and Market Risks

Worldwide general economic, business, and industry conditions may have an adverse effect on the Company's results.

The global economic instability caused by the COVID-19 pandemic has caused and may continue to cause, among other things, declining consumer and business confidence, volatile raw material prices, instability in credit markets, high unemployment, fluctuating interest and exchange rates, and other challenges in the countries in which we operate. The Company's business and operating results could be adversely affected by these global economic conditions. The Company's customers and potential customers may experience deterioration of their businesses, cash flow shortages, and difficulty obtaining financing. As discussed below, the industries we serve have in the past been adversely affected by the uncertain global economic climate due to the cyclical nature of their businesses. As a result, existing or potential customers may reduce or delay their growth and investments and their plans to purchase products and may not be able to fulfill their obligations in a timely fashion. Further, suppliers could experience similar conditions, which could affect their ability to fulfill their obligations to the Company. Adversity within capital markets may also impact the Company's results of operations by negatively affecting the amount of expense the Company records for its pension and other postretirement benefit plans. Actuarial valuations used to calculate income or expense for the plans reflect assumptions about financial market and other economic conditions – the most significant of which are the discount rate and the expected long-term rate of return on plan assets. Such actuarial valuations may change based on changes in key economic indicators. Global economic markets remain uncertain, and there can be no assurance that market conditions will improve in the near future. Future weakness in the global economy could materially and adversely affect our business and operating results.

Our customers' businesses are cyclical or have changing regional demands. Our operations are subject to these trends and we may not be able to mitigate these risks.

Our Performance Materials segment's sales are predominantly derived from the metalcasting market. The metalcasting market is dependent upon the demand for castings for automobile components, farm and construction equipment, oil and gas production equipment, power generation turbine castings, and rail car components. Many of these types of equipment are sensitive to fluctuations in demand during periods of recession or difficult economic conditions, including the current conditions resulting from the COVID-19 pandemic, which has affected and may continue to affect the demand for our Performance Materials segment's products and services.

In the paper industry, which is served by our Paper PCC product line, production levels for uncoated freesheet within North America and Europe, our two largest markets are projected to continue to decrease. The reduced demand for premium writing paper products has also caused recent paper mill closures. We expect paper consumption to gradually improve, however remain below 2019 levels.

Our Refractories segment primarily serves the steel industry. Global steel production has been and will continue to be affected by volatility in the market due to the COVID-19 pandemic. We expect steel consumption to remain below 2019 levels but improved from 2020 levels.

Demand for our Energy Services segment's products and services is affected by the level of exploration, development, and production activity of, and the corresponding capital spending by, oil and natural gas companies, which are heavily influenced by the benchmark price of these commodities. Oil and natural gas prices decreased significantly as a result of the COVID-19 pandemic with West Texas Intermediate (WTI) oil spot prices declining from a high of $63 per barrel in January 2020 to record low prices in April 2020. We expect that the volatility of oil prices, if sustained, will continue to cause oil and natural gas companies to reduce their capital expenditures and production and exploration activities. This has the effect of decreasing the demand and increasing competition for the services we provide. In addition, the performance of our Energy Services segment is affected by changes in technologies, locations of customers' targeted reserves, and competition in various geographic markets.

Our Environmental Products and Building Materials products sales are predominantly derived from the commercial construction and infrastructure markets. In addition, our Processed Minerals and Specialty PCC product lines are affected by the domestic building and construction markets, as well as the automotive market.

Demand for our products is subject to trends in these markets. During periods of economic slowdown, our customers often reduce their capital expenditures and defer or cancel pending projects. Such developments occur even amongst customers that are not experiencing financial difficulties. In addition, these trends could cause our customers to face liquidity issues or bankruptcy, which could deteriorate the aging of our accounts receivable, increase our bad debt exposure and possibly trigger impairment of assets or realignment of our businesses. The Company has taken steps to reduce its exposure to variations in its customers' businesses, including by diversifying its portfolio of products and services; through geographic expansion, and by structuring most of its long-term satellite PCC contracts to provide a degree of protection against declines in the quantity of product purchased, since the price per ton of PCC generally rises as the number of tons purchased declines. In addition, many of the Company's product lines lower its customers' costs of production or increase their productivity, which should encourage them to use its products. However, there can be no assurance that these efforts will mitigate the risks of our dependence on these industries. Continued weakness in the industries we serve has had, and may in the future have, an adverse effect on sales of our products and our results of operations. A continued or renewed economic downturn in one or more of the industries or geographic regions that the Company serves, or in the worldwide economy, could cause actual results of operations to differ materially from historical and expected results.

The Company operates in very competitive industries, which could adversely affect our profitability.

The Company has many competitors. Some of our principal competitors have greater financial and other resources than we have. Accordingly, these competitors may be better able to withstand economic downturns and changes in conditions within the industries in which we operate and may have significantly greater operating and financial flexibility than we do. We also face competition for some of our products from alternative products, and some of the competition we face comes from competitors in lower-cost production countries like China and India. As a result of the competitive environment in the markets in which we operate, we currently face and will continue to face pressure on the sales prices of our products from competitors, which could reduce profit margins.

The Company's sales could be adversely affected by consolidation in customer industries, principally paper, foundry and steel.

Several consolidations in the paper industry have taken place in recent years and such consolidation could continue in the future. These consolidations could result in partial or total closure of some paper mills where the Company operates PCC satellites. Such closures would reduce the Company's sales of PCC, except to the extent that they resulted in shifting paper production and associated purchases of PCC to another location served by the Company. Similarly, consolidations have occurred in the foundry and steel industries. Such consolidations in the major industries we serve concentrate purchasing power in the hands of a smaller number of manufacturers, enabling them to increase pressure on suppliers, such as the Company. This increased pressure could have an adverse effect on the Company's results of operations in the future.

The Company's sales of PCC could be adversely affected by our failure to renew or extend long term sales contracts for our satellite operations.

The Company's sales of PCC to paper customers are typically pursuant to long-term evergreen agreements, initially ten years in length, with paper mills where the Company operates satellite PCC plants. Sales pursuant to these contracts represent a significant portion of our worldwide Paper PCC sales, which were $308.4 million in 2020, or approximately 19% of the Company's net sales. The terms of many of these agreements have been extended or renewed in the past, often in connection with an expansion of the satellite plant. However, failure of a number of the Company's customers to renew or extend existing agreements on terms as favorable to the Company as those currently in effect, or at all, could have a substantial adverse effect on the Company's results of operations, and could also result in impairment of the assets associated with the PCC plant.

Financial Risks

Servicing the Company’s debt will require a significant amount of cash. This could reduce the Company’s flexibility to respond to changing business and economic conditions or fund capital expenditures or working capital needs. Our ability to generate cash depends on many factors beyond our control.

At December 31, 2020 the Company had $952.7 million aggregate principal amount of total indebtedness (consisting primarily of $548.0 million aggregate principal amount of loans under our term facility and $400.0 million aggregate principal amount of notes) and an additional $290.5 million of borrowing capacity under the revolving credit facility (after giving effect to $9.5 million of outstanding letters of credit). Our outstanding indebtedness will require a significant amount of cash to make interest payments. Further, the interest rate on a significant portion of our borrowings under our senior secured credit facility is based on LIBOR interest rates, which could result in higher interest expense in the event of an increase in interest rates. In addition, since these borrowings under our senior secured credit facility extend beyond 2021, the interest rates for these obligations might be subject to change based on the United Kingdom's Financial Conduct Authority's intention to phase out LIBOR by the end of 2021. Our ability to pay interest on our debt and to satisfy our other debt obligations will depend in part upon our future financial and operating performance and upon our ability to renew or refinance borrowings. Prevailing economic conditions and financial, business, competitive, regulatory and other factors, many of which are beyond our control, will affect our ability to make these payments. We cannot guarantee that our business will generate sufficient cash flow from operations or that future borrowings will be available to us in an amount sufficient to enable us to fund our liquidity needs. If we are unable to generate sufficient cash flow to meet our debt service obligations, we will have to pursue one or more alternatives, such as reducing or delaying capital or other expenditures, refinancing debt, selling assets, or raising equity capital. Further, the requirement to make significant interest payments may reduce the Company’s flexibility to respond to changing business and economic conditions or fund capital expenditure or working capital needs and may increase the Company’s vulnerability to adverse economic conditions.

The agreements and instruments governing our debt contain various covenants that could significantly impact our ability to operate our business.

The agreement governing our senior secured credit facility and the indenture that governs our 5.0% Senior Notes due 2028 contain a number of significant covenants that, among other things, limit our ability to: incur or guarantee additional indebtedness, pay dividends or make other distributions or repurchase or redeem capital stock, prepay, redeem or repurchase certain debt, issue certain preferred stock or similar equity securities, make loans and investments, sell or otherwise dispose of assets, incur liens, enter into transactions with affiliates, enter into agreements restricting our subsidiaries’ ability to pay dividends and consolidate, merge or sell all or substantially all of our assets. In addition, our revolving credit facility, if used, requires us to comply with specific financial ratios, including a maximum net leverage ratio, under which we are required to achieve specific financial results. Our ability to comply with these provisions may be affected by events beyond our control. A breach of any of these covenants would result in a default under the applicable agreements. In the event of any default under our senior secured credit facility, our lenders could elect to declare all amounts borrowed under the credit agreement, together with accrued interest thereon, to be due and payable. In such an event, we cannot assure you that we would have sufficient assets to pay debt then outstanding under the credit agreement, the indenture governing our notes, and any other agreements governing our debt. Any future refinancing of the senior secured credit facility is likely to contain similar restrictive covenants. We may also incur future debt obligations that might subject us to additional restrictive covenants that could affect our financial and operational flexibility. We cannot assure you that we will be granted waivers or amendments to these agreements if for any reason we are unable to comply with these agreements or that we will be able to refinance our debt on terms acceptable to us, or at all.

Technology, Development and Growth Risks

The Company’s results could be adversely affected if it is unable to effectively achieve and implement its growth initiatives.

Sales and income growth of the Company depends upon a number of uncertain events, including the outcome of the Company's strategies of increasing its penetration into geographic markets such as Brazil, Russia, India and China as well as other Asian and Eastern European countries; increasing its penetration into product markets such as the market for papercoating pigments and the market for groundwood paper pigments; increasing sales to existing PCC customers by increasing the amount of PCC used per ton of paper produced; developing, introducing and selling new products such as the FulFill® family of products for the paper industry. Difficulties, delays or failure of any of these strategies could affect the future growth rate of the Company. Our strategy also anticipates growth through future acquisitions. However, our ability to identify and consummate any future acquisitions on terms that are favorable to us may be limited by the number of attractive acquisition targets, internal demands on our resources and our ability to obtain financing. Our success in integrating newly acquired businesses will depend upon our ability to retain key personnel, avoid diversion of management’s attention from operational matters, and integrate general and administrative services. In addition, future acquisitions could result in the incurrence of additional debt, costs and contingent liabilities. Integration of acquired operations may take longer, or be more costly or disruptive to our business, than originally anticipated, and it is also possible that expected synergies from future acquisitions may not materialize. We also may incur costs and divert management attention with regard to potential acquisitions that are never consummated.

Delays or failures in new product development could adversely affect the Company’s operations.

The Company’s future business success will depend in part upon its ability to maintain and enhance its technological capabilities, to respond to changing customer needs, and to successfully anticipate or respond to technological changes on a cost-effective and timely basis. The Company is engaged in a continuous effort to develop new products and processes in all of its product lines. Difficulties, delays or failures in the development, testing, production, marketing or sale of such new products could cause actual results of operations to differ materially from our expected results.

The Company’s ability to compete is dependent upon its ability to defend its intellectual property against inappropriate disclosure, theft and infringement.

The Company's ability to compete is based in part upon proprietary knowledge, both patented and unpatented. The Company's ability to achieve anticipated results depends in part on its ability to defend its intellectual property against inappropriate disclosure and theft as well as against infringement. In addition, development by the Company's competitors of new products or technologies that are more effective or less expensive than those the Company offers could have a material adverse effect on the Company's financial condition or results of operations.

The Company’s operations could be impacted by the increased risks of doing business abroad.

The Company does business in many areas internationally. Approximately 48% of our sales in 2020 were derived from outside the United States and we have significant production facilities which are located outside of the United States. We have in recent years expanded our operations in emerging markets, and we plan to continue to do so in the future, particularly in China, India, Brazil, the Middle East, and Eastern Europe. Some of our operations are located in areas that have experienced political or economic instability, including Indonesia, Malaysia, Nigeria, Egypt, Russia, Saudi Arabia, Turkey, Brazil, Thailand, China and South Africa. The UK’s decision to exit the European Union (referred to as Brexit) has caused additional volatility in the markets and currency exchange rates. Market conditions and exchange rates could continue to be volatile in the near term as this decision is implemented. As the Company expands its operations overseas, it faces increased risks of doing business abroad, including inflation, fluctuation in interest rates, changes in applicable laws and regulatory requirements, export and import restrictions, tariffs, nationalization, expropriation, limits on repatriation of funds, civil unrest, terrorism, unstable governments and legal systems, and other factors. We are also subject to increased risks of natural disasters, public health crises, including the occurrence of a contagious disease or illness, such as COVID-19, and other catastrophic events in such countries. Many of these risks are beyond our control and can lead to sudden, and potentially prolonged, changes in demand for our products, difficulty in enforcing agreements, and losses in the realizability of our assets. Adverse developments in any of the areas in which we do business could cause actual results to differ materially from historical and expected results. In addition, a significant portion of our raw material purchases and sales outside the United States are denominated in foreign currencies, and liabilities for non-U.S. operating expenses and income taxes are denominated in local currencies. Accordingly, reported sales, net earnings, cash flows and fair values have been and, in the future, will be affected by changes in foreign currency exchange rates. Our overall success as a global business depends, in part, upon our ability to succeed in differing legal, regulatory, economic, social and political conditions. We cannot assure you that we will implement policies and strategies that will be effective in each location where we do business.

The Company’s operations are dependent on the availability of raw materials and access to ore reserves at its mining operations. Increases in costs of raw materials, energy, or shipping could adversely affect our financial results.

The Company depends in part on having an adequate supply of raw materials for its manufacturing operations, particularly lime and carbon dioxide for the PCC product line, and magnesia and alumina for its Refractory operations. Purchase prices and availability of these critical raw materials are subject to volatility. At any given time, we may be unable to obtain an adequate supply of these critical raw materials on a timely basis, on price and other terms, or at all. While most such raw materials are readily available, the Company has purchased approximately 49% of its magnesia requirements from sources in China over the past five years. The price and availability of magnesia have fluctuated in the past and they may fluctuate in the future. Price increases for certain other of our raw materials, including petrochemical products, as well as increases in energy prices, have also affected our business. Our production processes consume a significant amount of energy, primarily electricity, diesel fuel, natural gas and coal. We use diesel fuel to operate our mining and processing equipment and our freight costs are heavily dependent upon fuel prices and surcharges. Energy costs also affect the cost of raw materials. On a combined basis, these factors represent a large exposure to petrochemical and energy products which may be subject to significant price fluctuations. The contracts pursuant to which we construct and operate our satellite PCC plants generally adjust pricing to reflect the pass-through of increases in costs resulting from inflation, including energy. However, there is a time lag before such price adjustments can be implemented. The Company and its customers will typically negotiate reasonable price adjustments in order to recover these escalating costs, but there can be no assurance that we will be able to recover increasing costs through such negotiations.

The Company also depends on having adequate access to ore reserves of appropriate quality at its mining operations. There are numerous uncertainties inherent in estimating ore reserves including subjective judgments and determinations that are based on available geological, technical, contract and economic information.

The Company relies on shipping bulk cargos of bentonite from the United States, Turkey and China to customers, as well as our own subsidiaries, and we are sensitive to our ability to recover these shipping costs. In the last few years, bulk cargo shipping rates have been very volatile, and, to a lesser extent, the availability of bulk cargo containers have been suspect. If we cannot secure our container requirements or offset additional shipping costs with price increases to customers, our profitability could be impacted. We are also subject to other shipping risks. In particular, rail service interruptions have affected our ability to ship, and the availability of rail service, and our ability to recover increased rail costs, may be beyond our control. During the COVID-19 pandemic, our ability to ship our products has been, and may in the future be, affected by government mandates in certain jurisdictions in which we operate.

Operational Risks

The Company is subject to stringent regulation in the areas of environmental, health and safety, and tax, and may incur unanticipated costs or liabilities arising out of claims for various legal, environmental and tax matters or product stewardship issues.

The Company's operations are subject to international, federal, state and local governmental environmental, health and safety, tax and other laws and regulations. We have expended, and may be required to expend in the future, substantial funds for compliance with such laws and regulations. In addition, future events, such as changes to or modifications of interpretations of existing laws and regulations, or enforcement polices, or further investigation or evaluation of the potential environmental impacts of operations or health hazards of certain products, may affect our mining rights or give rise to additional compliance and other costs that could have a material adverse effect on the Company. Government action taken in response to the COVID-19 pandemic, including government-imposed restrictions on the movement of people and goods, and other new legal rights and obligations, could also have an adverse effect on the Company. Further, certain of our customers are subject to various federal and international laws and regulations relating to environmental and health and safety matters, especially our Energy Services customers who are subject to drilling permits, waste water disposal and other regulations. To the extent that these laws and regulations affecting our customers change, demand for our products and services could also change and thereby affect our financial results. State, national, and international governments and agencies have been evaluating climate-related legislation and regulation that would restrict emissions of greenhouse gases in areas in which we conduct business, and some such legislation and regulation have already been enacted or adopted. Enactment of climate-related legislation or adoption of regulation that restrict emissions of greenhouse gases in areas in which we conduct business could have an adverse effect on our operations or demand for our products. Our manufacturing processes, particularly the manufacturing process for PCC, use a significant amount of energy and, should energy prices increase as a result of such legislation or regulation, we may not be able to pass these increased costs on to purchasers of our products. We cannot predict if or when currently proposed or additional laws and regulations regarding climate change or other environmental or health and safety concerns will be enacted or adopted.

The Company is also subject to income tax laws and regulations in the United States and various foreign jurisdictions. Significant judgment is required in evaluating and estimating our provision and accruals for these taxes. Our income tax liabilities are dependent upon the location of earnings among these different jurisdictions. Our income tax provision and income tax liabilities could be adversely affected by the jurisdictional mix of earnings, changes in valuation of deferred tax assets and liabilities and changes in tax treaties, laws and regulations.

The Company is currently a party in various litigation matters and tax and environmental proceedings and faces risks arising from various unasserted litigation matters, including, but not limited to, product liability, patent infringement, antitrust claims, and claims for third party property damage or personal injury stemming from alleged environmental torts. Failure to appropriately manage safety, human health, product liability and environmental risks associated with the Company's products and production processes could adversely impact the Company's employees and other stakeholders, the Company's reputation and its results of operations. Public perception of the risks associated with the Company's products and production processes could impact product acceptance and influence the regulatory environment in which the Company operates. While the Company has procedures and controls to manage these risks, carries liability insurance, which it believes to be appropriate to its businesses, and has provided reserves for current matters, which it believes to be adequate, an unanticipated liability, arising out of a current matter or proceeding or from the other risks described above, could have a material adverse effect on the Company's financial condition or results of operations.

Production facilities are subject to operating risks and capacity limitations that may adversely affect the Company's financial condition or results of operations.

The Company is dependent on the continued operation of its production facilities. During the COVID-19 pandemic, our facilities have been, and may in the future be, temporarily closed in response to government mandates in certain jurisdictions in which we operate or for the safety of our employees in response to positive diagnoses for COVID-19. Production facilities are subject to hazards associated with the manufacturing, handling, storage, and transportation of chemical materials and products, including pipeline leaks and ruptures, explosions, fires, inclement weather and natural disasters, mechanical failure, unscheduled downtime, labor difficulties, transportation interruptions, and environmental risks. We maintain property, business interruption and casualty insurance but such insurance may not cover all risks associated with the hazards of our business and is subject to limitations, including deductibles and maximum liabilities covered. We may incur losses beyond the limits, or outside the coverage, of our insurance policies. Further, from time to time, we may experience capacity limitations in our manufacturing operations. In addition, if we are unable to effectively forecast our customers' demand, it could affect our ability to successfully manage operating capacity limitations. These hazards, limitations, disruptions in supply and capacity constraints could adversely affect financial results.

Operating results for some of our segments are seasonal.

Our Energy Services Segment and certain product lines within our Performance Materials segment are affected by seasonal weather patterns. A majority of our Energy Services revenues are derived from the Gulf of Mexico and surrounding states, which are susceptible to hurricanes that typically occur June 1st through November 30th. Actual or threatened hurricanes can result in volatile demand for services provided by our Energy Services segment. Our Environmental Products and Building Materials product lines within our Performance Materials segment are affected by weather patterns which determine the feasibility of construction activities. Typically, less construction activity occurs in winter months and thus this segment's revenues tend to be greatest in the second and third quarters when weather patterns in our geographic markets are more conducive to construction activities. Our Processed Minerals product line is subject to similar seasonal patterns.

Our operations have been and will continue to be subject to cyber-attacks that could have a material adverse impact on our business, consolidated results of operations, and consolidated financial condition.

Our operations are becoming increasingly dependent on digital technologies and services. We use these technologies for internal purposes, including data storage, processing, and transmissions, as well as in our manufacturing operations and in our interactions with customers and suppliers. Increased use of remote working arrangements has only increased our reliance on these technologies. Digital technologies are subject to the risk of cyber-attacks. If our systems for protecting against cybersecurity risks prove not to be sufficient, we could be adversely affected by, among other things: loss of or damage to intellectual property, proprietary or confidential information, or customer, supplier, or employee data; interruption of our business operations; and increased costs required to prevent, respond to, or mitigate cybersecurity attacks.

In October 2020, we detected a ransomware attack impacting certain of our information technology systems. The network security incident primarily impacted our internal corporate functions. The Company's manufacturing sites, which rely on different networks, continued to operate safely and with limited interruption. Further, we currently do not believe that any of our customers or suppliers were impacted as a result of this incident. Nonetheless, we believe that the security event included unauthorized access to personal data of employees, former employees and their dependents.

The risks associated with the October 2020 incident or future incidents could harm our reputation and our relationships with customers, suppliers, employees, and other third parties, and may result in claims against us. In addition, although we do not currently believe the October 2020 incident will have a material impact on us, there can be no assurance that this incident or future incidents will not have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The Company's corporate headquarters, sales offices, research laboratories, plants, mines and other facilities are owned by the Company except as otherwise noted. Set forth below is certain information relating to the Company's principal plants and office and research facilities.

Location	Facility	Product Line	Segment
United States			
Alabama, Sandy Ridge	Plant; Mine	Metalcasting and specialty products	Performance Materials
Arizona, Pima County	Plant; Mine (1)	Limestone	Specialty Minerals
Arkansas, Ashdown	Plant	PCC	Specialty Minerals
California, Lucerne Valley	Plant; Mine	Limestone	Specialty Minerals
Connecticut, Canaan	Plant; Mine	Limestone, Metallurgical Wire/Calcium	Specialty Minerals; Refractories
Georgia, Cartersville	Plant	Environmental products and other building materials products	Performance Materials
Illinois, Belvidere	Plant	Metalcasting products	Performance Materials
Illinois, Hoffman Estates	Research Laboratories; Administrative office (2)	All Company Products	Performance Materials
Indiana, Portage	Plant	Refractories/Shapes	Refractories
Indiana, Troy	Plant	Metalcasting products	Performance Materials
Iowa, Shell Rock	Plant	Metalcasting products	Performance Materials
Louisiana, Baton Rouge	Plant	Monolithic Refractories	Refractories
Louisiana, Lafayette	Plant	Personal Care Products	Performance Materials
Louisiana, New Iberia	Operations base (2)	Filtration and Well testing services	Energy Services
Massachusetts, Adams	Plant; Mine	Limestone, Lime, PCC	Specialty Minerals
Michigan, Albion	Plant	Metalcasting products	Performance Materials
Mississippi, Aberdeen	Plant	Performance additive products	Performance Materials
Montana, Dillon	Plant; Mine	Talc	Specialty Minerals
Nebraska, Scottsbluff	Transportation terminal		Performance Materials
New York, New York	Headquarters (2)	All Company Products	Headquarters
North Dakota, Gascoyne	Plant; Mine	Metalcasting and specialty products	Performance Materials
Ohio, Archbold	Plant	Metalcasting products	Performance Materials
Ohio, Bryan	Plant	Monolithic Refractories	Refractories
Ohio, Dover	Plant	Monolithic Refractories/Shapes	Refractories
Pennsylvania, Bethlehem	Administrative Office; Research Laboratories; Sales Offices	All Company Products	All Segments
Pennsylvania, Easton	Administrative Office; Research Laboratories; Plant; Sales Offices	All Company Products	All Segments
Pennsylvania, Slippery Rock	Plant; Sales Offices	Monolithic Refractories/Shapes	Refractories
Pennsylvania, York	Plant	Metalcasting and pet care products	Performance Materials
Tennessee, Chattanooga	Plant	Metalcasting products	Performance Materials
Texas, Bay City	Plant	Talc	Specialty Minerals
Texas, Houston	Research Laboratories (2)	Filtration and well testing services	Energy Services
Texas, Houston	Administrative Office (2)	Filtration and well testing services	Energy Services
Wisconsin, Neenah	Plant	Metalcasting products	Performance Materials
Wisconsin, Superior	Plant	PCC	Specialty Minerals
Wyoming, Colony	Plant; Mine	Metalcasting, pet litter, personal care, specialty and basic minerals products	Performance Materials
Wyoming, Lovell	Plant; Mine	Specialty and pet care products; Environmental and building materials products	Performance Materials

Location	Facility	Product Line	Segment
International			
Australia, Brisbane	Sales Office/Administrative Office	Metalcasting, specialty and pet care products	Performance Materials
Australia, Carlingford	Sales Office (2)	Monolithic Refractories	Refractories
Australia, Gurulmundi	Plant; Mine	Metalcasting, specialty and pet care products	Performance Materials
Australia, Perth	Operations base (2)	Filtration services	Energy Services
Austria, Rottersdorf	Plant	Pet care products	Performance Materials
Belgium, Brussels	Administrative Office	Monolithic Refractories	Refractories
Brazil, Macae	Operations base (2)	Filtration services	Energy Services
Brazil, Sao Jose dos Campos	Sales Office (2)/Administrative Office	PCC	Specialty Minerals
Canada, Pt. Claire	Administrative Office	PCC/Monolithic Refractories	Specialty Minerals; Refractories
China, Beijing	Sales Office/Administrative Office	Metalcasting, specialty, fabric care and pet care products	Performance Materials
China, Chao Yang, Liaoning	Plant; Mine	Metalcasting and fabric care products	Performance Materials
China, Shanghai	Administrative Office/Sales Office	PCC/Monolithic Refractories	Specialty Minerals; Refractories
China, Suzhou	Plant	Environmental and building materials products	Performance Materials
China, Suzhou	Plant/Sales Office/Research Laboratories	PCC/Monolithic Refractories	Specialty Minerals; Refractories
China, Tianjin	Plant; Mine; Research Laboratories	Metalcasting and fabric care products	Performance Materials
Germany, Duisburg	Plant/Sales Office/Research Laboratories	Laser Scanning Instrumentation/ Probes/Monolithic Refractories	Refractories
India, Chennai	Plant	Metalcasting products	Performance Materials
India, Mumbai	Sales Office (2)/Administrative Office	PCC/Monolithic Refractories/ Metallurgical Wire	Specialty Minerals; Refractories
Indonesia, Jakarta	Operations base (2)	Filtration services	Energy Services
Ireland, Cork	Plant; Administrative Office (2)/ Research Laboratories	Monolithic Refractories	Refractories
Italy, Brescia	Sales Office	Monolithic Refractories/Shapes	Refractories
Italy, Nave	Plant	Monolithic Refractories/Shapes	Refractories
Japan, Gamagori	Plant/Research laboratories	Monolithic Refractories/Shapes, Calcium	Refractories
Japan, Tokyo	Sales/Administrative Office	Monolithic Refractories	Refractories
Korea, Pyeongtaek	Plant	Environmental, building materials and other products	Performance Materials
Malaysia, Kemaman	Operations base (2)	Filtration and well testing services	Energy Services
Netherlands, Hengelo	Plant/Administrative Office	Metallurgical Wire	Refractories
Netherlands, Moerdjik	Plant/Administrative Office	Pet Care Products	Performance Materials
Nigeria, Port Harcourt	Operations base (2)	Well Testing services	Energy Services
Poland, Szczytno	Plant	Environmental products	Performance Materials
South Africa, Johannesburg	Sales Office/Administrative Office (2)	Monolithic Refractories	Refractories
South Africa, Pietermaritzburg	Plant	Monolithic Refractories	Refractories
South Korea, Yangbuk-Myeun, Kyeung-buk	Plant; Mine	Metalcasting products	Performance Materials
Spain, Santander	Administrative Office	Monolithic Refractories	Refractories

Location	Facility	Product Line	Segment
Thailand, Laemchabang	Plant	Metalcasting and fabric care products	Performance Materials
Turkey, Enez	Plant; Mine	Metalcasting, specialty and basic minerals products	Performance Materials
Turkey, Gebze	Plant/Research Laboratories	Monolithic Refractories/Shapes/ Application Equipment	Refractories
Turkey, Istanbul	Sales Office/Administrative Office	Monolithic Refractories	Refractories
Turkey, Kutahya	Plant	Monolithic Refractories/Shapes	Refractories
Turkey, Unye	Plant; Mine	Pet Care Products	Performance Materials
Turkey, Usak	Plant; Mine	Specialty material products	Performance Materials
United Kingdom, Aberdeen	Operations base (2)	Filtration services	Energy Services
United Kingdom, Birkenhead	Research Laboratories (2)	Environmental products	Performance Materials
United Kingdom, Lifford	Plant	PCC, Lime	Specialty Minerals
United Kingdom, Rotherham	Plant/Sales Office	Monolithic Refractories/Shapes	Refractories
United Kingdom, Winsford	Plant/Research Laboratories	Fabric care and other products	Performance Materials

(1) This plant and quarry is leased to another company.

(2) Leased by the Company. The facilities in Cork, Ireland, are operated pursuant to a 99-year lease, the term of which commenced in 1963. The Company's headquarters in New York, New York, are held under a lease which expires in 2031.

Set forth below is the location of, and the main customer served by, each of the Company's satellite PCC plants in operation or, under construction, within the Specialty Minerals segment, as of December 31, 2020. Generally, the land on which each satellite PCC plant is located is leased at a nominal amount by the Company from the host paper mill pursuant to a lease, the term of which generally runs concurrently with the term of the PCC production and sale agreement between the Company and the host paper mill.

Location	Principal Customer
United States	
Alabama, Jackson	PCA Corporation
Alabama, Selma	International Paper Company
Kentucky, Wickliffe	Phoenix Paper Wickliffe LLC
Maine, Jay	Verso Paper Holdings LLC
Michigan, Quinnesec	Verso Paper Holdings LLC
Minnesota, Cloquet	Sappi Ltd.
Minnesota, International Falls	PCA Corporation
New York, Ticonderoga	International Paper Company
Ohio, Chillicothe	P.H. Glatfelter Co./Pixelle Specialty Solutions
South Carolina, Eastover	International Paper Company
Washington, Longview	North Pacific Paper Corporation

Location	Principal Customer
International	
Brazil, Guaiba	CMPC - Celulose Rio Grandense
Brazil, Jacarei	Munksjo Brasil Ind e Com de Papeis Especiais Ltda.
Brazil, Luiz Antonio	International Paper do Brasil Ltda.
Brazil, Mucuri	Suzano Papel e Celulose S. A.
Brazil, Suzano	Suzano Papel e Celulose S. A.
Canada, St. Jerome, Quebec	Les Entreprises Rolland Inc
Canada, Windsor, Quebec	Domtar Inc.
China, Changshu	UPM Changshu
China, Dagang (1)	Gold East Paper (Jiangsu) Company Ltd.
China, Zhenjiang (1)	Gold East Paper (Jiangsu) Company Ltd.
China, Suzhou (1)	Gold HuaSheng Paper Company Ltd.
China, Henan	Henan Jianghe Paper Co., Ltd.
China, Shandong	Shandong Sun Paper Industry Joint Stock Company Ltd
China, Shouguang (1)	Shandong Meilun Paper Corporation
China, Yanzhou	Yanzhou Tianzhang Paper Industry Co., LTD
Finland, Äänekoski	Metsa Board Corporation
Finland, Tervakoski	Delfort
France, Alizay	Double A Paper Company Ltd.
France, Quimperle	PDM Industries
France, Saillat Sur Vienne	International Paper Company
Germany, Schongau	UPM Corporation
India, Ballarshah (1)	Ballarpur Industries Ltd.
India, Dandeli	West Coast Paper Mill Ltd.
India, Gaganapur (1)	Ballarpur Industries Ltd.
India, Kala Amb (2)	Ruchira Papers Limited
India, Lalkuan	Century Papers Ltd.
India, Saila Khurd	Kuantum Papers Ltd.
India, Rayagada (1)	JK Paper
India, Mukstar (2)	Satia Industries Ltd.
Indonesia, Perawang (1)	PT Indah Kiat Pulp and Paper Corporation
Indonesia, Perawang 2 (1)	PT Indah Kiat Pulp and Paper Corporation
Japan, Shiraoi (1)	Nippon Paper Group Inc.
Malaysia, Sipitang	Ballarpur Industries Ltd.
Poland, Kwidzyn	International Paper – Kwidzyn, S.A
Portugal, Figueira da Foz (1)	Navigator Paper Figueira, S.A.
Slovakia, Ruzomberok	Mondi Business Paper SCP
South Africa, Merebank (1)	Mondi Paper Company Ltd.
Thailand, Namphong	Phoenix Pulp & Paper Public Co. Ltd.
Thailand, Tha Toom (1)	Double A Paper Company Ltd.
Thailand, Tha Toom 2 (1)	Double A Paper Company Ltd.

(1) These plants are owned through joint ventures.
(2) This plant is under construction.

The following table sets forth, for each of the quarries or mines we own or operate, our current estimate as to the amount of proven and probable reserves such quarry or mine holds, based on the most recent mine plan, its usage rate in 2020, and a conversion factor for the conversion of in-situ materials to saleable products, by major mineral category.

	2020 Tons Usage (000s)	Total Tons of Reserves (000s)	Assigned Reserves (000s)	Unassigned Reserves** (000s)	Conversion Factor	Mining Claims		
						Owned	Unpatented *	Leased
Limestone								
Adams, MA	684	21,626	21,626	—	80%	21,626	—	—
Canaan, CT	510	21,130	21,130	—	90%	21,130	—	—
Lucerne Valley, CA	1,082	38,637	38,637	—	95%	38,637	—	—
Pima County, AZ	177	7,522	7,522	—	90%	7,522	—	—
Total Limestone	2,453	88,915	88,915	—		88,915	—	—
			100%	0%		100%	0%	0%
Talc								
Dillon, MT	122	2,567	2,567	—	80%	2,567	—	—
			100%	0%		100%	0%	0%
Sodium Bentonite								
Australia	83	1,063	1,063	—	80%			1,063
Belle/Colony, WY/SD	1,345	61,306	61,306	—	77%	3,550	12,093	45,663
Lovell, WY	507	35,740	35,740	—	86%	16,781	14,756	4,203
Other SD, WY, MT		72,831	—	72,831	79%	54,815	15,048	2,968
Total Sodium Bentonite	1,935	170,940	98,109	72,831		75,146	41,897	53,897
			57%	43%		44%	24%	32%
Calcium Bentonite								
Chao Yang, Liaoning, China	332	1,291	1,291	—	78%			1,291
Nevada	1	1,559	1,059	500	76%	1,015	44	500
Sandy Ridge, AL	40	6,335	6,335	—	75%	1,839		4,496
Turkey, Enez//Usak	229	3,228	3,228	—	77%			3,228
Turkey, Unye	314	12,458	12,458	—	80%			12,458
Total Calcium Bentonite	916	24,871	24,371	500		2,854	44	21,973
			98%	2%		12%	0%	88%
Leonardite								
Gascoyne, ND	34	2,514	2,514	—	72%	—	2,158	356
			100%	0%			86%	14%
Chromite								
South Africa	—	3,494	3,494	—	75%	—	—	3,494
			100%	0%		0%	0%	100%
Other								
Nevada**	—	2,997	—	2,997	80%		2,997	—
			0%	100%		0%	100%	0%
GRAND TOTALS	5,460	296,298	219,970	76,328		169,482	47,096	79,720
			74%	26%		57%	16%	27%

* Quantity of reserves that would be owned if patent was granted.
** Unassigned reserves are reserves which we expect will require additional expenditures for processing facilities.

Our estimates of total reserves in the table above require us to make certain key assumptions. These assumptions relate to consistency of deposits in relation to drilling samples obtained with respect to both quantity and quality of reserves contained therein; the ratio of overburden to mineral deposits; any environmental or social impact of mining the minerals; and profitability of extracting those minerals, including haul distance to processing plants, applicability of minerals to various end markets and selling prices within those markets, and our past experiences in the deposits, several of which we have been operating in for many decades.

The Company believes that its facilities, which are of varying ages and are of different construction types, have been satisfactorily maintained, are in good condition, are suitable for the Company's operations and generally provide sufficient capacity to meet the Company's production requirements. Based on past loss experience, the Company believes it is adequately insured with respect to these assets and for liabilities likely to arise from its operations.

Item 3. Legal Proceedings

The Company and its subsidiaries are involved in the legal and environmental proceedings described in Note 18 to the consolidated financial statements included elsewhere in this report, which disclosure is incorporated herein by reference. From time to time, the Company and its subsidiaries are also the subject of various routine legal actions and claims arising in the ordinary course of their businesses. The Company does not anticipate that the individual or aggregate liability arising out of litigation pending or claims known to be threatened against the Company and its subsidiaries will have a material adverse effect on the Company's results of operations, cash flows or financial condition.

Item 4. Mine Safety Disclosures

The information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K is included in Exhibit 95 to this Annual Report on Form 10-K.

Information About Our Executive Officers

Set forth below are the names and ages of all Executive Officers of the Registrant indicating all positions and offices with the Registrant held by each such person, and each such person's principal occupations or employment during the past five years.

Name	Age	Position
Douglas T. Dietrich	51	Chief Executive Officer
Brett Argirakis	56	Senior Vice President and Managing Director, Minteq International Inc. and MTI Global Supply Chain
Michael A. Cipolla	63	Vice President, Corporate Controller and Chief Accounting Officer
Erin N. Cutler	33	Vice President, Human Resources
Matthew E. Garth	46	Senior Vice President, Finance and Treasury, Chief Financial Officer
Jonathan J. Hastings	58	Group President, Performance Materials
Andrew M. Jones	62	Vice President and Managing Director, Energy Services
Douglas W. Mayger	63	Senior Vice President and Head of Global Operations, Performance Materials
Thomas J. Meek	63	Senior Vice President, General Counsel, Secretary and Chief Compliance Officer
D.J. Monagle, III	58	Group President, Specialty Minerals and Refractories

Douglas T. Dietrich was elected Chief Executive Officer effective December 2016. He joined the Company in August 2007 as Vice President, Corporate Development and Treasury, and was appointed Senior Vice President, Finance and Treasury, Chief Financial Officer effective January 2011. Prior to joining the Company, Mr. Dietrich was Vice President, Alcoa Wheel Products since 2006 and President, Alcoa Latin America Extrusions and Global Rod and Bar Products since 2002.

Brett Argirakis was elected to Senior Vice President and Managing Director, Minteq International Inc. and MTI Global Supply Chain in December 2020. Prior to that, he was Vice President and Managing Director, Minteq International effective in 2016. In October 2019, he was given the additional responsibility for MTI Global Supply Chain. Mr. Argirakis joined the Company in 1987 and has held positions of increasing responsibility. Prior to his current position, he was Global Vice President & General Manager, Refractories effective August 2009. Prior to that, he served as Director, Marketing, Minteq Europe and as Director of Sales and Field Operations for Minteq U.S.

Michael A. Cipolla was elected Vice President, Corporate Controller and Chief Accounting Officer in July 2003. Prior to that, he served as Corporate Controller and Chief Accounting Officer of the Company since 1998. From 1992 to 1998 he served as Assistant Corporate Controller of the Company.

Erin N. Cutler was elected Vice President, Human Resources effective August 2020. Prior to that, she was Director, Talent Management, where she led major human resources initiatives including enhancing talent management and succession practices, strengthening talent acquisition efforts, and building talent development programs through the creation and deployment of internship and mentorship programs. Prior to joining the Company in July 2015, she was employed by Pratt Industries where she held multiple human resource positions of increasing responsibility.

Matthew E. Garth was elected Senior Vice President, Finance and Treasury, Chief Financial Officer effective January 2017. Mr. Garth joined the Company from Arconic Inc. (formerly Alcoa Inc.), where most recently he had been Vice President, Financial Planning & Analysis and Investor Relations since 2015. Prior to his most recent position, he was Vice President, Finance & CFO Operations-Alcoa Global Packing from 2014 to 2015; Vice President, Finance- Alcoa Global Packing from 2011 to 2014; Vice President, Finance – Alcoa North American Rolled Products from 2010 to 2011; Director, Investor Relations Alcoa Inc. from 2009 to 2010; and Director, Corporate Treasury Alcoa Inc. from 2007 to 2009.

Jonathan J. Hastings was elected Group President, Performance Materials effective June 2018. He joined the Company in September 2011 as Vice President, Corporate Development, and was appointed Senior Vice President, Corporate Development effective April 2013. Prior to joining the Company, he was Senior Director of Strategy and New Business Development – Coatings, Global at The Dow Chemical Company. Prior to that he held positions of increasing responsibility at Rohm and Haas, including Vice President & General Manager – Packaging and Building Materials – Europe.

Andrew M. Jones was elected Vice President and Managing Director, Energy Services in October 2015. Prior to that, he was Vice President and Managing Director, Eastern Hemisphere, Energy Services since 2014 and Vice President of CETCO Oilfield Services West Africa since 2012. Prior to joining the Company, he was Managing Director of Africa Oilfield Services since 2009.

Douglas W. Mayger was elected Senior Vice President and Head of Global Operations, Performance Materials in October 2019. Prior to that, he was Senior Vice President and Director – MTI Supply Chain effective November 2015. Prior to that, he was Senior Vice President, Performance Minerals and Supply Chain effective June 2011. Prior to that, he was Vice President and Managing Director, Performance Minerals, effective October 2008. He joined the Company as plant manager in Lucerne Valley in 2002, and subsequently was Business Manager – Western Region and General Manager – Carbonates West, Performance Minerals. Before joining the Company, he served as Vice President of Operations for Aggregate Industries.

Thomas J. Meek was elected Senior Vice President, General Counsel and Secretary, Chief Compliance Officer in October 2012. Mr. Meek joined the Company as Vice President, General Counsel and Secretary effective September 1, 2009. In December 2011, he was given the additional responsibility for Human Resources. Prior to joining the Company, he served as Deputy General Counsel at Alcoa Inc. Before joining Alcoa Inc. in 1999, Mr. Meek worked with Koch Industries, Inc. of Wichita, Kansas, where he held numerous supervisory positions. His last position there was Interim General Counsel. From 1985 to 1990, Mr. Meek was an Associate/Partner in the Wichita, Kansas law firm of McDonald, Tinker, Skaer, Quinn & Herrington, P.A.

D.J. Monagle III was named Group President, Specialty Minerals and Refractories in March 2017. Prior to that, he was Senior Vice President, Chief Operating Officer – Specialty Minerals Inc. and Minteq Group, effective February 2014. Prior to that, he was Senior Vice President and Managing Director, Paper PCC, effective October 2008. In November 2007, he was appointed Vice President and Managing Director – Performance Minerals. He joined the Company in January of 2003 and held positions of increasing responsibility including Vice President, Americas, Paper PCC and Global Marketing Director, Paper PCC. Before joining the Company, Mr. Monagle worked for the Paper Technology Group at Hercules between 1990 and 2003, where he held sales and marketing positions of increasing responsibility. Between 1985 and 1990, he served as an aviation officer in the U.S. Army’s 11th Armored Cavalry Regiment, leaving the service as a troop commander with a rank of Captain.

PART II

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

Market Information

The Company's common stock is traded on the New York Stock Exchange under the symbol "MTX".

Holders

On February 3, 2021 there were approximately 181 holders of record of the common stock.

Issuer Purchases of Equity Securities

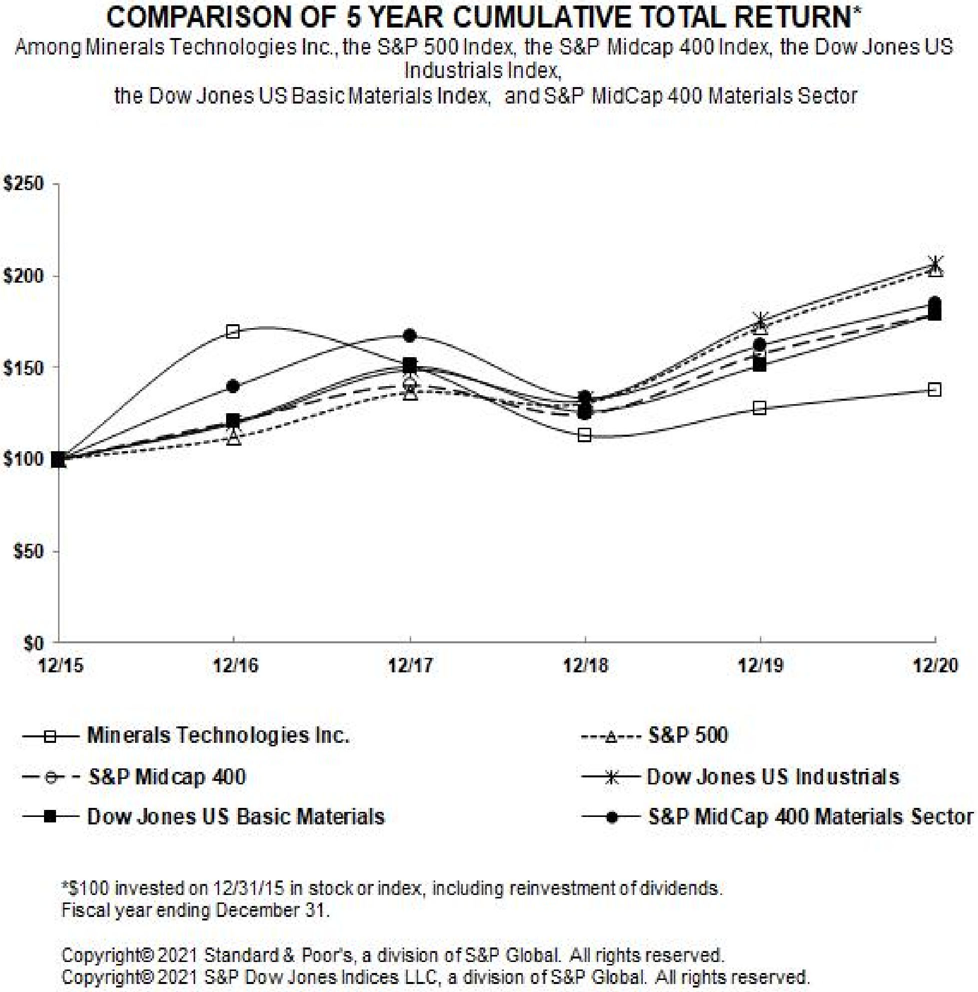
Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of the Publicly Announced Program	Dollar Value of Shares that May Yet be Purchased Under the Program
September 28 - October 25	71,756	$ 55.73	984,202	$ 25,436,325
Total	71,756	$ 55.73		
October 26 - November 22	—	$ —	—	$ 75,000,000
November 23 - December 31	179,810	$ 61.63	179,810	$ 63,918,183
Total	179,810	$ 61.63		

On October 23, 2019, the Company's Board of Directors authorized the Company's management to repurchase, at its discretion, up to $75 million of the Company's shares over a one-year period. Over this program's one-year period, 984,202 shares were repurchased for $49.6 million, or an average price of approximately $50.36 per share. This program is now complete.

On October 21, 2020, the Company's Board of Directors authorized the Company's management to repurchase, at its discretion, up to $75 million of the Company's shares over a one-year period. As of December 31, 2020, 179,810 shares have been repurchased under this program for $11.1 million, or an average price of approximately $61.63 per share.

Performance Graph

The graph below compares Minerals Technologies Inc.'s cumulative 5-year total shareholder return on common stock with the cumulative total returns of the S&P 500 index, the Dow Jones US Industrials index, the S&P Midcap 400 index, the Dow Jones US Basic Materials index, and the S&P MidCap 400 Materials Sector. The graph tracks the performance of a $100 investment in our common stock and in each index (with the reinvestment of all dividends) from 12/31/2015 to 12/31/2020.



	2015	2016	2017	2018	2019	2020
Minerals Technologies Inc.	$ 100.00	$ 169.00	$ 151.04	$ 112.97	$ 127.29	$ 137.72
S&P 500	100.00	111.96	136.40	130.42	171.49	203.04
S&P Midcap 400	100.00	120.74	140.35	124.80	157.49	179.00
Dow Jones US Industrials	100.00	119.53	148.86	132.10	175.45	206.90
Dow Jones US Basic Materials	100.00	120.27	150.45	126.12	151.04	178.71
S&P MidCap 400 Materials Sector	100.00	139.82	167.38	133.48	162.38	185.23

Item 6. Selected Financial Data

(in millions, except per share data)	Year Ended December 31, 2020	2019	2018	2017	2016
Net sales	$ 1,594.8	$ 1,791.0	$ 1,807.6	$ 1,675.7	$ 1,638.0
Cost of sales	1,189.4	1,350.4	1,346.2	1,208.5	1,177.6
Production margin	405.4	440.6	461.4	467.2	460.4
Marketing and administrative expenses	176.5	187.5	178.6	180.7	176.4
Research and development expenses	19.9	20.3	22.7	23.7	23.8
Litigation expenses	10.4	10.9	—	—	—
Acquisition-related expenses	3.1	—	1.7	3.4	8.0
Restructuring and other items, net	7.6	13.2	2.5	15.0	28.3
Income from operations	187.9	208.7	255.9	244.4	223.9
Interest expense, net	(38.2)	(43.2)	(45.9)	(43.4)	(54.4)
Debt modification costs and fees	—	—	—	(3.9)	—
Non-cash pension settlement charge	(6.4)	—	(4.4)	—	—
Other non-operating income (deductions), net	(5.3)	(8.2)	(1.5)	(6.2)	0.8
Total non-operating deductions, net	(49.9)	(51.4)	(51.8)	(53.5)	(53.6)
Income from operations before tax and equity in earnings	138.0	157.3	204.1	190.9	170.3
Provision (benefit) for taxes on income*	24.4	22.8	34.4	(6.6)	35.3
Equity in earnings of affiliates, net of tax	2.2	1.9	3.5	1.5	2.1
Consolidated net income	115.8	136.4	173.2	199.0	137.1
Less:					
Net income attributable to non-controlling interests	3.4	3.7	4.2	3.9	3.7
Net income attributable to Minerals Technologies Inc. (MTI)	$ 112.4	$ 132.7	$ 169.0	$ 195.1	$ 133.4
Earnings per share attributable to MTI:					
Basic	$ 3.29	$ 3.79	$ 4.79	$ 5.54	$ 3.82
Diluted	$ 3.29	$ 3.78	$ 4.75	$ 5.48	$ 3.79
Cash dividends declared per common share	$ 0.20	$ 0.20	$ 0.20	$ 0.20	$ 0.20
Shares used in computation of earnings per share:					
Basic	34.2	35.0	35.3	35.2	34.9
Diluted	34.2	35.1	35.6	35.6	35.2

* During the fourth quarter of 2017, the Company recorded a provisional $47 million income tax benefit from the U.S. Tax Cuts and Job Acts legislation. This benefit is comprised of an $82 million benefit which related primarily to the remeasurement of the Company's U.S. deferred tax liabilities at a lower U.S. tax rate of 21%, partially offset by tax expense of $35 million for the deemed repatriation of unremitted earnings of foreign subsidiaries. During 2018, the Company recorded a benefit of $4.4 million as a measurement period adjustment to the deemed repatriation of unremitted earnings of foreign subsidiaries.

	Year Ended December 31,				
(in millions)	2020	2019	2018	2017	2016
Working capital	$ 737.8	$ 520.7	$ 494.4	$ 542.2	$ 455.6
Total assets	3,209.4	3,112.6	3,087.1	2,970.4	2,863.4
Long-term debt, net of unamortized discount and deferred financing costs	933.2	824.3	907.8	959.8	1,069.9
Total debt	934.2	927.6	1,016.3	969.9	1,082.8
Total shareholders' equity	1,498.7	1,434.6	1,385.3	1,279.1	1,030.9

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

Cautionary Statement for “Safe Harbor” Purposes under the Private Securities Litigation Reform Act of 1995

The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements made by or on behalf of the Company. This report contains statements that the Company believes may be “forward-looking statements” within the meaning of Section 21E of the Securities Exchange Act of 1934, particularly statements relating to the Company’s objectives, plans or goals, future actions, future performance or results of current and anticipated products, sales efforts, expenditures, and financial results. From time to time, the Company also provides forward-looking statements in other publicly-released materials, both written and oral. Forward-looking statements provide current expectations and forecasts of future events such as new products, revenues and financial performance, and are not limited to describing historical or current facts. They can be identified by the use of words such as “outlook,” “forecast,” “believes,” “expects,” “plans,” “intends,” “anticipates,” and other words and phrases of similar meaning.

Forward-looking statements are necessarily based on assumptions, estimates and limited information available at the time they are made. A broad variety of risks and uncertainties, both known and unknown, as well as the inaccuracy of assumptions and estimates, can affect the realization of the expectations or forecasts in these statements. Many of these risks and uncertainties are difficult to predict or are beyond the Company’s control. Consequently, no forward-looking statements can be guaranteed. Actual future results may vary materially. Significant factors affecting the expectations and forecasts are set forth under “Item 1A — Risk Factors” in this Annual Report on Form 10-K.

The Company undertakes no obligation to update any forward-looking statements to reflect events or circumstances that arise after the date hereof. Investors should refer to the Company's subsequent filings under the Securities Exchange Act of 1934 for further disclosures.

Executive Summary

Worldwide sales decreased 11% in 2020 to $1.595 billion as compared with $1.791 billion in 2019. Foreign exchange had an unfavorable impact on sales of $16 million or 1%. Consolidated income from operations was $187.9 million as compared with $208.7 million in the prior year. Included in income from operations for 2020 was $10.4 million related to litigation expenses associated with the bankruptcy of Novinda Corp, $7.6 million for assets write-downs and severance-related costs, $3.1 million of acquisition-related expenses and $4.0 million in costs related to system restoration and risk mitigation following a ransomware attack on certain of the Company's information technology systems. Included in income from operations in 2019 were restructuring and other items of $13.2 million and a $10.9 million charge related to litigation expenses associated with the bankruptcy of Novinda Corp. Net income was $112.4 million in 2020, as compared to $132.7 million in the prior year. The Company reported diluted earnings of $3.29 per share in 2020 as compared with $3.78 per share in the prior year.

In March 2020, the World Health Organization categorized the novel coronavirus (COVID-19) as a pandemic. We have remained focused on the health and safety of our employees, and deployed rigorous health, safety and wellness protocols for all of our facilities in order to protect our employees. We have also conducted scenario planning and developed contingency plans to ensure we are supporting our customers and adjusting to changing market dynamics. Around the world, the Company continues to closely adhere to all government regulations as they are issued. Applicable governmental directives across the United States and other global locations have typically permitted the continued operation of essential critical infrastructure sectors. As the Company supplies products and services to many essential industries, including critical manufacturing and energy sectors, all of our operations had qualified as essential businesses. Accordingly, all of the Company’s production facilities are currently operational. In a few locations, however, sites were temporarily impacted by the pandemic during 2020.

The economic environment related to the COVID-19 pandemic, which slowed business activity in several key end-markets, negatively impacted the Company’s results in 2020. The pandemic has affected and may continue to affect the demand for a number of our Performance Materials segment’s products and services. Paper consumption has been and may continue to be impacted. Global steel production has been and may continue to be affected by volatility in the market due to the pandemic, which could impact our Refractory segment. Oil and natural gas prices have been volatile as a result of the pandemic, and this could cause oil and natural gas companies to reduce their capital expenditures and production and exploration activities.

The impacts of the COVID-19 pandemic may continue to impact our results during 2021. The extent to which our operations will be impacted by the pandemic will depend largely on future developments, including the continued severity of the pandemic and future actions by government authorities to contain it or treat its impact. These conditions are highly uncertain and cannot be accurately predicted. We will continue to actively monitor and respond to the evolving situation.

In 2020, the Company continued to execute on its growth strategies of geographic expansion and new product innovation. The Company delivered sales growth across several product lines and geographies, increased volumes through capacity expansions and a new PCC satellite facility, and capitalized on customer demand for our latest innovative products.

Long-term debt as of December 31, 2020 was $933.2 million. On June 30, 2020, the Company issued $400 million aggregate principal amount of 5.0% Senior Notes due 2028. The net proceeds were used to repay $148 million of fixed rate term loans and $100 million of outstanding borrowing under its revolving credit facility and the remainder for general corporate purposes. Additionally, in 2020, we repurchased $40.7 million of treasury shares.

Our balance sheet continues to be strong. Cash, cash equivalents and short-term investments were $371.8 million as of December 31, 2020. Cash flow from operations for 2020 was $240.6 million. The Company currently has more than $650 million of available liquidity, including cash on hand, as well as availability under its revolving credit facility. We believe these factors will allow us to meet our anticipated funding requirements. Our intention is to maintain a balanced approach to capital deployment, by using excess cash flow for investments in growth, continued debt reduction and selective share repurchases.

Outlook

The COVID-19 pandemic had an adverse effect on our reported results for 2020, and may continue to negatively impact our business and results of operations for 2021. The extent to which our operations will be impacted by the pandemic will depend largely on future developments, including the severity of the pandemic and actions by government authorities to contain it or treat its impact. These are highly uncertain and cannot be accurately predicted. We will continue to actively monitor and respond to the COVID-19 pandemic.

The Company will continue to focus on innovation and new product development and other opportunities for sales growth in 2021 from its existing businesses, as follows:

- Increase our presence and gain penetration of our bentonite-based foundry customers for the Metalcasting industry in emerging markets, such as China and India.
- Increase our presence and market share in global pet care products, particularly in emerging markets.
- Deploy new products in pet care such as lightweight litter.
- Increase our presence and market share in Asia and in the global powdered detergent market.
- Continue the development of our proprietary Enersol® products for agricultural applications worldwide.
- Pursue opportunities for our products in environmental and building and construction markets in the Middle East, Asia Pacific and South America regions.
- Increase our presence and market share for geosynthetic clay liners within the Environmental Products product line.
- Develop multiple high-filler technologies under the FulFill® platform of products, to increase the fill rate in freesheet paper and continue to progress with commercial discussions and full-scale paper machine trials.
- Develop products and processes for waste management and recycling opportunities to reduce the environmental impact of the paper mill, reduce energy consumption and improve the sustainability of the papermaking process, including our NewYield® and ENVIROFIL® products.
- Further penetration into the packaging segment of the paper industry.
- Increase our sales of PCC for paper by further penetration of the markets for paper filling at both freesheet and groundwood mills, particularly in emerging markets.
- Expand the Company's PCC coating product line using the satellite model.
- Promote the Company's expertise in crystal engineering, especially in helping papermakers customize PCC morphologies for specific paper applications.
- Expand PCC produced for paper filling applications by working with industry partners to develop new methods to increase the ratio of PCC for fiber substitutions.

- Develop unique calcium carbonate and talc products used in the manufacture of novel biopolymers, a new market opportunity.
- Deploy new talc and GCC products in paint, coating and packaging applications.
- Deploy value-added formulations of refractory materials that not only reduce costs but improve performance.
- Deploy our laser measurement technologies into new applications.
- Expand our refractory maintenance model to other steel makers globally.
- Increase our presence and market penetration in offshore produced water and offshore filtration and well testing within the Energy Services segment.
- Deploy operational excellence principles into all aspects of the organization, including system infrastructure and lean principles.
- Continue to explore selective acquisitions to fit our core competencies in minerals and fine particle technology.

However, there can be no assurance that we will achieve success in implementing any one or more of these opportunities.

Results of Operations

Consolidated Income Statement Review

	Year Ended December 31,				
(millions of dollars)	**2020**	**2019**	**2018**	**2020 vs. 2019**	**2019 vs. 2018**
Net sales	$ 1,594.8	$ 1,791.0	$ 1,807.6	(11.0)%	(0.9)%
Cost of sales	1,189.4	1,350.4	1,346.2	(11.9)%	0.3%
Production margin	405.4	440.6	461.4	(8.0)%	(4.5)%
Production margin %	25.4%	24.6%	25.5%		
Marketing and administrative expenses	176.5	187.5	178.6	(5.9)%	5.0%
Research and development expenses	19.9	20.3	22.7	(2.0)%	(10.6)%
Litigation expenses	10.4	10.9	—	(4.6)%	*
Acquisition-related expenses	3.1	—	1.7	*	*
Restructuring and other items, net	7.6	13.2	2.5	(42.4)%	*
Income from operations	187.9	208.7	255.9	(10.0)%	(18.4)%
Operating margin %	11.8%	11.7%	14.2%		
Interest expense, net	(38.2)	(43.2)	(45.9)	(11.6)%	(5.9)%
Non-cash pension settlement charge	(6.4)	—	(4.4)	*	*
Other non-operating deductions, net	(5.3)	(8.2)	(1.5)	(35.4)%	*
Total non-operating deductions, net	(49.9)	(51.4)	(51.8)	(2.9)%	(0.8)%
Income from operations before tax and equity in earnings	138.0	157.3	204.1	(12.3)%	(22.9)%
Provision for taxes on income	24.4	22.8	34.4	7.0%	(33.7)%
Effective tax rate	17.7%	14.5%	16.9%		
Equity in earnings of affiliates, net of tax	2.2	1.9	3.5	15.8%	(45.7)%
Consolidated net income	115.8	136.4	173.2	(15.1)%	(21.2)%
Less: Net income attributable to non-controlling interests	3.4	3.7	4.2	(8.1)%	(11.9)%
Net income attributable to Minerals Technologies Inc. (MTI)	$ 112.4	$ 132.7	$ 169.0	(15.3)%	(21.5)%

* Not meaningful

Net Sales

(millions of dollars)	Year Ended December 31, 2020	2019	2018	2020 vs. 2019	2019 vs. 2018
U.S.	$ 822.5	$ 962.4	$ 961.6	(14.5)%	0.1%
International	772.3	828.6	846.0	(6.8)%	(2.1)%
Total sales	$ 1,594.8	$ 1,791.0	$ 1,807.6	(11.0)%	(0.9)%
Performance Materials Segment	$ 752.8	$ 823.3	$ 828.1	(8.6)%	(0.6)%
Specialty Minerals Segment	510.9	574.4	589.3	(11.1)%	(2.5)%
Refractories Segment	258.1	298.1	311.9	(13.4)%	(4.4)%
Energy Services Segment	73.0	95.2	78.3	(23.3)%	21.6%
Total sales	$ 1,594.8	$ 1,791.0	$ 1,807.6	(11.0)%	(0.9)%

Worldwide net sales in 2020 decreased 11% from the previous year to $1,594.8 million. Foreign exchange had an unfavorable impact on sales of approximately $16 million or 1 percentage point. Net sales in the United States decreased 14.5% to $822.5 million in 2020 and represented 52% of consolidated net sales. International sales decreased 6.8% to $772.3 million in 2020 and represented 48% of consolidated net sales.

Worldwide net sales in 2019 decreased 1% from the previous year to $1,791.0 million. Foreign exchange had an unfavorable impact on sales of approximately $32.8 million or 2 percentage points. Net sales in the United States increased 0.1% to $962.4 million in 2019 and represented 54% of consolidated net sales. International sales decreased 2.1% to $828.6 million in 2019 and represented 46% of consolidated net sales.

Operating Costs and Expenses

Consolidated cost of sales was $1,189.4 million, $1,350.4 million and $1,346.2 million in 2020, 2019 and 2018, respectively. Production margin as a percentage of net sales was 25.4% in 2020, 24.6% in 2019 and 25.5% in 2018. The increase in production margin in 2020 was primarily due to higher selling prices and cost control.

Marketing and administrative costs were $176.5 million, $187.5 million and $178.6 million in 2020, 2019 and 2018, respectively. Marketing and administrative costs as a percentage of net sales were 11.1% in 2020, 10.5% in 2019 and 9.9% in 2018. Included in marketing and administrative costs in 2020 was a $4.0 million charge relating to system restoration and risk mitigation following a ransomware attack on certain of the Company's information technology systems. Included in marketing and administrative costs in 2019 was bad debt expense of $2.5 million relating to a Refractories customer in the UK and higher mark to market expenses as compared to prior year.

Research and development expenses were $19.9 million, $20.3 million and $22.7 million in 2020, 2019 and 2018, respectively. Research and development expenses as a percentage of net sales were 1.2% in 2020, 1.1% in 2019 and 1.3% in 2018.

In 2020, the Company recorded a $10.4 million charge related to litigation expenses associated with the bankruptcy of Novinda Corp. In addition, the Company recorded a $7.6 million charge for asset write-downs and other restructuring costs and $3.1 million for acquisition-related expenses.

In 2019, the Company recorded a $13.2 million charge for asset write-downs and severance-related costs. In addition, the Company recorded a $10.9 million charge related to litigation expenses associated with the bankruptcy of Novinda Corp.

In 2018, the Company recorded a $1.8 million restructuring charge relating to Energy Services businesses we previously exited and a $0.7 million asset-write down charge related to the closure of one of our Paper PCC facilities in North America in the first quarter of 2019. In addition, the Company incurred $1.7 million for acquisition-related expenses.

Income from Operations

During 2020, the Company recorded income from operations of $187.9 million, as compared with $208.7 million in the prior year. Income from operations represented 11.8% of sales compared with 11.7% of sales in the prior year. Income from operations in 2020 included a $10.4 million charge related to litigation expenses associated with the bankruptcy of Novinda Corp, $7.6 million for asset write-downs and severance-related costs, $4.0 million related to system restoration and risk mitigation following a ransomware attack on certain of the Company's information technology systems and $3.1 million of acquisition-related expenses.

During 2019, the Company recorded income from operations of $208.7 million, as compared with $255.9 million in the prior year. Income from operations represented 11.7% of sales compared with 14.2% of sales in the prior year. Income from operations in 2019 included a charge of $13.2 million for asset write-downs and severance-related costs and a $10.9 million charge related to litigation expenses associated with the bankruptcy of Novinda Corp.

Non-Operating Income (Deductions)

The Company recorded non-operating deductions, net of $49.9 million in 2020 as compared with $51.4 million in the previous year.

Included in non-operating deductions was net interest expense of $38.2 million in 2020 as compared to $43.2 million in the prior year, as a result of lower debt balances due to principal repayments and lower interest rates. Additionally, the Company recorded at $6.4 million non-cash pension settlement charge relating to one of the Company's retirement plans in the United States.

Net interest expense was $43.2 million in 2019 as compared to $45.9 million in the prior year, as a result of lower debt balances due to principal repayments.

Provision for Taxes on Income

Provision for taxes was $24.4 million, $22.8 million and $34.4 million in 2020, 2019 and 2018, respectively. The effective tax rates were 17.7%, 14.5% and 16.9% during 2020, 2019 and 2018, respectively. Included in the provision for taxes for 2018 is a $4.4 million benefit representing an adjustment of the provisional amounts previously recorded for the U.S. Tax Cuts and Jobs Act (“U.S. Tax Reform”) legislation, enacted in December 2017.

The higher effective tax rate in 2020 as compared to 2019 was primarily due to tax credits in the prior year resulting from the expiration of a tax statute of limitations. The lower effective tax rate in 2019 as compared to 2018 was primarily due to aforementioned tax benefits resulting from the expiration of a tax statute of limitations.

The other factors having the most significant impact on our effective tax rates in recent periods are the rate differentials related to foreign earnings indefinitely invested, percentage depletion, and the tax benefits on restructuring and impairment charges at a higher rate.

Percentage depletion allowances (tax deductions for depletion that may exceed our tax basis in our mineral reserves) are available to us under the income tax laws of the United States for operations conducted in the United States. The tax benefits from percentage depletion were $8.5 million in 2020, $7.8 million in 2019 and $8.0 million in 2018.

The U.S. Tax Reform legislation established a new Global Intangible Low-Tax Income provision (“GILTI”) that currently taxes certain income from foreign operations. The Company has elected, as its accounting policy, to treat the taxes due from GILTI as a current period expense when incurred. The net charge to the Company for GILTI was $0.6 million and $2.1 million for 2020 and 2018, respectively. There was no charge for GILTI in 2019.

We operate in various countries around the world that have tax laws, tax incentives and tax rates that are significantly different than those of the United States. These differences combine to move our overall effective tax rate higher or lower than the United States statutory rate depending on the mix of income relative to income earned in the United States. The effects of foreign earnings and the related foreign rate differentials resulted in increases of $4.6 million, $6.0 million and $2.3 million in 2020, 2019 and 2018, respectively.

Consolidated Net Income Attributable to MTI Shareholders

Consolidated net income was $115.8 million in 2020 and included a $24.1 million charge, net of tax. This charge consisted of litigation expenses associated with the bankruptcy of Novinda Corp., asset write-downs, severance-related costs, IT incident remediation cost, acquisition-related costs and a non-cash pension settlement charge.

Consolidated net income was $136.4 million in 2019 and included a $20.8 million charge, net of tax. This charge consisted of the asset write-downs, severance-related costs and litigation expenses associated with the bankruptcy of Novinda Corp.

Segment Review

The following discussions highlight the operating results for each of our four segments.

Performance Materials Segment

(millions of dollars)	Year Ended December 31, 2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net Sales					
Metalcasting	$ 258.1	$ 291.2	$ 328.9	$ (33.1)	$ (37.7)
Household, Personal Care & Specialty Products	380.2	376.6	348.5	3.6	28.1
Environmental Products	58.6	86.6	80.3	(28.0)	6.3
Building Materials	55.9	68.9	70.4	(13.0)	(1.5)
Total net sales	$ 752.8	$ 823.3	$ 828.1	$ (70.5)	$ (4.8)
Income from operations	$ 103.6	$ 97.1	$ 116.8	$ 6.5	$ (19.7)
% of net sales	13.8%	11.8%	14.1%		

2020 v 2019

Net sales in the Performance Materials segment in 2020 were $752.8 million and decreased $70.5 million, or 9 percent from 2019. Metalcasting's sales decreased $33.1 million or 11 percent, primarily due to COVID-19 related weaker foundry demand in North America. Household, Personal Care & Specialty Products sales increased $3.6 million or 1 percent from the prior year, primarily driven by strong demand for consumer-oriented products. Environmental Products and Building Materials sales experienced COVID-19 related project delays that yielded a decrease in sales from the prior year of $28.0 million and $13.0 million, respectively.

Income from operations increased $6.5 million to $103.6 million in 2020 and represented 13.8% of net sales as compared to $97.1 million and 11.8% of sales in 2019. Pricing actions, cost control and expense reductions more than offset the impact of lower sales versus the prior year.

2019 v 2018

Net sales in the Performance Materials segment in 2019 were $823.3 million and decreased $4.8 million, or 1 percent from 2018. Foreign exchange had an unfavorable impact of $13.4 million or 2%. Metalcasting's sales decreased $37.7 million or 11 percent, primarily due to lower market-based pricing and volumes in the specialty sands products, as well as weaker demand in US automotive, heavy truck and agriculture equipment. Household, Personal Care & Specialty Products sales increased 8 percent, primarily driven by continued strong performance of our Global pet care business, as well as increases in our Human and Animal Health businesses. In the third quarter of 2019, the Company combined its Basic Minerals product line with its Household, Personal Care & Specialty Products product line. Environmental Products sales rose 8 percent due to a large international project and higher volumes of our geosynthetic clay liners and specialty liners. Building Materials sales decreased 2% due primarily to the difference in magnitude of waterproofing projects as compared with prior year.

Income from operations decreased $19.7 million to $97.1 million in 2019 and represented 11.8% of net sales as compared to $116.8 million and 14.1% of sales in 2018. Included in income from operations were $7.0 million of restructuring and impairment costs. While pricing actions more than offset higher raw material costs, operating income and margins were impacted by lower Metalcasting sales and unfavorable product mix.

Specialty Minerals Segment

(millions of dollars)	Year Ended December 31, 2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net Sales					
Paper PCC	$ 308.4	$ 364.9	$ 378.5	$ (56.5)	$ (13.6)
Specialty PCC	69.3	69.1	66.9	0.2	2.2
PCC Products	$ 377.7	$ 434.0	$ 445.4	$ (56.3)	$ (11.4)
Ground Calcium Carbonate	$ 89.3	$ 91.3	$ 91.0	$ (2.0)	$ 0.3
Talc	43.9	49.1	52.9	(5.2)	(3.8)
Processed Minerals Products	$ 133.2	$ 140.4	$ 143.9	$ (7.2)	$ (3.5)
Total net sales	$ 510.9	$ 574.4	$ 589.3	$ (63.5)	$ (14.9)
Income from operations	$ 67.8	$ 83.1	$ 95.4	$ (15.3)	$ (12.3)
% of net sales	13.3%	14.5%	16.2%		

2020 v 2019

Net sales in the Specialty Minerals segment decreased 11 percent to $510.9 million in 2020 from $574.4 million in 2019. Worldwide sales of PCC products decreased to $377.7 million in 2020 from $434.0 million in the prior year largely due to lower paper demand and temporary COVID-19 related customer shutdowns. Specialty PCC sales remained flat as compared with prior year as automotive and residential construction markets rebounded during 2020 and consumer-oriented markets continue to be strong. Sales of Processed Minerals products decreased 5 percent to $133.2 million in 2020 primarily driven by the slowdown in residential construction and automotive markets in the second and third quarters.

Income from operations decreased $15.3 million to $67.8 million in 2020 and represented 13.3% of net sales compared to $83.1 million and 14.5% of sales in the prior year. Included in income from operations were $7.6 million of restructuring and impairment costs.

2019 v 2018

Net sales in the Specialty Minerals segment decreased 3 percent to $574.4 million in 2019 from $589.3 million in 2018. Worldwide sales of PCC products decreased to $434.0 million in 2019 from $445.4 million in the prior year largely due to previously announced customer paper machine shutdowns in North America, including the closure of two U.S. paper mills in the first and fourth quarters of 2019. These shutdowns were offset by a 3 percent increase in Paper PCC volumes in Asia as a result of the ramp up of a new satellite and additional capacity. Specialty PCC increased 3 percent primarily due to demand-driven expansions. Sales of Processed Minerals products decreased 2 percent to $140.4 million in 2019 primarily driven by a reduction of sales in the automotive and construction markets.

Income from operations decreased $12.3 million to $83.1 million in 2019 and represented 14.5% of net sales compared to $95.4 million and 16.2% of sales in the prior year. This decrease was primarily driven by the paper mill shutdowns in North America and lower volumes in Europe, which was partially offset by higher pricing. Included in income from operations for 2019 were restructuring and asset write-down charges of $2.5 million.

Refractories Segment

(millions of dollars)	Year Ended December 31, 2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net Sales					
Refractory Products	$ 212.3	$ 244.8	$ 261.1	$ (32.5)	$ (16.3)
Metallurgical Products	45.8	53.3	50.8	(7.5)	2.5
Total net sales	$ 258.1	$ 298.1	$ 311.9	$ (40.0)	$ (13.8)
Income from operations	$ 35.5	$ 39.8	$ 45.4	$ (4.3)	$ (5.6)
% of net sales	13.8%	13.4%	14.6%		

2020 v 2019

Net sales in the Refractories segment decreased 13 percent to $258.1 million in 2020, as a result of steel mill utilization rates decline in the second quarter in North America and Europe, which was followed by a gradual improvement in the second half of the year.

Income from operations decreased $4.3 million to $35.5 million and represented 13.8% of net sales in 2020 compared to $39.8 million or 13.4% of sales in 2019 due to lower refractory volumes globally.

2019 v 2018

Net sales in the Refractories segment decreased 4 percent to $298.1 million in 2019, driven by lower sales of Refractory products globally, partially offset by higher metallurgical products and laser equipment sales.

Income from operations decreased $5.6 million to $39.8 million and represented 13.4% of net sales in 2019 compared to $45.4 million or 14.6% of sales in 2018 due to lower refractory volumes globally. Included in income from operations for 2019 were restructuring and asset write-down charges of $0.8 million and a $2.5 million bad debt reserve relating to a customer bankruptcy.

Energy Services Segment

(millions of dollars)	Year Ended December 31, 2020	2019	2018	2020 vs. 2019	2019 vs. 2018
Net Sales	$ 73.0	$ 95.2	$ 78.3	$ (22.2)	$ 16.9
Income (Loss) from operations	$ 5.2	$ 7.8	$ 4.5	$ (2.6)	$ 3.3
% of net sales	7.1%	8.2%	5.7%		

2020 v 2019

Net sales in the Energy Services segment decreased $22.2 million in 2020 or 23 percent, primarily driven by the decrease in activity due to COVID-19 restrictions and the impact of storm activity in the Gulf of Mexico.

The segment recorded income from operations of $5.2 million in 2020 as compared to $7.8 million in the prior year.

2019 v 2018

Net sales in the Energy Services segment increased $16.9 million in 2019 or 22 percent, driven by higher well testing and filtration activity in the North Sea and Gulf of Mexico and increased equipment sales and filtration activity in the Asia Pacific region.

The segment recorded income from operations of $7.8 million in 2019 as compared to $4.5 million in the prior year. Included in income from operations was $1.8 million of restructuring and asset write-down charges in 2019.

Liquidity and Capital Resources

Cash provided from continuing operations in 2020 was $240.6 million, compared with $238.3 million in prior year. Cash flows provided from operations in 2020 were principally used to repay debt, fund capital expenditures, acquire assets, repurchase shares and to pay the Company's dividend to common shareholders. The Company’s intention is to use excess cash flow for investments in growth, continued debt reduction and selective share repurchases.

On May 9, 2014, in connection with the acquisition of AMCOL International Corporation (“AMCOL”), the Company entered into a credit agreement providing for the $1.560 billion senior secured term loan facility (the “Term Facility”) and a $200 million senior secured revolving credit facility (the “Revolving Facility” and, together with the Term Facility, the “Facilities”).

On June 23, 2015, the Company entered into an amendment (the “First Amendment”) to the credit agreement to reprice the $1.378 billion then outstanding on the Term Facility. As amended, the Term Facility had a $1.078 billion floating rate tranche and a $300 million fixed rate tranche. On February 14, 2017, the Company entered into an amendment (the “Second Amendment”) to the credit agreement to reprice the $788 million floating rate tranche then outstanding, which extended the maturity and lowered the interest costs by 75 basis points. On April 18, 2018, the Company entered into an amendment (the “Third Amendment”) to the credit agreement to refinance its then existing senior secured revolving credit facility. In connection with the Third Amendment, the existing senior secured revolving credit facility was replaced with a new revolving credit facility with $300 million of aggregate commitments (the “Revolving Credit Facility” and, together with the Term Facility, the “Senior Secured Credit Facilities”). Following the amendments, the loans outstanding under the floating rate tranche of the Term Facility are scheduled to mature on February 14, 2024, the loans outstanding (if any) and commitments under the Revolving Facility will mature and terminate, as the case may be, on April 18, 2023. Loans under the fixed rate tranche of the Term Facility were repaid in full in June 2020. Loans under the floating rate tranche of the Term Facility bear interest at a rate equal to an adjusted LIBOR rate (subject to a floor of 0.75%) plus an applicable margin equal to 2.25% per annum. Loans under the Revolving Facility bear interest at a rate equal to an adjusted LIBOR rate plus an applicable margin equal to 1.625% per annum. Such rates are subject to decrease by up to 25 basis points in the event that, and for so long as, the Company’s net leverage ratio (as defined in the credit agreement) is less than certain thresholds. The variable rate tranche has a 1% required amortization per year. The Company will pay certain fees under the credit agreement, including customary annual administration fees. The obligations of the Company under the Senior Secured Credit Facilities are unconditionally guaranteed jointly and severally by, subject to certain exceptions, all material domestic subsidiaries of the Company (the “Guarantors”) and secured, subject to certain exceptions, by a security interest in substantially all of the assets of the Company and the Guarantors.

On June 30, 2020, the Company issued $400 million aggregate principal amount of 5.0% Senior Notes due 2028 (the “Notes”). The Notes were issued pursuant to an indenture, dated as of June 30, 2020, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee. The Company used the net proceeds of its offering of the Notes to repay all of its outstanding loans under the fixed rate tranche of the Term Facility, repay all of its outstanding borrowings under its Revolving Credit Facility, and the remainder for general corporate purposes.

The Notes bear an interest rate of 5.0% per annum payable semi-annually on January 1 and July 1 of each year, beginning on January 1, 2021. The Notes are unconditionally guaranteed on a senior unsecured basis by each of the Company’s existing and future wholly owned domestic restricted subsidiaries that is a borrower under or that guarantees the Company’s obligations under its Senior Secured Credit Facilities or that guarantees the Company’s or any of the Company’s wholly owned domestic subsidiaries’ long-term indebtedness in an aggregate amount in excess of $50 million.

At any time and from time to time prior to July 1, 2023, the Company may redeem some or all of the Notes for cash at a redemption price equal to 100% of their principal amount, plus the “make-whole” premium described in the Indenture and accrued and unpaid interest, if any, to, but excluding, the applicable redemption date. Beginning on July 1, 2023, the Company may redeem some or all of the Notes at any time and from time to time at the applicable redemption prices listed in the Indenture, plus accrued and unpaid interest, if any, to, but excluding, the applicable redemption date. In addition, at any time and from time to time prior to July 1, 2023, the Company may redeem up to 40% of the aggregate principal amount of the Notes with funds from one or more equity offerings at a redemption price equal to 105.000% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but excluding, the applicable redemption date.

If the Company experiences a change of control (as defined in the indenture), the Company is required to offer to repurchase the Notes at 101% of the principal amount of such Notes, plus accrued and unpaid interest, if any, to, but excluding, the date of repurchase.

The credit agreement and the Notes contain certain customary affirmative and negative covenants that limit or restrict the ability of the Company and its restricted subsidiaries to enter into certain transactions or take certain actions. In addition, the credit agreement contains a financial covenant that requires the Company, if on the last day of any fiscal quarter loans or letters of credit were outstanding under the Revolving Facility (excluding up to $25 million of letters of credit), to maintain a maximum net leverage ratio (as defined in the credit agreement) of 3.50 to 1.00 for the four fiscal quarter periods preceding such day. As of December 31, 2020, there were no loans outstanding and $9.5 million in letters of credit outstanding under the Revolving Facility. The Company is in compliance with all the covenants associated with the Revolving Facility as of the end of the period covered by this report.

The Company has a committed loan facility in Japan. As of December 31, 2020, there is an outstanding balance of $4.1 million on this facility. Principal will be repaid in accordance with the payment schedules ending in 2021. The Company repaid $0.6 million on these loans in 2020.

As part of the Sivomatic acquisition, the Company assumed $10.7 million in long-term debt, recorded at fair value, consisting of two term loans, one of which matured in the third quarter of 2020 and the other of which matures in 2022. These loans carry an interest rate of Euribor plus 2.0% and have quarterly repayments. During 2020, the Company repaid $1.5 million on these loans.

As of December 31, 2020, the Company had $25.6 million in uncommitted short-term bank credit lines, none of which were in use. The credit lines are primarily outside the U.S. and are generally one year in term at competitive market rates at large, well-established institutions. The Company typically uses its available credit lines to fund working capital requirements or local capital spending needs. We anticipate that capital expenditures for 2021 should be between $75 million and $85 million, principally related to opportunities to improve our operations and meet our strategic growth objectives. We expect to meet our other long-term financing requirements from internally generated funds, committed and uncommitted bank credit lines and, where appropriate, project financing of certain satellite plants.

On April 5, 2016, the Company entered into a floating to fixed interest rate swap for an initial aggregate notional amount of $300 million to limit exposure to interest rate increases related to a portion of the Company’s floating rate indebtedness. This swap agreement hedges a portion of contractual floating rate interest through its expiration in May 2021. As a result of the agreement, the Company’s effective fixed interest rate on the notional amount floating rate indebtedness will be 4.25%. The fair value of this instrument at December 31, 2020 was a liability of less than $0.1 million.

During the second quarter of 2018, the Company entered into a floating to fixed interest rate swap for a notional amount of $150 million. The fair value of this instrument at December 31, 2020 is a liability of $7.7 million. Additionally, the Company entered into a cross currency rate swap with a total notional value of $150 million to exchange monthly fixed-rate interest rate payments in U.S. dollars for monthly fixed-rate interest rate payments in Euros. The fair value of this instrument at December 31, 2020 is an asset of $0.4 million. These swaps mature in May 2023. As a result of these swaps, the Company's effective fixed interest rate on the notional floating rate indebtedness will be 2.5%.

On October 23, 2019, the Company's Board of Directors authorized the Company's management to repurchase, at its discretion, up to $75 million of the Company's shares over a one-year period. Over this program's one-year period, 984,202 shares were repurchased for $49.6 million, or an average price of approximately $50.36 per share. This program is now completed.

On October 21, 2020, the Company's Board of Directors authorized the Company's management to repurchase, at its discretion, up to $75 million of the Company's shares over a one-year period. As of December 31, 2020, 179,810 shares have been repurchased under this program for $11.1 million, or an average price of approximately $61.63 per share.

On January 27, 2021, the Company's Board of Directors declared a regular quarterly dividend on its common stock of $0.05 per share. No dividend will be payable unless declared by the Board and unless funds are legally available for payment thereof.

Contractual Obligations

The Company has committed cash outflow related to long-term debt, interest on debt, pension and post-retirement benefit obligations, operating lease agreements, and other long-term contractual obligations. As of December 31, 2020, minimum payments for these obligations were as follows:

	Payments Due by Period				
(millions of dollars)	**Total**	**2021**	**2022– 2023**	**2024– 2025**	**After 2025**
Long-term debt	$ 952.7	$ 4.5	$ 0.2	$ 548.0	$ 400.0
Interest related to long term debt	177.6	36.5	72.9	48.2	20.0
Estimated pension and post retirement plan funding	23.2	11.6	11.6	—	—
Operating lease obligations	74.0	14.4	21.6	14.0	24.0
Repatriation tax liability	21.3	0.9	6.9	13.5	—
Other long-term liabilities	24.1	0.4	—	—	23.7
Total contractual obligations	$ 1,272.9	$ 68.3	$ 113.2	$ 623.7	$ 467.7

Debt amounts in the preceding table represent the principal amounts of all outstanding long-term debt, including current portion. As of December 31, 2020, maturities for long-term debt extended to 2028. The above table does not include borrowings under our Revolving Facility as such amounts can be borrowed and repaid as required. Any remaining outstanding loans under the Revolving Facility will mature in April 2023.

Interest related to long-term debt is based on interest rates in effect as of December 31, 2020 and is calculated on debt with maturities that, on December 31, 2020 extended to 2024. As the contractual interest rate for a portion of our debt is variable, actual cash payments may differ from the estimates provided in the preceding table.

Estimated minimum required pension funding and post-retirement benefits are based on actuarial estimates using current assumptions for discount rates, long-term rate of return on plan assets, rate of compensation increases, and health care cost trend rates. The Company has determined that it is not practicable to present expected pension funding and other postretirement benefit payments beyond 2022 and, accordingly, no amounts have been included in the table beyond such dates.

The Company has several non-cancelable operating leases, primarily for office space and equipment. Operating lease obligations includes future minimum rental commitments under non-cancelable leases.

The Company recorded a tax liability for the one-time transition tax on accumulated foreign subsidiary earnings under U.S. Tax Reform of $35.1 million, payable in eight annual interest-free installments beginning in 2018. The Company paid its first installment in 2018 and was required to apply certain overpayments to the outstanding liability. The remaining liability is payable through 2025.

Other long-term liabilities include asset retirement obligations relating to the retirement of certain tangible long-lived assets and land restoration obligations at the Company's PCC satellite facilities and mining operations. See Note 21 to the Consolidated Financial Statements.

The total amount of contingent obligations associated with gross unrecognized tax benefits for uncertain tax positions, including positions impacting only the timing of tax benefits was $7.6 million at December 31, 2020. Payment of these obligations would result from settlements with taxing authorities. Due to the difficulty in determining the timing of settlements, these obligations are not included in the table above. We do not expect to make a tax payment related to these obligations within the next year that would significantly impact liquidity.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with U.S. generally accepted accounting principles. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingent assets and liabilities.

On an ongoing basis, we evaluate our estimates and assumptions, including those related to revenue recognition, valuation of long-lived assets, goodwill and other intangible assets, income taxes, including valuation allowances and pension plan assumptions. We base our estimates on historical experience and on other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that cannot readily be determined from other sources. There can be no assurance that actual results will not differ from those estimates.

We believe the following critical accounting policies require us to make significant judgments and estimates in the preparation of our consolidated financial statements.

Revenue Recognition

Revenue is recognized at the point in time when the customer obtains control of the promised goods or services in an amount that reflects the consideration we expect to receive in exchange for those goods or services. The Company's revenues are primarily derived from the sale of products. Our primary performance obligation is satisfied upon shipment or delivery to our customer based on written sales terms, which is also when control is transferred. Revenues from sales of equipment are recorded upon completion of installation and transfer of control to the customer. Revenues from services are recorded when the services are performed.

In most of our PCC contracts, the price per ton is based upon the total number of tons sold to the customer during the year. Under those contracts, the price billed to the customer for shipments during the year is based on periodic estimates of the total annual volume that will be sold to the customer. Revenues are adjusted at the end of each year to reflect the actual volume sold. There were no significant revenue adjustments in the fourth quarter of 2020 and 2019, respectively. We have consignment arrangements with certain customers in our Refractories segment. Revenues for these transactions are recorded when the consigned products are consumed by the customer.

Revenues within our Energy Services segment is service based. Certain contracts within this segment are long-term contracts. Revenue where our performance obligations are satisfied in phases is recognized over time using certain input measures based on the measurement of the value transferred to the customer, including milestones achieved.

Valuation of Long-lived Assets, Goodwill and Other Intangible Assets

We assess the possible impairment of long-lived assets and identifiable amortizable intangibles whenever events or changes in circumstances indicate that the carrying value may not be recoverable.

Goodwill is evaluated for impairment at least annually. Factors we consider important that could trigger an impairment review include the following:

- Significant under-performance relative to historical or projected future operating results;
- Significant changes in the manner of use of the acquired assets or the strategy for the overall business;
- Significant negative industry or economic trends;
- Market capitalization below invested capital.

Annually, the Company performs a qualitative assessment for each of its reporting units to determine if the two-step process for impairment testing is required. If the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, the Company then evaluates the recoverability of goodwill using a two-step impairment test approach at the reporting unit level. Step one involves a) developing the fair value of total invested capital of each reporting unit in which goodwill is assigned; and b) comparing the fair value of total invested capital for each reporting unit to its carrying amount, to determine if there is goodwill impairment. Should the carrying amount for a reporting unit exceed its fair value, then the step one test is failed, and the magnitude of any goodwill impairment is determined under step two. The amount of impairment loss is determined in step two by comparing the implied fair value of reporting unit goodwill with the carrying amount of goodwill.

The Company has five reporting units; Performance Materials, PCC, Processed Minerals, Refractories and Energy Services. We identify our reporting units by assessing whether the components of our operating segments constitute businesses for which discrete financial information is available and management regularly reviews the operating results of those components. In the fourth quarter of 2020, the Company performed a qualitative assessment of each of its reporting units and determined it was not more likely than not that the fair value of any of its reporting units was less than their carrying values.

Property, plant and equipment are depreciated over their useful lives. Useful lives are based on management's estimates of the period that the assets can generate revenue, which does not necessarily coincide with the remaining term of a customer's contractual obligation to purchase products made using those assets. Our sales of PCC are predominately pursuant to long-term evergreen contracts, initially ten years in length, with paper mills at which we operate satellite PCC plants. The terms of many of these agreements have been extended, often in connection with an expansion of the satellite PCC plant. Failure of a PCC customer to renew an agreement or continue to purchase PCC from our facility could result in an impairment of assets or accelerated depreciation at such facility.

We evaluate the recoverability of our property, plant and equipment whenever events or change in circumstances indicate that the carrying value of the assets may not be recoverable. For testing the recoverability, we primarily use discounted cash flow models or cost approach to estimate the fair value of these assets. Critical assumptions used in conducting these tests included expectations of our business performance and financial results, useful lives of assets, discount rates and comparable market data.

When we acquire a company, we determine fair value on the acquisition date of assets acquired and liabilities assumed. We use the income, market or cost approach (or a combination thereof) for the valuation and use valuation inputs and analyses that are based on market participant assumptions. Goodwill is calculated as the excess of the consideration transferred over the assets acquired and represents the estimated future economic benefits arising from other assets acquired that could not be individually identified and separately recognized.

Income Taxes

As part of the process of preparing our consolidated financial statements, we are required to estimate our income taxes in each of the jurisdictions in which we operate. This process involves estimating current tax expense together with assessing temporary differences resulting from differing treatments of items for tax and accounting purposes. These differences result in deferred tax assets and liabilities, which are included in the consolidated balance sheet. We must then assess the likelihood that our deferred tax assets will be recovered from future taxable income, and to the extent we believe that recovery is not likely, we must establish a valuation allowance. To the extent we establish a valuation allowance or change this allowance in a period, we must include an expense within the tax provision in the Consolidated Statements of Income.

Deferred tax liabilities represent the amount of income taxes payable in future periods. Such liabilities arise because of temporary differences between the financial reporting and tax bases of assets and liabilities. Deferred income tax assets represent amounts available to reduce income taxes payable on taxable income in future years. Such assets arise because of temporary differences between the financial reporting and tax bases of assets and liabilities, as well as from net operating losses. We evaluate the recoverability of these future tax deductions by assessing the adequacy of future expected taxable income from all sources, including reversal of taxable temporary differences and forecasted operating earnings. These sources of income inherently rely heavily on estimates. We use our historical experience and business forecasts to provide insight. The amount recorded for the net deferred tax liability was $138.4 million and $157.6 million at December 31, 2020 and 2019, respectively.

U.S. Tax Reform was enacted on December 22, 2017 and introduces significant changes to U.S. income tax law. Effective in 2018, the legislation reduced the U.S. statutory tax rate from 35% to 21%, created new taxes on certain foreign-sourced earnings and certain related-party payments. In addition, in 2017, the Company was subject to a one-time transition tax on accumulated foreign subsidiary earnings not previously subject to U.S. income tax. Accounting for the income tax effects of this legislation requires significant judgments and estimates in the interpretation and calculations of its provisions.

Due to the timing of the enactment and the complexity involved in applying the provisions of the U.S. Tax Reform, the Company made reasonable estimates of the effects and recorded provisional amounts in our consolidated financial statements for the year ended December 31, 2017. In 2018, the Company reviewed additional guidance issued by the U.S. Treasury Department, IRS and other standard-setting bodies, collected and prepared the necessary data, and made adjustments to the provisional amount, which resulted in a $4.4 million benefit recorded for the year ended December 31, 2018.

The application of income tax law is inherently complex. Laws and regulations in this area are voluminous and are often ambiguous. As such, we are required to make many subjective assumptions and judgments regarding our income tax exposures. Interpretations of and guidance surrounding income tax laws and regulations change over time. As such, changes in our subjective assumptions and judgments can materially affect amounts recognized in the consolidated balance sheets and statements of operations. See Note 9 to the Consolidated Financial Statements for additional detail on our uncertain tax positions.

Pension Benefits

We sponsor pension and other retirement plans in various forms covering the majority of employees who meet eligibility requirements. Several statistical and actuarial models which attempt to estimate future events are used in calculating the expense and liability related to the plans. These models include assumptions about the discount rate, expected return on plan assets and rate of future compensation increases as determined by us, within certain guidelines. Our assumptions reflect our historical experience and management's best judgment regarding future expectations. In addition, our actuarial consultants also use subjective factors such as withdrawal and mortality rates to estimate these assumptions. The actuarial assumptions used by us may differ materially from actual results due to changing market and economic conditions, higher or lower withdrawal rates or longer or shorter life spans of participants, among other things.

The investment strategy for pension plan assets is to maintain a broadly diversified portfolio designed to both preserve and grow plan assets to meet future plan obligations. The Company's average rate of return on assets from inception through December 31, 2020 was approximately 9%. The Company's assets are strategically allocated among equity, debt and other investments to achieve a diversification level that dampens fluctuations in investment returns. The Company's long-term investment strategy is an investment portfolio mix of approximately 55%-65% in equity securities, 30%-35% in fixed income securities and 0%-15% in other securities. As of December 31, 2020, the Company had approximately 56% of its pension assets in equity securities, 28% in fixed income securities and 16% in other securities.

The Company recognized pension expense of $18.4 million in 2020 as compared to $12.6 million in 2019. Accounting guidance on retirement benefits requires companies to discount future benefit obligations back to today's dollars using a discount rate that is based on high-quality fixed-income investments. A decrease in the discount rate increases the pension benefit obligation, while an increase in the discount rate decreases the pension benefit obligation. This increase or decrease in the pension benefit obligation is recognized in Accumulated other comprehensive income (loss) and subsequently amortized into earnings as an actuarial gain or loss. The guidance also requires companies to use an expected long-term rate of return on plan assets for computing current year pension expense. Differences between the actual and expected returns are also recognized in Accumulated other comprehensive income (loss) and subsequently amortized into earnings as actuarial gains and losses. At the end of 2020, total actuarial losses recognized in Accumulated other comprehensive income (loss) for pension plans were ($119.1) million as compared to ($99.7) million in 2019. The majority of the actuarial losses were due to decreases in the discount rate and lower actual rates of return on assets than expected during the financial crisis of 2008.

In 2020, included in other comprehensive income, is a net loss of $24.5 million ($18.7 million after-tax) primarily due to a change in discount rates. In 2019, a net loss of $21.2 million ($16.1 million after-tax) was recorded in other comprehensive income, primarily due to a change in discount rates. In 2018, a net loss of $21.6 million ($16.9 million after-tax) was recorded in other comprehensive income, primarily due to a change in discount rates and updated mortality tables.

Actuarial losses for pensions will be impacted in future periods by actual asset returns, discount rate changes, actual demographic experience and other factors that impact these expenses. These losses, reported in Accumulated other comprehensive income (loss), will generally be amortized as a component of net periodic benefit cost on a straight-line basis over the average remaining service period of active employees expected to receive benefits under the benefit plans. At the end of 2020, the average remaining service period of active employees or life expectancy for fully eligible employees was 9 years.

For a detailed discussion on the application of these and other accounting policies, see "Summary of Significant Accounting Policies" in Note 1 to the Consolidated Financial Statements. This discussion and analysis should be read in conjunction with the consolidated financial statements and related notes included elsewhere in this report.

Inflation

While inflation historically has not had a material impact on the Company, our financial performance could be adversely affected by increases in energy and commodity prices. Our production processes consume a significant amount of energy, primarily electricity, diesel fuel, natural gas and coal. We use diesel fuel to operate our mining and processing equipment and our freight costs are heavily dependent upon fuel prices and surcharges. Energy costs also affect the cost of raw materials. On a combined basis, these factors represent a large exposure to petrochemical and energy products which may be subject to significant price fluctuations. The contracts pursuant to which we construct and operate our satellite PCC plants generally adjust pricing to reflect the pass-through of increases in costs resulting from inflation, including lime and energy prices. However, there is a time lag before such price adjustments can be implemented. The Company and its customers will typically negotiate reasonable price adjustments in order to recover a portion of these escalating costs, but there can be no assurance that we will be able to recover increasing costs through such negotiations.

Cyclical Nature of Customers' Businesses

The bulk of our sales within Specialty Minerals, Performance Materials and Refractories segments are to customers in the paper manufacturing, metalcasting, steel manufacturing and construction industries, which have historically been cyclical. The pricing structure of some of our long-term PCC contracts makes our PCC business less sensitive to declines in the quantity of product purchased. In addition, our customers' demand for our Energy Services segments products and services are affected by oil and natural gas production activities, which are heavily influenced by the benchmark price of these commodities. Oil and natural gas prices decreased significantly between 2014 through 2017 and again in 2020, which has caused exploration companies to reduce their capital expenditures and production and exploration activities. This has had the effect of decreasing the demand and increasing competition for the services we provide. We cannot predict the economic outlook in the countries in which we do business, nor in the key industries we serve.

Recently Issued Accounting Standards

Changes to accounting principles generally accepted in the United States of America (U.S. GAAP) are established by the Financial Accounting Standards Board (FASB) in the form of accounting standards updates (ASUs) to the FASB's Accounting Standards Codification. The Company considers the applicability and impact of all ASUs. ASUs not listed below were assessed and determined to be either not applicable or are expected to have minimal impact on our consolidated financial position and results of operations.

Investments - Equity Securities, Investments - Equity Method and Joint Ventures, and Derivatives and Hedging

In January 2020, the FASB issued ASU 2020-01, "Investments - Equity Securities, Investments - Equity Method and Joint Ventures, and Derivatives and Hedging", which addresses the accounting for the transition into and out of the equity method and measuring certain purchased options and forward contracts to acquire investments. The standard is effective for interim and annual periods beginning on or after December 15, 2020. The adoption of this standard is not expected to have a material impact on the Company's financial statements.

Adoption of ASU 2016-13 Measurement of Credit Losses on Financial Instruments

In June 2016, the FASB issued ASU 2016-13, "Measurement of Credit Losses on Financial Instruments", which replaces existing incurred loss impairment guidance and establishes a single allowance framework for financial assets carried at amortized cost. The Company adopted this guidance on January 1, 2020 using a modified retrospective transition method. The Company did not record a cumulative-effect adjustment upon adoption of this standard. Adoption of this standard did not have a material impact on the Company's consolidated financial statements.

Adoption of ASU 2018-14 Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans

In August 2018, the FASB issued ASU 2018-14, "Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans", which modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The Company adopted this guidance on January 1, 2020 on a retrospective basis and has updated the disclosures contained in Note 17 to the Company's Consolidated Financial Statements. Other than the modification of certain disclosures, this guidance did not impact the Company's consolidated financial statements.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

We are exposed to market risk from fluctuations in foreign currency exchange rates, interest rates and credit risk. We use a variety of practices to manage these market risks, including derivative financial instruments when appropriate. Our treasury and risk management policies prohibit us from using derivative instruments for trading or speculative purposes. We also do not use leveraged derivative instruments or derivatives with complex features.

Exchange Rate Sensitivity

As we operate in over 30 countries with many international subsidiaries, we are exposed to currency fluctuations related to manufacturing and selling our products and services. This foreign currency risk is diversified and involves assets, liabilities and cash flows denominated in currencies other than the U.S. Dollar (USD).

We manage our foreign currency exchange risk in part through operational means, including managing same currency revenues versus same currency costs, as well as, same currency assets versus same currency liabilities. We also have subsidiaries with the same currency exposures which may offset each other, providing a natural hedge against one another's currency risk. When appropriate, we enter into derivative financial instruments, such as forward exchange contracts and cross currency interest rate swaps, to mitigate the impact of foreign exchange rate movements on our operating results. The counterparties are major financial institutions. Such forward exchange contracts would not subject us to additional risk from exchange rate because gains and losses on these contracts would offset losses and gains on the assets, liabilities, and transactions being hedged. In the second quarter of 2018, the Company entered into a cross currency swap with a total notional value of $150 million. The swap matures in May 2023. The fair value of this swap at December 31, 2020, was an asset of $0.4 million.

Assets and liabilities of our international subsidiaries are translated to their parent company's reporting currency at current exchange rates during consolidation; gains and losses stemming from these translations are included as a component of Other Comprehensive Income and reported within Accumulated Comprehensive Income within our Consolidated Balance Sheets. Income and expenses of our international subsidiaries are translated at average exchange rates for the period and, when included within retained earnings in the balance sheet at current exchange rates, the differences to those average exchange rates are included within Other Comprehensive Income and reported within Accumulated Comprehensive Income. When our subsidiaries transact business in currencies other than their functional currency, those transactions are revalued in their functional currency and differences resulting from such revaluations are included within other non-operating income (deduction), net within our Consolidated Statement of Income.

We do not anticipate that near-term changes in exchange rates will have a material impact on our future earnings or cash flows. However, there can be no assurance that a sudden and significant change in the value of foreign currencies would not have a material adverse effect on our financial condition and results of operations.

Interest Rate Sensitivity

A portion of our long-term bank debt bears interest at variable rates (see Note 16 to the Consolidated Financial Statements) and our results of operations would be affected by interest rate changes to such bank debt outstanding. The Company utilizes interest rate swaps to limit exposure to market fluctuations on floating-rate debt. During the second quarter of 2016, the Company entered into a floating to fixed interest rate swap for an initial aggregate notional amount of $300 million. The fair value of this swap at December 31, 2020, was a liability of less than $0.1 million. In the second quarter of 2018, the Company entered into an additional floating to fixed interest rate swap for with a total notional value of $150 million. The fair value of this swap at December 31, 2020, was a liability of $7.7 million. An immediate 10% increase in the interest rates would not have a material effect on our results of operations over the next fiscal year. A one percentage point change in interest rates would cost $1.5 million in incremental interest charges on an annual basis.

Credit Risk

We are exposed to credit risk on certain assets, primarily accounts receivable. We provide credit to customers in the ordinary course of business and perform ongoing credit evaluations. Concentrations of credit risk with respect to trade receivables are limited due to the large number of customers comprising our customer base. We currently believe our allowance for doubtful accounts is sufficient to cover customer credit risks. Our accounts receivable financial instruments are carried at amounts that approximate fair value.

Sovereign Debt Risk

We do not have any material credit risk with sovereign governments as we do not sell our products to them. We do, however, sell to customers in these countries, but we believe our risk associated with these customers is not material.

Item 8. Financial Statements and Supplementary Data

The financial information required by Item 8 is contained in Item 15 of Part IV of this report.

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

None.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures

As of the end of the period covered by this report, and under the supervision and with participation of the Company's management, including the Chief Executive Officer and the Chief Financial Officer, the Company carried out an evaluation of the effectiveness of the design and operation of the Company's disclosure controls and procedures, pursuant to Exchange Act Rule 13a-15(b). Based upon that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that the Company's disclosure controls and procedures were effective as of December 31, 2020.

Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, we have included a report of management's assessment of the design and operating effectiveness of our internal controls as part of this report. Management's report is included in our consolidated financial statements beginning on page F-1 of this report under the caption entitled "Management's Report on Internal Control Over Financial Reporting."

Changes in Internal Control Over Financial Reporting

There were no changes in the Company's internal control over financial reporting during the fourth fiscal quarter of 2020 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information concerning the Company's Board of Directors required by this item is incorporated herein by reference to the Company's Proxy Statement, under the captions “Corporate Governance”, “Committees of the Board of Directors” and “Item 1- Election of Directors.”

The Board has established a code of ethics for the Chief Executive Officer, the Chief Financial Officer, and the Chief Accounting Officer entitled "Code of Ethics for the Senior Financial Officers," which is available on our website, www.mineralstech.com, by clicking the links entitled *Our Company*, then *Corporate Governance* and then *Policies and Charters*.

See “Information About Our Executive Officers” in Part I of this report for information regarding executive officers of the Company.

Item 11. Executive Compensation

The information appearing in the Company's Proxy Statement under the captions “Compensation Discussion and Analysis,” “Report of the Compensation Committee” and “Compensation of Executive Officers and Directors" is incorporated herein by reference.

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

The information appearing in the Company's Proxy Statement under the caption "Security Ownership of Certain Beneficial Owners and Management" is incorporated herein by reference.

Equity Compensation Plan Information

The following table summarizes information about our equity compensation plans as of December 31, 2020. All outstanding awards relate to our common stock.

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options	Weighted Average Exercise Price of Outstanding Options	Number of Securities Remaining Available for Future Issuance
Equity compensation plans approved by security holders	1,363,366	$ 57.29	1,532,246
Total	1,363,366	$ 57.29	1,532,246

For further information, see Note 7 to the Consolidated Financial Statements.

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

The information appearing in the Company's Proxy Statement under the caption "Certain Relationships and Related Transactions" is incorporated herein by reference.

The Board has established Corporate Governance principles which include guidelines for determining Director independence, which is available on our website, www.mineralstech.com, by clicking the links entitled *Our Company*, then *Corporate Governance* and then *Policies and Charters*. The information appearing in the Company’s Proxy Statement under the caption “Corporate Governance – Director Independence” is incorporated herein by reference.

Item 14. Principal Accountant Fees and Services

The information appearing in the Company's Proxy Statement under the caption "Principal Accountant Fees and Services" is incorporated herein by reference.

PART IV

Item 15. Exhibits and Financial Statement Schedules

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

1. Financial Statements. The following Consolidated Financial Statements of Mineral Technologies Inc. and subsidiary companies and Reports of Independent Registered Public Accounting Firm are set forth on pages F-2 to F-38.

Consolidated Balance Sheets as of December 31, 2020 and 2019
Consolidated Statements of Income for the years ended December 31, 2020, 2019 and 2018
Consolidated Statements of Comprehensive Income for the years ended December 31, 2020, 2019 and 2018
Consolidated Statements of Cash Flows for the years ended December 31, 2020, 2019 and 2018
Consolidated Statements of Shareholders' Equity for the years ended December 31, 2020, 2019 and 2018
Notes to the Consolidated Financial Statements
Reports of Independent Registered Public Accounting Firm
Management's Report on Internal Control Over Financial Reporting

2. Financial Statement Schedule. The following financial statement schedule is filed as part of this report:

Schedule II – Valuation and Qualifying Accounts

All other schedules for which provision is made in the applicable accounting regulations of the SEC are not required under the related instructions or are inapplicable and, therefore, have been omitted.

3. Exhibits. The following exhibits are filed as part of, or incorporated by reference into, this report.

Exhibit No.	Exhibit Title
3.1	Restated Certificate of Incorporation of the Company (Incorporated by reference to exhibit 3.1 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2003)
3.2	By-Laws of the Company as amended and restated effective March 13, 2018 (Incorporated by reference to exhibit 3.1 filed with the Company's Current Report on Form 8-K (file no. 001-11430) filed on March 19, 2018)
4.1	Specimen Certificate of Common Stock (Incorporated by reference to exhibit 4.1 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2003)
4.2	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934 (Incorporated by reference to exhibit 4.2 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2019)
4.3	Indenture, dated as of June 30, 2020, by and among Minerals Technologies Inc., the subsidiary guarantors from time to time party thereto and The Bank of New York Mellon Trust Company, N.A., as a trustee (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K (file no. 001-11430) filed on June 30, 2020.)
10.1	Asset Purchase Agreement, dated as of September 28, 1992, by and between Specialty Refractories Inc. and Quigley Company Inc. (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-51292), originally filed on August 25, 1992)
10.1(a)	Agreement dated October 22, 1992 between Specialty Refractories Inc. and Quigley Company Inc., amending Exhibit 10.1 (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-59510), originally filed on March 15, 1993)
10.1(b)	Letter Agreement dated October 29, 1992 between Specialty Refractories Inc. and Quigley Company Inc., amending Exhibit 10.1 (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-59510), originally filed on March 15, 1993)
10.2	Reorganization Agreement, dated as of September 28, 1992, by and between the Company and Pfizer Inc. (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-51292), originally filed on August 25, 1992)
10.3	Asset Contribution Agreement, dated as of September 28, 1992, by and between Pfizer Inc. and Specialty Minerals Inc. (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-51292), originally filed on August 25, 1992)
10.4	Asset Contribution Agreement, dated as of September 28, 1992, by and between Pfizer Inc. and Barretts Minerals Inc. (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-51292), originally filed on August 25, 1992)
10.4(a)	Agreement dated October 22, 1992 between Pfizer Inc, Barretts Minerals Inc. and Specialty Minerals Inc., amending Exhibits 10.3 and 10.4 (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-59510), originally filed on March 15, 1993)

10.5	Employment Agreement, dated December 13, 2016, between the Company and Douglas T. Dietrich (Incorporated by reference to exhibit 10.1 filed with the Company's Current Report on Form 8-K (file no. 001-11430) filed on December 16, 2016) (+)
10.6	Form of Employment Agreement between the Company and each of Brett Argirakis, Michael A. Cipolla, Erin N. Cutler, Matthew E. Garth, Jonathan J., Hastings, Andrew Jones, Douglas W. Mayger, Thomas J. Meek, and D.J. Monagle, III (Incorporated by reference to exhibit 10.6 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2016) (+)
10.7	Severance Agreement between the Company and Douglas T. Dietrich (Incorporated by reference to the exhibit 10.2 filed with the Company’s Current Report on form 8-K (file no. 001-11430) filed on December 16, 2016) (+)
10.8	Form of Severance Agreement between the Company and each of Brett Argirakis, Michael A. Cipolla, Erin N. Cutler, Matthew E. Garth, Jonathan J., Hastings, Andrew Jones, Douglas W. Mayger, Thomas J. Meek, and D.J. Monagle, III (Incorporated by reference to exhibit 10.8 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2016) (+)
10.9	Form of Indemnification Agreement between the Company and each of Brett Argirakis, Michael A. Cipolla, Erin N. Cutler, Douglas T. Dietrich, Matthew E. Garth, Jonathan J. Hastings, Andrew Jones, Douglas W. Mayger, Thomas J. Meek, D.J. Monagle III and each of the Company’s non-employee directors (Incorporated by reference to exhibit 10.1 filed with the Company's Current Report on Form 8-K (file no. 001-11430) filed on May 8, 2009) (+)
10.10	Company Employee Protection Plan, as amended August 27, 1999 (Incorporated by reference to exhibit 10.7 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2004) (+)
10.11	Company Nonfunded Deferred Compensation and Unit Award Plan for Non-Employee Directors, as amended and restated effective January 1, 2008 (Incorporated by reference to exhibit 10.8 filed with the Company's Quarterly Report on Form 10-Q (file no. 001-11430) for the quarter ended March 30, 2008) (+)
10.11(a)	First Amendment to the Company Nonfunded Deferred Compensation and Unit Award Plan for Non-Employee Directors, dated January 18, 2012 (Incorporated by reference to exhibit 10.11(a) filed with the Company’s Annual Report on Form 10-K (file no. 001-11430)for the year ended December 31, 2011) (+)
10.12	2015 Stock Award and Incentive Plan of the Company, as amended and restated effective March 11, 2020 (Incorporated by reference to Appendix A to the Company’s Supplement to its 2020 Proxy Statement (file no. 001-11430) filed on April 22, 2020) (+)
10.12(a)	Form of Stock Option Agreement (Incorporated by reference to exhibit 10.12(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2019) (+)
10.12(b)	Form of Deferred Restricted Stock Unit Agreement (Incorporated by reference to exhibit 10.12(b) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2019) (+)
10.13	Company Retirement Plan, as amended and restated, dated August 27, 2020 (*)(+)
10.14	Company Supplemental Retirement Plan, amended and restated effective December 31, 2009 (Incorporated by reference to exhibit 10.13 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2009) (+)
10.14(a)	First Amendment to Company Supplemental Retirement Plan, as amended and restated, dated December 22, 2014 (Incorporated by reference to exhibit 10.14(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.14(b)	Second Amendment to Company Supplemental Retirement Plan, as amended and restated, dated December 20, 2019 (Incorporated by reference to exhibit 10.14(b) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2019) (+)
10.15	Company Savings and Investment Plan, as amended and restated, dated December 21, 2012 (Incorporated by reference to exhibit 10.14 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2012) (+)
10.15(a)	Amendment to the Company Savings and Investment Plan, as amended and restated, dated December 5, 2013 (Incorporated by reference to exhibit 10.15(a) filed with the Company’s Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2013) (+)

10.15(b)	Amendment to the Company Savings and Investment Plan, as amended and restated, dated December 5, 2013 (Incorporated by reference to exhibit 10.15(b) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2013) (+)
10.15(c)	Third Amendment to the Company Savings and Investment Plan, as amended and restated, dated December 22, 2014 (Incorporated by reference to exhibit 10.15(c) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.15(d)	Amendment to the Company Savings and Investment Plan, as amended and restated, dated December 31, 2015 (Incorporated by reference to exhibit 10.15(d) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2015)(+)
10.15(e)	Amendment to the Company Savings and Investment Plan, as amended and restated, dated July 16, 2020 (Incorporated by reference to exhibit 10.1 filed with the Company's Quarterly Report on Form 10-Q (file no. 001-11430) for the quarter ended June 28, 2020)(+)
10.15(f)	Amendment to the Company Savings and Investment Plan, as amended and restated, dated December 21, 2020 (*)(+)
10.16	Company Supplemental Savings Plan, amended and restated effective December 31, 2009 (Incorporated by reference to exhibit 10.15 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2009) (+)
10.16(a)	Amendment to the Company Supplemental Savings Plan, dated December 28, 2011 (Incorporated by reference to exhibit 10.16(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2011)(+)
10.16(b)	First Amendment to the Company Supplemental Savings Plan, dated December 22, 2014 (Incorporated by reference to exhibit 10.16(b) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.16(c)	Second Amendment to the Company Supplemental Savings Plan, dated December 22, 2014 (Incorporated by reference to exhibit 10.16(c) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.16(d)	Third Amendment to the Company Supplemental Savings Plan, dated December 16, 2016 (Incorporated by reference to exhibit 10.16(d) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2016)(+)
10.16(e)	Fourth Amendment to the Company Supplemental Savings Plan, dated December 20, 2019 (Incorporated by reference to exhibit 10.16(e) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2019) (+)
10.17	Company Health and Welfare Plan, effective as of April 1, 2003 and amended and restated as of January 1, 2006 (Incorporated by reference to exhibit 10.14 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2006)(+)
10.17(a)	Amendment to the Company Health and Welfare Plan, dated May 19, 2009 (Incorporated by reference to exhibit 10.16(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2009) (+)
10.17(b)	First Amendment to Company Health and Welfare Plan, dated December 22, 2014 (Incorporated by reference to exhibit 10.17(b) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.18	Company Retiree Medical Plan, effective as of January 1, 2011 (Incorporated by reference to exhibit 10.17 filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2010)(+)
10.18(a)	First Amendment to Company Retiree Medical Plan, dated December 22, 2014 (Incorporated by reference to exhibit 10.18(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.19	Amended and Restated Grantor Trust Agreement, dated as of April 1, 2010, by and between the Company and the Wilmington Trust Company (Incorporated by reference to exhibit 10.1 filed with the Company's Quarterly Report on Form 10-Q (file no. 001-11430) for the period ended April 4, 2010)(+)
10.19(a)	Agreement and Amendment No. 1, dated October 1, 2017, to the Amended and Restated Grantor Trust Agreement, dated as of April 1, 2010, by and between the Company and the Wilmington Trust Company (Incorporated by reference to exhibit 10.19(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2017)(+)
10.20	AMCOL International Corporation Nonqualified Deferred Compensation Plan, as amended (Incorporated by reference to exhibit 10.1 filed with the Annual Report on Form 10-K for the year ended December 31, 2008 of AMCOL International Corporation (file no. 0-15661))(+)
10.20(a)	First Amendment to AMCOL International Corporation Nonqualified Deferred Compensation Plan, as amended, dated December 22, 2014 (Incorporated by reference to exhibit 10.20(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.20(b)	Third Amendment to the AMCOL International Corporation Nonqualified Deferred Compensation Plan, as amended, dated August 21, 2015 (Incorporated by reference to exhibit 10.1 filed with the Company's Quarterly Report on Form 10-Q (file no. 001-11430) for the quarter ended September 27, 2015)(+)

10.21	AMCOL International Corporation Amended and Restated Supplementary Pension Plan for Employees (Incorporated by reference to the exhibit 10.6 filed with the Annual Report on Form 10-K for the year ended December 31, 2008 of AMCOL International Corporation (file no. 0-15661)) (+)
10.21(a)	First Amendment to AMCOL International Corporation Amended and Restated Supplementary Pension Plan for Employees, dated December 22, 2014 (Incorporated by reference to exhibit 10.21(a) filed with the Company's Annual Report on Form 10-K (file no. 001-11430) for the year ended December 31, 2014)(+)
10.21(b)	Second Amendment to Amended and Restated Supplementary Pension Plan for Employees of AMCOL International Corporation, dated August 21, 2015 (Incorporated by reference to exhibit 10.2 filed with the Company's Quarterly Report on Form 10-Q (file no. 001-11430) for the quarter ended September 27, 2015)(+)
10.22	Third Amendment, dated as of April 18, 2018, to the Credit Agreement, dated as of May 9, 2014, among Minerals Technologies Inc., the subsidiary borrowers party thereto, the lenders party thereto, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent , and the other agents party thereto, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent, and the other agents party thereto (Incorporated by reference to the exhibit 10.1 filed with the Company's Current Report on Form 8-K (file no. 001-11430) filed on April 20, 2018)
10.23	Indenture, dated July 22, 1963, between the Cork Harbour Commissioners and Roofchrome Limited (Incorporated by reference to the exhibit so designated filed with the Company's Registration Statement on Form S-1 (Registration No. 33-51292), originally filed on August 25, 1992)
21.1	Subsidiaries of the Company (*)
23.1	Consent of Independent Registered Public Accounting Firm (*)
24	Power of Attorney (*)
31.1	Rule 13a-14(a)/15d-14(a) Certification executed by the Company's principal executive officer (*)
31.2	Rule 13a-14(a)/15d-14(a) Certification executed by the Company's principal financial officer (*)
32	Section 1350 Certification (*)
95	Information Concerning Mine Safety Violations (*)
101.INS	Inline XBRL Instance Document (the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document)
101.SCH	Inline XBRL Taxonomy Extension Schema Document
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

(*) Filed herewith.
(+) Management contract or compensatory plan or arrangement required to be filed pursuant to Item 601 of Regulation S-K.

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.

By: /s/ Douglas T. Dietrich
Douglas T. Dietrich
Chief Executive Officer

February 19, 2021

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 in the capacities and on the dates indicated:

SIGNATURE	TITLE	DATE
/s/ Douglas T. Dietrich Douglas T. Dietrich	Chief Executive Officer (Principal Executive Officer)	February 19, 2021
/s/ Matthew E. Garth Matthew E. Garth	Senior Vice President – Finance and Treasury, Chief Financial Officer (Principal Financial Officer)	February 19, 2021
/s/ Michael A. Cipolla Michael A. Cipolla	Vice President – Controller and Chief Accounting Officer (Principal Accounting Officer)	February 19, 2021
* Joseph C. Breunig	Director	February 19, 2021
* John J. Carmola	Director	February 19, 2021
* Robert L. Clark	Director	February 19, 2021
* Alison A. Deans	Director	February 19, 2021
/s/ Douglas T. Dietrich Douglas T. Dietrich	Director	February 19, 2021
* Duane R. Dunham	Chairman and Director	February 19, 2021
* Franklin L. Feder	Director	February 19, 2021
* Carolyn K. Pittman	Director	February 19, 2021
* Marc E. Robinson	Director	February 19, 2021
* Donald C. Winter	Director	February 19, 2021

* By: /s/ Thomas J. Meek
Thomas J. Meek
Attorney-in-Fact

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES
CONSOLIDATED BALANCE SHEETS

(millions of dollars, except share and per share amounts)	December 31, 2020	December 31, 2019
ASSETS		
Current assets:		
Cash and cash equivalents	$ 367.7	$ 241.6
Short-term investments, at cost which approximates market	4.1	1.6
Accounts receivable	369.0	376.2
Inventories	248.2	253.3
Prepaid expenses	35.4	35.4
Other current assets	9.2	11.1
Total current assets	1,033.6	919.2
Property, plant and equipment, less accumulated depreciation and depletion	1,039.6	1,052.8
Goodwill	808.5	807.4
Intangible assets	195.8	203.0
Deferred income taxes	25.3	23.0
Other assets and deferred charges	106.6	107.2
Total assets	$ 3,209.4	$ 3,112.6
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Short-term debt	$ —	$ 101.2
Current maturities of long-term debt	1.0	2.1
Accounts payable	148.3	163.4
Income tax payable	8.7	4.2
Accrued compensation and related items	60.3	50.7
Other current liabilities	77.5	76.9
Total current liabilities	295.8	398.5
Long-term debt, net of unamortized discount and deferred financing costs	933.2	824.3
Deferred income taxes	163.7	180.6
Accrued pension and postretirement benefits	179.0	148.9
Other non-current liabilities	139.0	125.7
Total liabilities	1,710.7	1,678.0
Shareholders' equity:		
Preferred stock, without par value; 1,000,000 shares authorized; none issued	—	—
Common stock, par value at $0.10 per share; 100,000,000 shares authorized; Issued 49,051,181 shares in 2020 and 48,909,662 shares in 2019	4.9	4.9
Additional paid-in capital	453.3	442.2
Retained earnings	2,011.3	1,905.7
Accumulated other comprehensive loss	(308.3)	(290.4)
Less common stock held in treasury, at cost; 15,168,994 shares in 2020 and 14,365,355 shares in 2019	(700.4)	(659.7)
Total Minerals Technologies Inc. shareholders' equity	1,460.8	1,402.7
Non-controlling interests	37.9	31.9
Total shareholders' equity	1,498.7	1,434.6
Total liabilities and shareholders' equity	$ 3,209.4	$ 3,112.6

See Notes to Consolidated Financial Statements, which are an integral part of these statements.

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES
CONSOLIDATED STATEMENTS OF INCOME

	Year Ended December 31,		
(millions of dollars, except per share data)	**2020**	**2019**	**2018**
Product sales	$ 1,521.8	$ 1,695.8	$ 1,729.3
Service revenue	73.0	95.2	78.3
Total net sales	1,594.8	1,791.0	1,807.6
Cost of goods sold	1,140.5	1,285.8	1,293.3
Cost of service revenue	48.9	64.6	52.9
Total cost of sales	1,189.4	1,350.4	1,346.2
Production margin	405.4	440.6	461.4
Marketing and administrative expenses	176.5	187.5	178.6
Research and development expenses	19.9	20.3	22.7
Litigation expenses	10.4	10.9	—
Acquisition-related expenses	3.1	—	1.7
Restructuring and other items, net	7.6	13.2	2.5
Income from operations	187.9	208.7	255.9
Interest expense, net	(38.2)	(43.2)	(45.9)
Non-cash pension settlement charge	(6.4)	—	(4.4)
Other non-operating income (deductions), net	(5.3)	(8.2)	(1.5)
Total non-operating deductions, net	(49.9)	(51.4)	(51.8)
Income from operations before tax and equity in earnings	138.0	157.3	204.1
Provision for taxes on income	24.4	22.8	34.4
Equity in earnings of affiliates, net of tax	2.2	1.9	3.5
Consolidated net income	115.8	136.4	173.2
Less:			
Net income attributable to non-controlling interests	3.4	3.7	4.2
Net income attributable to Minerals Technologies Inc. (MTI)	$ 112.4	$ 132.7	$ 169.0
Earnings per share:			
Basic:			
Income from operations attributable to MTI	$ 3.29	$ 3.79	$ 4.79
Diluted:			
Income from operations attributable to MTI	$ 3.29	$ 3.78	$ 4.75
Cash dividends declared per common share	$ 0.20	$ 0.20	$ 0.20
Shares used in computation of earnings per share:			
Basic	34.2	35.0	35.3
Diluted	34.2	35.1	35.6

See Notes to Consolidated Financial Statements, which are an integral part of these statements.

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Consolidated net income	$ 115.8	$ 136.4	$ 173.2
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	10.9	(29.9)	(67.9)
Pension and postretirement plan adjustments	(18.7)	(16.1)	16.9
Unrealized gain (loss) on cash flow hedges	(8.5)	0.2	1.6
Total other comprehensive income (loss), net of tax	(16.3)	(45.8)	(49.4)
Total comprehensive income including non-controlling interests	99.5	90.6	123.8
Less: Net income attributable to non-controlling interests	3.4	3.7	4.2
Less: Foreign currency translation adjustments attributable to non-controlling interests	1.7	—	(1.8)
Comprehensive income attributable to non-controlling interests	5.1	3.7	2.4
Comprehensive income attributable to Minerals Technologies Inc.	$ 94.4	$ 86.9	$ 121.4

See Notes to Consolidated Financial Statements, which are an integral part of these statements.

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

(millions of dollars)	Year Ended December 31, 2020	2019	2018
Operating Activities:			
Consolidated net income	$ 115.8	$ 136.4	$ 173.2
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation, depletion and amortization	93.9	98.4	94.3
Loss on disposal of property, plant and equipment	0.2	1.9	2.8
Deferred income taxes	(2.7)	(1.4)	15.4
Pension amortization and settlement loss	13.1	9.2	13.4
Provision for bad debts	2.6	6.3	3.2
Stock-based compensation	10.2	8.1	6.2
Asset write-downs	7.1	7.5	0.7
Reduction of right of use asset	12.3	12.7	—
Other non-cash items	(2.2)	(1.9)	(3.5)
Changes in operating assets and liabilities			
Accounts receivable	13.7	9.9	(3.0)
Inventories	8.3	(16.0)	(14.7)
Pension plan funding	(12.2)	(7.7)	(24.2)
Accounts payable	(16.7)	(5.1)	(11.2)
Restructuring liabilities	(1.2)	2.4	(4.9)
Income taxes payable	3.9	2.5	(7.4)
Prepaid expenses and other	(5.5)	(24.9)	(36.7)
Net cash provided by operating activities	240.6	238.3	203.6
Investing Activities:			
Purchases of property, plant and equipment	(66.8)	(65.0)	(75.9)
Acquisition of business, net of cash acquired	—	—	(122.5)
Acquisition of assets	(9.2)	—	—
Proceeds from sale of assets	0.7	—	0.9
Purchases of short-term investments	(8.7)	(5.5)	(7.7)
Proceeds from sale of short-term investments	5.3	7.7	6.1
Other investing activities	—	0.8	(0.9)
Net cash used in investing activities	(78.7)	(62.0)	(200.0)
Financing Activities:			
Long-term debt issuance	400.0	—	—
Debt issuance costs	(6.4)	—	(1.5)
Repayment of long-term debt	(290.1)	(88.2)	(66.3)
Proceeds from issuance of short-term debt	—	—	113.0
Repayment of short-term debt	(101.2)	(4.0)	(14.0)
Purchase of common stock for treasury	(40.7)	(41.0)	(21.7)
Proceeds from issuance of stock under option plan	3.2	2.2	3.0
Tax withholding payments for stock-based compensation	(2.0)	(1.7)	(3.1)
Dividends paid to non-controlling interests	(0.7)	(4.2)	(1.8)
Capital contribution from non-controlling interests	1.7	0.6	3.7
Cash dividends paid	(6.8)	(7.0)	(7.1)
Net cash provided by (used in) financing activities	(43.0)	(143.3)	4.2
Effect of exchange rate changes on cash and cash equivalents	7.2	(0.2)	(11.2)
Net increase (decrease) in cash and cash equivalents	126.1	32.8	(3.4)
Cash and cash equivalents at beginning of period	241.6	208.8	212.2
Cash and cash equivalents at end of period	$ 367.7	$ 241.6	$ 208.8
Supplemental disclosure of cash flow information:			
Non-cash financing activities			
Treasury stock purchases settled after period end	$ 1.8	$ 1.1	$ 0.3

See Notes to Consolidated Financial Statements, which are an integral part of these statements.

MINERALS TECHNOLOGIES INC. AND SUBSIDIARY COMPANIES
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

(millions of dollars)	Equity Attributable to MTI						
	Common Stock	Additional Paid-in Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Treasury Stock	Non-controlling Interests	Total
Balance as of December 31, 2017	$ 4.9	$ 422.7	$ 1,607.2	$ (186.1)	$ (597.0)	$ 27.4	$ 1,279.1
Net income	—	—	169.0	—	—	4.2	173.2
Other comprehensive loss	—	—	—	(47.6)	—	(1.8)	(49.4)
Dividends declared	—	—	(7.1)	—	—	—	(7.1)
Dividends paid to non-controlling interests	—	—	—	—	—	(1.8)	(1.8)
Acquisition of non-controlling interest	—	—	—	—	—	0.1	0.1
Capital contribution from non-controlling interests	—	—	—	—	—	3.7	3.7
Issuance of shares pursuant to employee stock compensation plans	—	3.0	—	—	—	—	3.0
Purchase of common stock for treasury	—	—	—	—	(21.7)	—	(21.7)
Stock-based compensation	—	6.2	—	—	—	—	6.2
Balance as of December 31, 2018	$ 4.9	$ 431.9	$ 1,769.1	$ (233.7)	$ (618.7)	$ 31.8	$ 1,385.3
Net income	—	—	132.7	—	—	3.7	136.4
Other comprehensive loss	—	—	—	(45.8)	—	—	(45.8)
Dividends declared	—	—	(7.0)	—	—	—	(7.0)
Dividends paid to non-controlling interests	—	—	—	—	—	(4.2)	(4.2)
Cumulative effect of accounting change	—	—	10.9	(10.9)	—	—	—
Capital contribution from non-controlling interests	—	—	—	—	—	0.6	0.6
Issuance of shares pursuant to employee stock compensation plans	—	2.2	—	—	—	—	2.2
Purchase of common stock for treasury	—	—	—	—	(41.0)	—	(41.0)
Stock-based compensation	—	8.1	—	—	—	—	8.1
Balance as of December 31, 2019	$ 4.9	$ 442.2	$ 1,905.7	$ (290.4)	$ (659.7)	$ 31.9	$ 1,434.6
Net income	—	—	112.4	—	—	3.4	115.8
Other comprehensive income (loss)	—	—	—	(17.9)	—	1.6	(16.3)
Dividends declared	—	—	(6.8)	—	—	—	(6.8)
Dividends paid to non-controlling interests	—	—	—	—	—	(0.7)	(0.7)
Capital contribution from non-controlling interests	—	—	—	—	—	1.7	1.7
Issuance of shares pursuant to employee stock compensation plans	—	3.2	—	—	—	—	3.2
Purchase of common stock for treasury	—	—	—	—	(40.7)	—	(40.7)
Stock-based compensation	—	10.2	—	—	—	—	10.2
Conversion of RSU's for tax withholding	—	(2.3)	—	—	—	—	(2.3)

Balance as of December 31, 2020	$	4.9	$	453.3	$	2,011.3	$	(308.3)	$	(700.4)	$	37.9	$	1,498.7

See Notes to Consolidated Financial Statements, which are an integral part of these statements.

Note 1. Summary of Significant Accounting Policies

Business

The Company is a resource- and technology-based company that develops, produces and markets on a worldwide basis a broad range of specialty mineral, mineral-based and synthetic mineral products and supporting systems and services.

Basis of Presentation

The accompanying consolidated financial statements include the accounts of Minerals Technologies Inc. (the "Company"), its wholly and majority-owned subsidiaries, as well as variable interest entities for which the Company is the primary beneficiary. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The Company employs accounting policies that are in accordance with U.S. generally accepted accounting principles and require management to make estimates and assumptions relating to the reporting of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reported period. Significant estimates include those related to revenue recognition, valuation of long-lived assets, goodwill and other intangible assets, pension plan assumptions, income tax, and litigation and environmental liabilities. Actual results could differ from those estimates.

Cash Equivalents and Short-term Investments

The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents. Short-term investments consist of financial instruments, mainly bank deposits, with original maturities beyond three months, but less than twelve months. Short-term investments amounted to $4.1 million and $1.6 million at December 31, 2020 and 2019, respectively. There were no unrealized holding gains and losses on the short-term bank investments held at December 31, 2020.

Trade Accounts Receivable

Trade accounts receivables are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is the Company's best estimate of the amount of probable credit losses in the Company's existing accounts receivable. The Company determines the allowance based on historical write-off experience and specific allowances for bankrupt customers. The Company also analyzes the collection history and financial condition of its other customers, considering current industry conditions and determines whether an allowance needs to be established. The Company reviews its allowance for doubtful accounts monthly. Past due balances over 90 days based on payment terms are reviewed individually for collectability. Allowance for doubtful accounts was $15.0 million and $12.9 million at December 31, 2020 and 2019, respectively. Account balances are charged off against the allowance after all means of collection have been exhausted and the potential for recovery is considered remote. The Company does not have any off-balance-sheet credit exposure related to its customers.

Inventories

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

Additionally, items such as idle facility expense, excessive spoilage, freight handling costs, and re-handling costs are recognized as current period charges. The allocation of fixed production overheads to the costs of conversion are based upon the normal capacity of the production facility. Fixed overhead costs associated with idle capacity are expensed as incurred.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost. Significant improvements are capitalized, while maintenance and repair expenditures are charged to operations as incurred. The Company capitalizes interest cost as a component of construction in progress. The straight-line method of depreciation is used for substantially all of the assets for financial reporting purposes, except for mining related equipment which uses units-of-production method. The annual rates of depreciation are 3% - 6.67% for buildings, 6.67% - 12.5% for machinery and equipment, 8% - 12.5% for furniture and fixtures and 12.5% - 25% for computer equipment and software-related assets. The estimated useful lives of our PCC production facilities and machinery and equipment pertaining to our natural stone mining and processing plants and our chemical plants are 15 years.

Property, plant and equipment are depreciated over their useful lives. Useful lives are based on management's estimates of the period that the assets can generate revenue, which does not necessarily coincide with the remaining term of a customer's contractual obligation to purchase products made using those assets. The Company's sales of PCC are predominantly pursuant to long-term evergreen contracts, initially ten years in length, with paper mills at which the Company operates satellite PCC plants. The terms of many of these agreements have been extended, often in connection with an expansion of the satellite PCC plant. Failure of a PCC customer to renew an agreement or continue to purchase PCC from a Company facility could result in an impairment of assets charge or accelerated depreciation at such facility.

Depletion of mineral reserves is determined on a unit-of-extraction basis for financial reporting purposes, based upon proven and probable reserves, and generally on a percentage depletion basis for tax purposes.

Stripping Costs Incurred During Production

Stripping costs are those costs incurred for the removal of waste materials for the purpose of accessing ore body that will be produced commercially. Stripping costs incurred during the production phase of a mine are variable costs that are included in the costs of inventory produced during the period that the stripping costs are incurred.

Accounting for the Impairment of Long-Lived Assets

Long-lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable, the Company estimates the undiscounted future cash flows (excluding interest), resulting from the use of the asset and its ultimate disposition. If the sum of the undiscounted cash flows (excluding interest) is less than the carrying value, the Company recognizes an impairment loss, measured as the amount by which the carrying value exceeds the fair value of the asset, determined principally using discounted cash flows.

Goodwill and Other Intangible Assets

Goodwill represents the excess of purchase price and related costs over the value assigned to the net tangible and identifiable intangible assets of businesses acquired. Goodwill is not amortized, but instead assessed for impairment. Intangible assets with estimable useful lives are amortized on a straight-line basis over their respective estimated lives to the estimated residual values, and reviewed for impairment.

The Company performs a qualitative assessment for each of its reporting units to determine if the two-step process for impairment testing is required. If the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, the Company would then evaluate the recoverability of goodwill using a two-step impairment test approach at the reporting unit level. In the first step, the fair value for the reporting unit is compared to its book value including goodwill. In the case that the fair value of the reporting unit is less than book value, a second step is performed which compares the fair value of the reporting unit's goodwill to the book value of the goodwill. The fair value for the goodwill is determined based on the difference between the fair values of the reporting unit and the net fair values of the identifiable assets and liabilities of such reporting unit. If the fair value of the goodwill is less than the book value, the difference is recognized as impairment.

Investment in Joint Ventures

The Company uses the equity method of accounting to incorporate the results of its investments in companies in which it has significant influence but does not control; and cost method of accounting in companies in which it cannot exercise significant control. The Company records the equity in earnings of its investments in joint ventures on a one-month lag. At December 31, 2020 and 2019, the book value of the Company's equity method investments was $17.0 million and $16.1 million.

Accounting for Asset Retirement Obligations

The Company provides for obligations associated with the retirement of long-lived assets and the associated asset retirement costs. The fair value of a liability for an asset retirement obligation is recognized in the period in which it is incurred if a reasonable estimate of fair value can be made. The associated asset retirement costs are capitalized as part of the carrying amount of the long-lived asset. The Company also provides for legal obligations to perform asset retirement activities where timing or methods of settlement are conditional on future events.

The Company also records liabilities related to land reclamation as a part of the asset retirement obligations. The Company mines land for various minerals using a surface-mining process that requires the removal of overburden. In many instances, the Company is obligated to restore the land upon completion of the mining activity. As the overburden is removed, the Company recognizes this liability for land reclamation based on the estimated fair value of the obligation. The obligation is adjusted to reflect the passage of time and changes in estimated future cash outflows.

Fair Value of Financial Instruments

The recorded amounts of cash and cash equivalents, receivables, short-term borrowings, accounts payable, accrued interest, and variable-rate long-term debt approximate fair value because of the short maturity of those instruments or the variable nature of underlying interest rates. Short-term investments are recorded at cost, which approximates fair market value.

Derivative Financial Instruments

The Company records derivative financial instruments which are used to hedge certain foreign exchange risk at fair value on the balance sheet. See Note 13 for a full description of the Company's hedging activities and related accounting policies.

Revenue Recognition

Revenue is recognized at the point in time when the customer obtains control of the promised goods or services in an amount that reflects the consideration we expect to receive in exchange for those goods or services. The Company's revenues are primarily derived from the sale of products. Our primary performance obligation is satisfied upon shipment or delivery to our customer based on written sales terms, which is also when control is transferred. Revenues from sales of equipment are recorded upon completion of installation and transfer of control to the customer. Revenues from services are recorded when the services are performed.

In most of our PCC contracts, the price per ton is based upon the total number of tons sold to the customer during the year. Under those contracts, the price billed to the customer for shipments during the year is based on periodic estimates of the total annual volume that will be sold to the customer. Revenues are adjusted at the end of each year to reflect the actual volume sold. There were no significant revenue adjustments in the fourth quarter of 2020 and 2019, respectively. We have consignment arrangements with certain customers in our Refractories segment. Revenues for these transactions are recorded when the consigned products are consumed by the customer.

Revenues within our Energy Services segment is service based. Certain contracts within this segment are long-term contracts. Revenue where our performance obligations are satisfied in phases is recognized over time using certain input measures based on the measurement of the value transferred to the customer, including milestones achieved.

Foreign Currency

The assets and liabilities of the Company's international subsidiaries are translated into U.S. dollars using exchange rates at the respective balance sheet date. The resulting translation adjustments are recorded in accumulated other comprehensive income (loss) in shareholders' equity. Income statement items are generally translated at monthly average exchange rates prevailing during the period. International subsidiaries operating in highly inflationary economies translate non-monetary assets at historical rates, while net monetary assets are translated at current rates, with the resulting translation adjustments included in net income. At December 31, 2020, the Company had no international subsidiaries operating in highly inflationary economies.

Income Taxes

Deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates in effect for the year in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date.

The Company operates in multiple taxing jurisdictions, both within the U.S. and outside the U.S. In certain situations, a taxing authority may challenge positions that the Company has adopted in its income tax filings. The Company regularly assesses its tax position for such transactions and includes reserves for those differences in position. The reserves are utilized or reversed once the statute of limitations has expired or the matter is otherwise resolved.

The application of income tax law is inherently complex. Laws and regulations in this area are voluminous and are often ambiguous. As such, we are required to make many subjective assumptions and judgments regarding our income tax exposures. Interpretations of and guidance surrounding income tax laws and regulations change over time. As such, changes in our subjective assumptions and judgments can materially affect amounts recognized in the consolidated balance sheets and statements of operations. The Company's accounting policy is to recognize interest and penalties as part of its provision for income taxes. See Note 9 for additional detail on our uncertain tax positions.

The accompanying financial statements do not include a provision for foreign withholding taxes on international subsidiaries' unremitted earnings, which are expected to be permanently reinvested overseas.

Research and Development

Research and development costs are expensed as incurred.

Accounting for Stock-Based Compensation

The Company recognizes compensation expense for share-based awards based upon the grant date fair value over the vesting period.

Pension and Post-retirement Benefits

The Company has defined benefit pension plans covering the majority of its employees. The benefits are generally based on years of service and an employee's modified career earnings.

The Company also provides post-retirement healthcare benefits for the majority of its retirees and employees in the United States. The Company measures the costs of its obligation based on its best estimate. The net periodic costs are recognized as employees render the services necessary to earn the post-retirement benefits.

Environmental

Expenditures that relate to current operations are expensed or capitalized as appropriate. Expenditures that relate to an existing condition caused by past operations and which do not contribute to current or future revenue generation are expensed. Liabilities are recorded when it is probable the Company will be obligated to pay amounts for environmental site evaluation, remediation or related costs, and such amounts can be reasonably estimated.

Earnings Per Share

Basic earnings per share have been computed based upon the weighted average number of common shares outstanding during the period.

Diluted earnings per share have been computed based upon the weighted average number of common shares outstanding during the period assuming the issuance of common shares for all potentially dilutive common shares outstanding.

Subsequent Events

The Company has evaluated for subsequent events through the date of issuance of its financial statements.

Recently Issued Accounting Standards

Changes to accounting principles generally accepted in the United States of America (U.S. GAAP) are established by the Financial Accounting Standards Board (FASB) in the form of accounting standards updates (ASUs) to the FASB's Accounting Standards Codification. The Company considers the applicability and impact of all ASUs. ASUs not listed below were assessed and determined to be either not applicable or are expected to have minimal impact on our consolidated financial position and results of operations.

Investments - Equity Securities, Investments - Equity Method and Joint Ventures, and Derivatives and Hedging

In January 2020, the FASB issued ASU 2020-01, "Investments - Equity Securities, Investments - Equity Method and Joint Ventures, and Derivatives and Hedging", which addresses the accounting for the transition into and out of the equity method and measuring certain purchased options and forward contracts to acquire investments. The standard is effective for interim and annual periods beginning on or after December 15, 2020. The adoption of this standard is not expected to have a material impact on the Company's financial statements.

Adoption of ASU 2016-13 Measurement of Credit Losses on Financial Instrument

In June 2016, the FASB issued ASU 2016-13, "Measurement of Credit Losses on Financial Instruments", which replaces existing incurred loss impairment guidance and establishes a single allowance framework for financial assets carried at amortized cost. The Company adopted this guidance on January 1, 2020 using a modified retrospective transition method. The Company did not record a cumulative-effect adjustment upon adoption of this standard. Adoption of this standard did not have a material impact on the Company's consolidated financial statements.

Adoption of ASU 2018-14 Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans

In August 2018, the FASB issued ASU 2018-14, "Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans", which modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The Company adopted this guidance on January 1, 2020 on a retrospective basis and has updated the disclosures contained in Note 17. Other than the modification of certain disclosures, this guidance did not impact the Company's consolidated financial statements.

Note 2. COVID-19

In March 2020, the World Health Organization categorized the novel coronavirus (COVID-19) as a pandemic. Around the world, the Company has been closely adhering to all government regulations as they are issued. Applicable governmental directives across the United States and other global locations have typically permitted the continued operation of essential critical infrastructure sectors. As the Company supplies products and services to many essential industries, including critical manufacturing and energy sectors, all of our operations have qualified as essential businesses. Accordingly, all of the Company’s production facilities are currently operational. In a few locations, however, sites were temporarily impacted by the pandemic.

The economic environment related to the COVID-19 pandemic, which slowed business activity in several key end-markets, negatively impacted the Company’s results in 2020. The pandemic has affected and may continue to affect the demand for a number of our Performance Materials segment’s products and services. Paper consumption has been and may continue to be impacted, affecting sales in our Specialty Minerals segment. Global steel production has been and may continue to be affected by volatility in the market due to the pandemic, which could impact our Refractory segment. Oil and natural gas prices have been volatile as a result of the pandemic, and this could cause oil and natural gas companies to reduce their capital expenditures and production and exploration activities, serviced by our Energy Services segment.

The impacts of the COVID-19 pandemic may continue to impact our results during 2021. The extent to which our operations will be impacted by the pandemic will depend largely on future developments, including the continued severity of the pandemic and future actions by government authorities to contain it or treat its impact. These conditions are highly uncertain and cannot be accurately predicted. We will continue to actively monitor and respond to the evolving situation.

On March 27, 2020, the U.S. government enacted the Coronavirus Aid, Relief, and Economic Security Act (“CARES Act”) which includes modifications to the limitation on business interest expense and net operating loss provisions, and provides a payment delay of employer payroll taxes during 2020 after the date of enactment with 50% due by December 31, 2021 and the remaining 50% due by December 31, 2022. The CARES Act did not have a material impact on the Company’s consolidated financial statements.

Note 3. Leases

We determine if an arrangement is a lease at inception. The Company has operating leases for premises, equipment, rail cars and automobiles. Our leases have remaining lease terms of 1 year to 50 years, some of which may include options to extend the leases further. The Company considers these options in determining the lease term used to establish the right-of-use assets and lease liabilities. As most of our leases do not provide an implicit rate, we use our incremental borrowing rate based upon the information available at commencement date, or as of implementation of ASC 842, in determining the present value of lease payments.

Leases with an initial term of 12 months or less are not recorded on the balance sheet. We recognize lease expense for these leases on a straight-line basis over the lease term. Certain lease agreements contain both lease and non-lease components. We account for lease components together with non-lease components.

Operating lease cost was $15.3 million and $16.6 million for the years ended December 31, 2020 and December 31, 2019, respectively. The components of lease costs are as follows:

	December 31,	
(millions of dollars)	**2020**	**2019**
Operating lease cost	$ 15.2	$ 15.5
Short-term lease cost	0.1	1.1
Total	$ 15.3	$ 16.6

Supplemental cash flow information and non-cash activity related to our leases are as follows:

(millions of dollars)	December 31, 2020
Operating cash flows information:	
Cash paid for amounts included in the measurement of lease liabilities	$ 15.7
Non-cash activity:	
Right-of-use assets obtained in the exchange for operating lease liabilities	$ 18.1

Weighted average remaining lease term, and weighted average discount rates related to the Company’s leases were as follows:

Weighted-average remaining operating lease term (in years)	7.71
Weighted-average operating leases discount rate	5.0%

The following table summarizes the Company's outstanding lease assets and liabilities and their classification on the Consolidated Balance Sheet:

(millions of dollars)	Balance Sheet Classification	December 31, 2020	December 31, 2019
Right-of-use-asset	Other assets and deferred charges	$ 50.9	$ 44.8
Lease liability - current	Other current liabilities	11.7	11.9
Lease liability - non-current	Other non-current liabilities	49.2	43.3

Future minimum lease payments under the Company's leases as of December 31, 2020 were as follows:

(millions of dollars)	December 31, 2020
2021	$ 14.4
2022	12.1
2023	9.5
2024	7.6
2025	6.4
Thereafter	24.0
Total future minimum lease payments	74.0
Less imputed interest	(13.1)
Total	$ 60.9

A summary of rent expense for the fiscal year ended December 31, 2018 was as follows:

(millions of dollars)	December 31, 2018
Rent expense	$ 19.5

The Company has certain arrangements under which we are the lessor. Lease income associated with these leases is not material.

Note 4. Revenue from Contracts with Customers

The Company's revenues are primarily derived from the sale of products in product lines within our Performance Materials, Specialty Minerals, Refractories and Energy Services businesses. Our primary performance obligation (the sale of products) is satisfied upon shipment or delivery to our customers based on written sales terms, which is also when control is transferred. In most of our contracts in our Paper PCC product line, which is in our Specialty Minerals segment, the price per ton is based upon the total number of tons sold to the customer during the year. Under these contracts, the price billed to the customer for shipments during the year is based on periodic estimates of the total annual volume that will be sold to such customer. Revenues are adjusted at the end of each year to reflect the actual volume sold.

Revenue from sales of equipment, primarily in our Refractory products product line within our Refractories segment, is recorded upon completion of installation and control is transferred to the customer. Revenue from services is recorded when the services have been performed. Included within our Refractory products product line are certain consignment arrangements with certain customers in our Refractories segment. Revenues for these transactions are recorded when the consigned products are consumed by the customer and control is transferred.

Revenue from long-term construction, primarily in our Energy Services segment, where our performance obligations are satisfied in phases, is recognized over time using certain input measures based on the measurement of the value transferred to the customer, including milestones achieved.

The following table disaggregates our revenue by major source (product line) for the years ended December 31, 2020, 2019 and 2018:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Net Sales			
Metalcasting	$ 258.1	$ 291.2	$ 328.9
Household, Personal Care & Specialty Products	380.2	376.6	348.5
Environmental Products	58.6	86.6	80.3
Building Materials	55.9	68.9	70.4
Performance Materials	752.8	823.3	828.1
Paper PCC	308.4	364.9	378.5
Specialty PCC	69.3	69.1	66.9
Ground Calcium Carbonate	89.3	91.3	91.0
Talc	43.9	49.1	52.9
Specialty Minerals	510.9	574.4	589.3
Refractory Products	212.3	244.8	261.1
Metallurgical Products	45.8	53.3	50.8
Refractories	258.1	298.1	311.9
Energy Services	73.0	95.2	78.3
Total	$ 1,594.8	$ 1,791.0	$ 1,807.6

Note 5. Business Combination

On April 30, 2018, the Company completed the acquisition of Sivomatic Holding B.V. (“Sivomatic”), a leading European supplier of premium pet litter products. Sivomatic is a vertically integrated manufacturer, with production facilities in the Netherlands, Austria and Turkey. With a leading position in premier clumping products, Sivomatic’s product portfolio spans the range of pet litter derived from bentonite, sourced predominantly from wholly-owned mines in Turkey. The results of Sivomatic are included in our Performance Materials segment. Sivomatic sales of $61.8 million are included in the Company's consolidated results for the year ended December 31, 2018. The acquisition was financed through a combination of cash on hand and borrowings under the Company’s credit facilities. The fair value of the total consideration transferred, net of cash acquired, was $122.5 million.

The acquisition has been accounted for using the acquisition method of accounting, which requires, among other things, that we recognize the assets acquired and liabilities assumed at their respective fair values as of the acquisition date. As of April 30, 2019, the purchase price allocation has been finalized.

The Company used the income, market, or cost approach (or a combination thereof) for the preliminary valuation and used valuation inputs and analyses that were based on market participant assumptions. Market participants are considered to be buyers and sellers unrelated to the Company in the principal or most advantageous market for the asset or liability. For certain items, the carrying value was determined to be a reasonable approximation of fair value based on the information available.

Goodwill was calculated as the excess of the consideration transferred over the assets acquired and represents the estimated future economic benefits arising from other assets acquired that could not be individually identified and separately recognized. The allocation was completed during the second quarter of 2019. Goodwill recognized as a result of this acquisition is not deductible for tax purposes.

In connection with the acquisition, the Company recorded an additional deferred tax liability of $18.8 million with a corresponding increase to goodwill. The increase in deferred tax liability represents the tax effect of the difference between the estimated assigned fair value of the tangible and intangible assets and the tax basis of such assets.

Mineral rights were valued using discounted cash flow method. Plant, property and equipment were valued using the cost method adjusted for age and deterioration.

Intangible assets acquired mainly include tradenames and customer relationships. Both tradenames and customer relationships have an estimated useful life of approximately 20 years.

The Company did not present pro forma and other financial information for the Sivomatic acquisition, as this is not considered to be a material business combination.

Note 6. Restructuring and Other Items, net

During the third quarter of 2020, Domtar Corporation announced the permanent shut down of their previously idled paper machine at their mill in Ashdown, Arkansas. As a result, the Company recorded a non-cash asset write-down charge of $1.1 million for its Paper PCC satellite facility at this mill.

During the second quarter of 2020, Verso Papers announced they would be idling two of their paper mills indefinitely. As a result, the Company recorded a non-cash asset write-down charge of $6.0 million and $0.3 million in severance related costs for its Paper PCC satellite facilities at these mills. The Company also recorded lease termination costs at one of these closed mills.

During the second quarter of 2019, the Company initiated a restructuring and cost savings program to better align our costs and organizational structure with the current market environment. The Company recorded a $7.5 million non-cash asset write-down charge related to facilities and equipment no longer operating and deemed to be held for sale or discontinued and $5.7 million in other restructuring costs.

In 2018, the Company recorded non-cash asset write-down charges relating to the shut-down of one of its Paper PCC facilities in the U.S. in the first quarter of 2019 and additional restructuring costs relating to our exited Energy Services businesses.

The following table outlines the amount of restructuring charges recorded within the Consolidated Statements of Income and the segments they relate to:

Restructuring and Other Items, net	**Year Ended December 31,**		
(millions of dollars)	**2020**	**2019**	**2018**
Asset Write-Downs			
Performance Materials	$ —	$ 4.2	$ —
Specialty Minerals	7.1	1.6	0.7
Energy Services	—	1.7	—
Total asset write-down charges	$ 7.1	$ 7.5	$ 0.7
Severance and other employee costs			
Performance Materials	$ —	$ 2.8	$ —
Specialty Minerals	0.3	0.9	—
Refractories	—	0.8	—
Energy Services	—	0.1	1.8
Corporate	—	1.1	—
Total severance and other employee costs	$ 0.3	$ 5.7	$ 1.8
Other			
Specialty Minerals	$ 0.2	$ —	$ —
Total restructuring and other items, net	$ 7.6	$ 13.2	$ 2.5

At December 31, 2020 and 2019, the Company had $3.6 million and $5.0 million, respectively, included within other current liabilities within our Consolidated Balance Sheets for cash expenditures needed to satisfy remaining obligations under these reorganization initiatives. The Company expects to pay these amounts by the end of 2021.

The following table is a reconciliation of our restructuring liability balance as of December 31, 2020 and 2019:

	December 31,	
(millions of dollars)	**2020**	**2019**
Restructuring liability, beginning of period	$ 5.0	$ 2.5
Additional provisions	0.3	5.7
Cash payments	(1.6)	(3.2)
Other	(0.1)	—
Restructuring liability, end of period	$ 3.6	$ 5.0

Note 7. Stock-Based Compensation

At the Company’s 2020 Annual Meeting of Stockholders, the Company’s stockholders ratified the adoption of an amendment and restatement of the Company’s 2015 Stock Award and Incentive Plan (the “2015 Plan”), which provides for grants of incentive and non-qualified stock options, restricted stock, stock appreciation rights, stock awards or performance unit awards. This amendment and restatement increased the number of shares available for issuance pursuant to the 2015 Plan by 1,300,000 shares. The amendment and restatement also removed references to sections of the Internal Revenue Code that no longer apply, added a one-year minimum vesting requirement for all equity awards, subject to an exception of up to 5% of total shares available, and prohibited payment of dividends or dividend equivalents on unvested awards. Finally, the amendment and restatement also revised the definition of “change in control” in the 2015 Plan. The amendment and restatement of the Company’s 2015 Plan by the Company’s stockholders applies to all awards granted under the 2015 Plan after March 11, 2020; awards granted prior to such date are governed by the 2015 Plan as in effect prior to the adoption of such changes (or, for awards granted prior to May 2015, by the 2001 Stock Award and Incentive Plan, as amended and restated (together with the 2015 Plan, the "Plans")).

The Plans are administered by the Compensation Committee of the Board of Directors. Stock options granted under the Plans generally have a ten year term. The exercise price for stock options are at prices at or above the fair market value of the common stock on the date of the grant, and each award of stock options will vest ratably over a specified period, generally three years.

Stock-based compensation expense is recognized in the consolidated financial statements for stock options based on the grant date fair value.

Net income for years ended 2020, 2019 and 2018 include $4.6 million, $4.8 million and $4.2 million pre-tax compensation costs, respectively, related to stock option expense as a component of marketing and administrative expenses. All stock option expense is recognized in the consolidated statements of operations. The related tax benefit included in the statement of income on the non-qualified stock options was $1.2 million, $1.3 million and $1.1 million for 2020, 2019 and 2018, respectively.

Stock Options

The fair value of options granted is estimated on the date of grant using the Black-Scholes valuation model. Compensation expense is recognized only for those options expected to vest, with forfeitures estimated at the date of grant based on the Company's historical experience and future expectations. The forfeiture rate assumption used for the periods ended December 31, 2020, 2019 and 2018 was 8.45%, 8.85% and 8.20%, respectively.

The weighted average grant date fair value for stock options granted during the years ended December 31, 2020, 2019 and 2018 was $18.99, $18.86 and $25.79, respectively. The weighted average grant date fair value for stock options vested during 2020, 2019 and 2018 was $23.85, $22.46 and $21.33, respectively. The total intrinsic value of stock options exercised during the years ended December 31, 2020, 2019 and 2018 was $2.3 million, $2.2 million and $3.3 million, respectively.

The fair value for stock awards was estimated at the date of grant using the Black-Scholes option valuation model with the following weighted average assumptions for the years ended December 31, 2020, 2019 and 2018:

	Year Ended December 31,		
	2020	**2019**	**2018**
Expected life (in years)	6.7	6.6	6.2
Interest rate	1.67%	2.62%	2.50%
Volatility	30.34%	30.26%	30.33%
Expected dividend yield	0.35%	0.37%	0.26%

The expected term of the options represents the estimated period of time until exercised and is based on historical experience of similar awards, based upon contractual terms, vesting schedules, and expectations of future employee behavior. The expected stock-price volatility is based upon the historical and implied volatility of the Company's stock. The interest rate is based upon the implied yield on U.S. Treasury bills with an equivalent remaining term. Estimated dividend yield is based upon historical dividends paid by the Company.

The following table summarizes stock option activity for the year ended December 31, 2020:

	Awards	Weighted Average Exercise Price per Share	Weighted Average Remaining Contractual Life (Years)	Aggregate Intrinsic Value (Millions)
Awards outstanding at December 31, 2019	1,227,620	$ 55.83		
Granted	286,078	57.67		
Exercised	(93,099)	35.11		
Canceled	(57,233)	63.92		
Awards outstanding at December 31, 2020	1,363,366	$ 57.29	6.15	$ 11.4
Awards exercisable at December 31, 2020	876,206	$ 56.55	4.83	$ 8.9

The aggregate intrinsic value above is calculated before applicable income taxes, based on the Company's closing stock price of $62.12 as of the last business day of the period ended December 31, 2020 had all options been exercised on that date. The weighted average intrinsic value of the options exercised during 2020, 2019 and 2018 was $24.41, $27.21 and $33.10 per share, respectively. As of December 31, 2020, total unrecognized stock-based compensation expense related to non-vested stock options was approximately $4.7 million, which is expected to be recognized over a weighted average period of approximately three years.

The Company issues new shares of common stock upon the exercise of stock options.

Non-vested stock option activity for the year ended December 31, 2020 is as follows:

	Awards	Weighted Average Grant Date Fair Value per Share
Nonvested awards outstanding at December 31, 2019	438,773	$ 63.15
Granted	286,078	57.67
Vested	(199,723)	66.94
Canceled	(37,968)	60.15
Nonvested awards outstanding at December 31, 2020	487,160	$ 58.61

Restricted Stock

The Company has granted key employees rights to receive shares of the Company's common stock pursuant to the Plan. The rights will be deferred for a specified number of years of service, subject to restrictions on transfer and other conditions. Compensation expense for these shares is recognized over the vesting period. The Company granted 108,212 shares, 116,901 shares and 69,361 shares for the periods ended December 31, 2020, 2019 and 2018, respectively. The fair value was determined based on the market value of unrestricted shares. As of December 31, 2020, there was unrecognized stock-based compensation related to restricted stock of $6.4 million, which will be recognized over approximately the next three years. The compensation expense amortized with respect to all units was approximately $5.6 million, $5.2 million and $4.4 million for the periods ended December 31, 2020, 2019 and 2018, respectively. In addition, the Company recorded reversals of $2.3 million, $1.9 million and $2.4 million for periods ended December 31, 2020, 2019 and 2018, respectively, related mostly to the conversion of restricted stock for tax withholding purposes. Such costs and reversals are included in marketing and administrative expenses.

The following table summarizes the restricted stock activity for the Plan:

	Awards	Weighted Average Grant Date Fair Value per Share
Unvested balance at December 31, 2019	177,736	$ 62.40
Granted	108,212	56.93
Vested	(43,702)	66.07
Canceled	(40,261)	65.42
Unvested balance at December 31, 2020	201,985	$ 58.07

Note 8. Earnings Per Share (EPS)

	Year Ended December 31,		
(in millions, except per share data)	**2020**	**2019**	**2018**
Net income attributable to MTI	$ 112.4	$ 132.7	$ 169.0
Weighted average shares outstanding	34.2	35.0	35.3
Dilutive effect of stock options and stock units	—	0.1	0.3
Weighted average shares outstanding, adjusted	34.2	35.1	35.6
Basic earnings per share attributable to MTI	$ 3.29	$ 3.79	$ 4.79
Diluted earnings per share attributable to MTI	$ 3.29	$ 3.78	$ 4.75

Of the options outstanding of 1,363,366, 1,227,620 and 1,054,259 for the years ended December 31, 2020, 2019 and 2018, respectively, options to purchase 591,322 shares, 825,331 shares and 568,284 shares of common stock for the years ended December 31, 2020, 2019 and 2018, respectively, were not included in the computation of diluted earnings per share because they were anti-dilutive, as the exercise prices of the options were greater than the average market price of the common shares.

Note 9. Income Taxes

The U.S. Tax Cuts and Jobs Act (“U.S. Tax Reform”), enacted in December 2017, significantly changes U.S. corporate income tax laws by, among other things, reducing the U.S. corporate income tax rate to 21% starting in 2018 and creating a territorial tax system with a one-time mandatory tax on previously deferred foreign earnings of U.S. subsidiaries. Under U.S. GAAP (specifically, ASC Topic 740), the effects of changes in tax rates and laws on deferred tax balances are recognized in the period in which the new legislation is enacted.

During 2018, we recorded a benefit of $4.4 million as a measurement period adjustment to the one-time mandatory tax on previously deferred earnings of non-U.S. subsidiaries. The accounting for income tax effects of U.S. Tax Reform is complete based on additional tax regulations available as of December 31, 2018. Amounts recorded during 2018 and 2017, respectively, are reflected within the provision for income taxes in the Consolidated Statement of Income.

Additionally, U.S. Tax Reform subjects a U.S. shareholder to current tax on global intangible low-taxed income ("GILTI") earned by certain foreign subsidiaries. We have elected to not recognize deferred taxes for temporary differences until such differences reverse as GILTI in future years.

Income from operations before provision for taxes by domestic and foreign source is as follows:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Income from operations before income taxes and income from affiliates and joint ventures:			
Domestic	$ 21.4	$ 46.9	$ 93.1
Foreign	116.6	110.4	111.0
	$ 138.0	$ 157.3	$ 204.1

The provision (benefit) for taxes on income consists of the following:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Domestic			
Taxes currently payable			
Federal	$ (7.1)	$ (3.3)	$ (3.7)
State and local	0.2	0.8	1.4
Deferred income taxes	2.2	(6.6)	11.1
Domestic tax provision (benefit)	(4.7)	(9.1)	8.8
Foreign			
Taxes currently payable	34.0	26.7	21.3
Deferred income taxes	(4.9)	5.2	4.3
Foreign tax provision	29.1	31.9	25.6
Total tax provision (benefit)	$ 24.4	$ 22.8	$ 34.4

The provision (benefit) for taxes on income shown in the previous table is classified based on the location of the taxing authority, regardless of the location in which the taxable income is generated.

The major elements contributing to the difference between the U.S. federal statutory tax rate and the consolidated effective tax rate are as follows:

	Year Ended December 31,		
	2020	**2019**	**2018**
U.S. statutory rate	21.0%	21.0%	21.0%
Depletion	(6.2)%	(5.0)%	(3.9)%
Difference between tax provided on foreign earnings and the U.S. statutory rate	3.3%	3.8%	1.1%
Global Intangible Low-Tax Income (GILTI)	0.4%	—	0.8%
Foreign Derived Intangible Income	(1.0)%	(0.8)%	(0.7)%
State and local taxes, net of federal tax benefit	—	0.2%	1.9%
Tax credits and foreign dividends	(0.6)%	(0.7)%	(0.3)%
Change in valuation allowance	—	1.0%	—
Impact of uncertain tax positions	(0.2)%	(5.0)%	0.5%
Impact of officer's non-deductible compensation	1.0%	0.8%	0.8%
Impact of U.S. Tax Reform	—	(1.1)%	(2.2)%
Other	—	0.3%	(2.1)%
Consolidated effective tax rate	17.7%	14.5%	16.9%

The Company believes that its accrued liabilities are sufficient to cover its U.S. and foreign tax contingencies. The tax effects of temporary differences that give rise to significant portions of the deferred tax assets and deferred tax liabilities are presented below:

(millions of dollars)	December 31, 2020	December 31, 2019
Deferred tax assets attributable to:		
Accrued liabilities	$ 29.8	$ 29.7
Net operating loss carry forwards	31.1	33.9
Pension and post-retirement benefits costs	46.3	39.0
Other	28.2	31.4
Valuation allowance	(20.9)	(23.8)
Total deferred tax assets	114.5	110.2
Deferred tax liabilities attributable to:		
Plant and equipment, principally due to differences in depreciation	169.5	181.3
Intangible assets	69.5	69.5
Other	13.9	17.0
Total deferred tax liabilities	252.9	267.8
Net deferred tax asset (liability)	$ (138.4)	$ (157.6)

Net deferred tax assets and net deferred tax liabilities are as follows:

(millions of dollars)	December 31, 2020	December 31, 2019
Net deferred tax asset, long-term	$ 25.3	$ 23.0
Net deferred tax liability, long-term	163.7	180.6
Net deferred tax asset (liability), long-term	$ (138.4)	$ (157.6)

The Company has $31.1 million of deferred tax assets arising from tax loss carry forwards which will be realized through future operations. Carry forwards of approximately $17.6 million expire over the next 20 years, and $13.5 million can be utilized over an indefinite period.

On December 31, 2020, the Company had $7.6 million of total unrecognized tax benefits. Included in this amount were a total of $5.1 million of unrecognized income tax benefits that, if recognized, would affect the Company's effective tax rate. While it is expected that the amount of unrecognized tax benefits will change in the next 12 months, we do not expect the change to have a significant impact on the results of operations or the financial position of the Company.

The following table summarizes the activity related to our unrecognized tax benefits:

(millions of dollars)	2020	2019
Balance at beginning of the year	$ 7.9	$ 16.6
Increases related to current year tax positions	0.7	1.5
Increases related to new judgements	—	0.7
Decreases related to audit settlements and statue expirations	(1.0)	(10.9)
Balance at the end of the year	$ 7.6	$ 7.9

The Company's accounting policy is to recognize interest and penalties accrued, relating to unrecognized income tax benefits as part of its provision for income taxes. The Company recorded no interest and penalties during 2020 and had a total accrued balance on December 31, 2020 of $1.9 million.

The Company operates in multiple taxing jurisdictions, both within and outside the U.S. In certain situations, a taxing authority may challenge positions that the Company has adopted in its income tax filings. The Company, with a few exceptions (none of which are material), is no longer subject to U.S. federal, state, local, and international income tax examinations by tax authorities for years prior to 2010.

Net cash paid for income taxes were $28.5 million, $29.5 million and $43.8 million for the years ended December 31, 2020, 2019 and 2018, respectively.

The Company had approximately $460.1 million of foreign subsidiaries' undistributed earnings as of December 31, 2020. We intend to continue to permanently reinvest these earnings overseas for the foreseeable future and while U.S. federal tax expense as been recognized as a result of U.S. Tax Reform, no deferred tax liabilities with respect to foreign withholding taxes or state taxes have been recognized.

Note 10. Inventories

The following is a summary of inventories by major category:

	December 31,	
(millions of dollars)	**2020**	**2019**
Raw materials	$ 107.1	$ 105.9
Work-in-process	9.0	7.2
Finished goods	85.6	95.5
Packaging and supplies	46.5	44.7
Total inventories	$ 248.2	$ 253.3

Note 11. Property, Plant and Equipment

The major categories of property, plant and equipment and accumulated depreciation and depletion are presented below:

	December 31,	
(millions of dollars)	**2020**	**2019**
Mineral rights and reserves	$ 565.8	$ 571.0
Land	50.9	47.5
Buildings	225.6	218.1
Machinery and equipment	1,254.3	1,241.2
Furniture and fixtures and other	138.9	144.1
Construction in progress	41.4	35.1
	2,276.9	2,257.0
Less: accumulated depreciation and depletion	(1,237.3)	(1,204.2)
Property, plant and equipment, net	$ 1,039.6	$ 1,052.8

In the third quarter of 2020, the Company acquired the assets of a mining and hauling company in the western United States for $9.2 million to support our bentonite clay mining operations.

Depreciation and depletion expense for the years ended December 31, 2020, 2019 and 2018 was $77.9 million, $82.1 million and $80.7 million, respectively.

Note 12. Goodwill and Other Intangible Assets

Goodwill and other intangible assets with indefinite lives are not amortized, but instead are assessed for impairment, at least annually. The carrying amount of goodwill was $808.5 million and $807.4 million as of December 31, 2020 and December 31, 2019, respectively. The net change in goodwill since December 31, 2020 was primarily attributable to the effects of foreign exchange.

The balance of goodwill by segment and the activity occurring in the past two fiscal years is as follows:

(millions of dollars)	Performance Materials	Specialty Minerals	Refractories	Consolidated
Balance at December 31, 2018	$ 755.9	$ 12.3	$ 44.2	$ 812.4
Change in goodwill relating to:				
Foreign exchange translation	(4.7)	0.2	(0.5)	(5.0)
Total Changes	$ (4.7)	$ 0.2	$ (0.5)	$ (5.0)
Balance at December 31, 2019	$ 751.2	$ 12.5	$ 43.7	$ 807.4
Change in goodwill relating to:				
Foreign exchange translation	1.2	0.2	(0.3)	1.1
Total Changes	$ 1.2	$ 0.2	$ (0.3)	$ 1.1
Balance at December 31, 2020	$ 752.4	$ 12.7	$ 43.4	$ 808.5

Acquired intangible assets subject to amortization as of December 31, 2020 and December 31, 2019 were as follows:

		December 31, 2020		December 31, 2019	
	Weighted Average Useful Life (Years)	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Tradenames	35	$ 203.9	$ 38.6	$ 203.9	$ 32.5
Technology	13	18.8	9.6	18.8	8.0
Patents and trademarks	19	6.4	6.1	6.4	5.9
Customer relationships	22	26.9	5.9	24.7	4.4
	32	$ 256.0	$ 60.2	$ 253.8	$ 50.8

The weighted average amortization period of the acquired intangible assets subject to amortization is approximately 32 years. Amortization expense was approximately $9.3 million, $9.1 million and $8.8 million for the years ended December 31, 2020, 2019 and 2018, respectively and is recorded within the Marketing and administrative expenses line within the Consolidated Statements of Income. The estimated amortization expense is as follows: 2021 - $9.3 million; 2022 -$9.1; 2023 - $9.0; 2024 -$9.0 million; 2025 - $9.0 million and $150.4 million thereafter.

Note 13. Derivative Financial Instruments and Hedging Activities

As a multinational corporation with operations throughout the world, the Company is exposed to certain market risks. The Company uses a variety of practices to manage these market risks, including, when considered appropriate, derivative financial instruments. The Company's objective is to offset gains and losses resulting from interest rates and foreign currency exposures with gains and losses on the derivative contracts used to hedge them. The Company uses derivative financial instruments only for risk management and not for trading or speculative purposes.

By using derivative financial instruments to hedge exposures to changes in interest rates and foreign currencies, the Company exposes itself to credit risk and market risk. Credit risk is the risk that the counterparty will fail to perform under the terms of the derivative contract. When the fair value of a derivative contract is positive, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is negative, the Company owes the counterparty, and therefore, it does not face any credit risk. The Company minimizes the credit risk in derivative instruments by entering into transactions with major financial institutions.

Market risk is the adverse effect on the value of a financial instrument that results from a change in interest rates, currency exchange rates, or commodity prices. The market risk associated with interest rate and forward exchange contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

Cash Flow Hedges

For derivative instruments that are designated and qualify as cash flow hedges, the Company records the effective portion of the gain or loss in accumulated other comprehensive income (loss) as a separate component of shareholders' equity. The Company subsequently reclassifies the effective portion of gain or loss into earnings in the period during which the hedged transaction is recognized in earnings.

The Company utilizes interest rate swaps to limit exposure to market fluctuations on floating-rate debt. In the second quarter of 2018, the Company entered into a floating to fixed interest rate swap for a notional amount of $150 million. The fair value of this swap is a liability of $7.7 million at December 31, 2020 and is recorded in other non-current liabilities on the Consolidated Balance Sheet. In addition, in the second quarter of 2016, the Company entered into a floating to fixed interest rate swap for an initial aggregate notional amount of $300 million. The notional amount at December 31, 2020 was $29 million. The fair value of this swap is a liability of less than $0.1 million at December 31, 2020 and is recorded in other current liabilities on the Consolidated Balance Sheet. These interest rate swaps are designated as cash flow hedges. The gains and losses associated with these interest rate swaps are recorded in accumulated other comprehensive income (loss).

Net Investment Hedges

To protect the value of our investments in our foreign operations against adverse changes in foreign currency exchange rates, the Company from time to time hedges a portion of our net investment in one or more of our foreign subsidiaries. During the second quarter of 2018, the Company entered into a cross currency rate swap with a total notional value of $150 million to exchange monthly fixed-rate interest payments in U.S. dollars for monthly fixed-rate interest rate payments in Euros. This contract matures in May 2023 and requires the exchange of Euros and U.S. dollar principal payments upon maturity. The fair value of this swap is an asset of $0.4 million at December 31, 2020 and is recorded in other assets and deferred charges on the Consolidated Balance Sheet. Changes in the fair value of this instrument are recognized in accumulated other comprehensive income (loss) to offset the change in the carrying amount of the net investment being hedged. Amounts are reclassified out of accumulated other comprehensive income (loss) into earnings when the hedged net investment is either sold or substantially liquidated.

Other

The Company is exposed to potential gains or losses from foreign currency fluctuations affecting net investments and earnings denominated in foreign currencies. The Company is particularly sensitive to currency exchange rate fluctuations for the following currencies: British pound sterling (GBP), Chinese renminbi (CNY), Euro, Malaysian ringgit (MYR), Polish zloty (PLN), South African Rand (ZAR), Thai baht (THB) and Turkish lira (TRY). When considered appropriate, the Company enters into foreign exchange derivative contracts to mitigate the risk of fluctuations on these exposures. The Company does not designate these contracts for hedge accounting treatment and the changes in fair value of these contracts are recorded in earnings. The Company recorded losses (gains) of $0.2 million, $2.1 million and $(0.7) million in other non-operating income (deductions), net within the Consolidated Statements of Income for the years ended 2020, 2019 and 2018 respectively. There were no open contracts at December 31, 2020 and December 31, 2019.

Note 14. Fair Value of Financial Instruments

Fair value is an exchange price that would be received for an asset or paid to transfer a liability (exit price) in an orderly transaction between market participants at the measurement date. The Company utilizes market data or assumptions that market participants would use in pricing the asset or liability. The Company follows a three-tier fair value hierarchy, which prioritizes the inputs used in measuring fair value. These tiers include: Level 1, defined as observable inputs such as quoted prices in active markets; Level 2, defined as inputs other than quoted prices in active markets that are either directly or indirectly observable; and Level 3, defined as unobservable inputs about which little or no market data exists, therefore requiring an entity to develop its own assumptions.

Assets and liabilities measured at fair value are based on one or more of three valuation techniques. The three valuation techniques are as follows:

- Market approach – prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities.
- Cost approach – amount that would be required to replace the service capacity of an asset or replacement cost.
- Income approach – techniques to convert future amounts to a single present amount based on market expectations, including present value techniques, option-pricing and other models.

The Company primarily applies the income approach for foreign exchange derivatives for recurring fair value measurements and attempts to utilize valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs.

The following table sets forth by level within the fair value hierarchy the Company's financial assets and liabilities accounted for at fair value on a recurring basis at the end of each of the past two years. Assets and liabilities are classified in their entirety based on the lowest level of input that is significant to the fair value measurement. The Company's assessment of the significance of a particular input to the fair value measurement requires judgment and may affect the valuation of fair value assets and liabilities and their placement within the fair value hierarchy levels.

(millions of dollars)

		Fair Value Measurements Using		
Description	**Asset / (Liability) Balance at December 31, 2020**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Deferred compensation plan assets	$ 14.2	$ —	$ 14.2	$ —
Supplementary pension plan assets	15.0	—	15.0	—
Cross currency rate swap	0.4	—	0.4	—
Interest rate swaps	(7.6)	—	(7.6)	—

		Fair Value Measurements Using		
Description	**Asset / (Liability) Balance at December 31, 2019**	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Deferred compensation plan assets	$ 13.7	$ —	$ 13.7	$ —
Supplementary pension plan assets	12.8	—	12.8	—
Cross currency rate swap	10.2	—	10.2	—
Interest rate swaps	(5.9)	—	(5.9)	—

The fair value of foreign exchange contracts is determined based on inputs that are readily available in public markets or can be derived from information available in publicly quoted markets and are categorized as Level 2. Deferred compensation and supplementary pension plan assets related to the acquisition of AMCOL businesses and are valued using quoted prices for similar assets in active markets.

The Company does not have any financial assets or liabilities measured at fair value on a recurring basis categorized as Level 3, except for pension assets discussed in Note 17, and there were no transfers in or out of Level 3 during the year ended December 31, 2020 and 2019. There were also no changes to the Company's valuation techniques used to measure asset and liability fair values on a recurring basis.

Note 15. Financial Instruments and Concentrations of Credit Risk

The following methods and assumptions were used to estimate the fair value of each class of financial instrument:

Cash and cash equivalents, short-term investments, accounts receivable and payable: The carrying amounts approximate fair value because of the short maturities of these instruments.

Short-term debt and other liabilities: The carrying amounts of short-term debt and other liabilities approximate fair value because of the short maturities of these instruments.

Long-term debt: The fair value of the long-term debt of the Company is estimated based on the quoted market prices for that debt or similar debt and approximates the carrying amount.

Forward exchange contracts: The fair value of forward exchange contracts (used for hedging purposes) is based on information derived from active markets. If appropriate, the Company would enter into forward exchange contracts to mitigate the impact of foreign exchange rate movements on the Company's operating results. It does not engage in speculation. Such foreign exchange contracts would offset losses and gains on the assets, liabilities and transactions being hedged.

Credit risk: The Company provides credit to customers in the ordinary course of business. The Company’s customer base is diverse and includes customers located throughout the world. Credit risk results from the possibility that a loss may occur from the failure of another party to perform according to the terms of the contracts. The Company regularly monitors its credit risk exposures and takes steps to mitigate the likelihood of these exposures resulting in an actual loss. The Company's extension of credit is based on an evaluation of the customer's financial condition and collateral is generally not required.

The Company's bad debt expense for the years ended December 31, 2020, 2019 and 2018 was $2.6 million, $6.3 million and $3.2 million, respectively.

Note 16. Long-Term Debt and Commitments

The following is a summary of long-term debt:

	December 31,			
(millions of dollars)	**2020**		**2019**	
Term Loan Facility- Variable Tranche due February 14, 2024, net of unamortized discount and deferred financing costs of $12.4 million and $16.0 million	$	535.6	$	642.0
Senior Notes due 2028, net of unamortized deferred financing costs of $6.1 million		393.9		—
Term Loan Facility- Fixed Tranche due May 9, 2021, net of unamortized discount and deferred financing costs of $— million and $0.2 million	$	—	$	177.8
Netherlands Term Loan due 2020		—		1.1
Netherlands Term Loan due 2022		0.6		1.0
Japan Loan Facilities		4.1		4.5
Total	$	934.2	$	826.4
Less: Current maturities		1.0		2.1
Long-term debt	$	933.2	$	824.3

On May 9, 2014, in connection with the acquisition of AMCOL International Corporation (“AMCOL”), the Company entered into a credit agreement providing for a $1,560 million senior secured term loan facility (the “Term Facility”) and a $200 million senior secured revolving credit facility (the “Revolving Facility” and, together with the Term Facility, the “Facilities”).

On June 23, 2015, the Company entered into an amendment (the “First Amendment”) to the credit agreement to reprice the $1.378 billion then outstanding on the Term Facility. As amended, the Term Facility had a $1.078 billion floating rate tranche and a $300 million fixed rate tranche. On February 14, 2017, the Company entered into an amendment (the “Second Amendment”) to the credit agreement to reprice the $788 million floating rate tranche then outstanding, which extended the maturity and lowered the interest costs by 75 basis points. On April 18, 2018, the Company entered into an amendment (the “Third Amendment”) to the credit agreement to refinance its then existing senior secured revolving credit facility. In connection with the Third Amendment, the existing senior secured revolving credit facility was replaced with a new revolving credit facility with $300 million of aggregate commitments (the "Revolving Credit Facility" and, together with the Term Facility, the "Senior Secured Credit Facilities"). Following the amendments, the loans outstanding under the floating rate tranche of the Term Facility are scheduled to mature on February 14, 2024, and the loans outstanding (if any) and commitments under the Revolving Facility will mature and terminate, as the case may be, on April 18, 2023. Loans under the fixed rate tranche of the Term Facility were repaid in full in June 2020. Loans under the floating rate tranche of the Term Facility bear interest at a rate equal to an adjusted LIBOR rate (subject to a floor of 0.75%) plus an applicable margin equal to 2.25% per annum. Loans under the Revolving Facility bear interest at a rate equal to an adjusted LIBOR rate plus an applicable margin equal to 1.625% per annum. Such rates are subject to decrease by up to 25 basis points in the event that, and for so long as, the Company’s net leverage ratio (as defined in the credit agreement) is less than certain thresholds. The variable rate tranche has a 1% required amortization per year. The Company will pay certain fees under the credit agreement, including customary annual administration fees. The obligations of the Company under the Senior Secured Credit Facilities are unconditionally guaranteed jointly and severally by, subject to certain exceptions, all material domestic subsidiaries of the Company (the “Guarantors”) and secured, subject to certain exceptions, by a security interest in substantially all of the assets of the Company and the Guarantors.

The credit agreement contains certain customary affirmative and negative covenants that limit or restrict the ability of the Company and its restricted subsidiaries to enter into certain transactions or take certain actions. In addition, the credit agreement contains a financial covenant that requires the Company, if on the last day of any fiscal quarter loans or letters of credit were outstanding under the Revolving Facility (excluding up to $25 million of letters of credit), to maintain a maximum net leverage ratio (as defined in the credit agreement) of 3.50 to 1.00 for the four fiscal quarter period preceding such day. As of December 31, 2020, there were no outstanding loans and $9.5 million in letters of credit outstanding under the Revolving Facility. The Company is in compliance with all the covenants associated with the Revolving Facility as of the end of the period covered by this report.

On June 30, 2020, the Company issued $400 million aggregate principal amount of 5.0% Senior Notes due 2028 (the "Notes"). The Notes were issued pursuant to an indenture, dated as of June 30, 2020, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee. The Company used the net proceeds of its offering of the Notes to repay all of its outstanding loans under the fixed rate tranche of the Term Facility, repay all of its outstanding borrowings under its Revolving Credit Facility, and the remainder for general corporate purposes.

The Notes bear an interest rate of 5.0% per annum payable semi-annually on January 1 and July 1 of each year, beginning on January 1, 2021. The Notes are unconditionally guaranteed on a senior unsecured basis by each of the Company's existing and future wholly owned domestic restricted subsidiaries that is a borrower under or that guarantees the Company's obligations under its Senior Secured Credit Facilities or that guarantees the Company's or any of the Company's wholly owned domestic subsidiaries' long-term indebtedness in an aggregate amount in excess of $50 million.

At any time and from time to time prior to July 1, 2023, the Company may redeem some or all of the Notes for cash at a redemption price equal to 100% of their principal amount, plus the “make-whole” premium described in the Indenture and accrued and unpaid interest, if any, to, but excluding, the applicable redemption date. Beginning on July 1, 2023, the Company may redeem some or all of the Notes at any time and from time to time at the applicable redemption prices listed in the Indenture, plus accrued and unpaid interest, if any, to, but excluding, the applicable redemption date. In addition, at any time and from time to time prior to July 1, 2023, the Company may redeem up to 40% of the aggregate principal amount of the Notes with funds from one or more equity offerings at a redemption price equal to 105% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but excluding, the applicable redemption date.

If the Company experiences a change of control (as defined in the indenture), the Company is required to offer to repurchase the Notes at 101% of the principal amount of such Notes, plus accrued and unpaid interest, if any, to, but excluding, the date of repurchase.

The indenture contains certain customary affirmative and negative covenants that limit or restrict the ability of the Company and its restricted subsidiaries to enter into certain transactions or take certain actions, as well as customary events of default.

During 2020, the Company repaid $288 million on its Term Facility.

As part of the Sivomatic acquisition, the Company assumed $10.7 million in long-term debt, recorded at fair value, consisting of two term loans, one of which matured in the third quarter of 2020 and the other of which matures in 2022. These loans carry an interest rate of Euribor plus 2.0% and have quarterly repayments. During 2020, the Company repaid $1.5 million on these loans.

The Company has a committed loan facility in Japan. As of December 31, 2020, there was an outstanding balance of $4.1 million on this facility. Principal will be repaid in accordance with the payment schedules ending in 2021. The Company repaid $0.6 million on this loan in 2020.

As of December 31, 2020, the Company had $25.6 million in uncommitted short-term bank credit lines, none of which were in use.

There were no short-term borrowings as of December 21, 2020 and there were $101.2 million in short-term borrowings as of December 31, 2019. The weighted average interest rate on short-term borrowings outstanding as December 31, 2019 was 3.9%.

The aggregate maturities of long-term debt are as follows: $4.5 million in 2021; $0.2 million in 2022; $— million in 2023, $548.0 million in 2024; $0.0 million in 2025 and $400.0 million thereafter.

During 2020, 2019 and 2018, respectively, the Company incurred interest costs of $40.7 million, $46.0 million and $48.6 million, including $0.6 million, $0.6 million and $0.5 million, respectively, which were capitalized. Interest paid approximated the incurred interest cost.

Note 17. Benefit Plans

Pension Plans and Other Postretirement Benefit Plans

The Company and its subsidiaries have pension plans covering the majority of eligible employees on a contributory or non-contributory basis. Benefits under defined benefit plans are generally based on years of service and an employee's career earnings. Employees generally become fully vested after five years.

The Company also provides postretirement health care and life insurance benefits for the majority of its U.S. retired employees. Employees are generally eligible for benefits upon retirement and completion of a specified number of years of creditable service. The Company does not pre-fund these benefits and has the right to modify or terminate the plan in the future.

The Company’s disclosures for the U.S. plans have been combined with those outside of the U.S. as the international plans do not have significantly different assumptions, and together represent less than 22% of our total benefit obligation.

The following table set forth Company's pension obligation and funded status at December 31:

	Pension Benefits		Post-Retirement Benefits	
(millions of dollars)	**2020**	**2019**	**2020**	**2019**
Change in benefit obligations:				
Beginning projected benefit obligation	$ 484.4	$ 416.3	$ 5.9	$ 5.7
Service cost	7.7	6.8	0.2	0.2
Interest cost	10.5	14.0	0.2	0.2
Actuarial (gain)/loss	56.5	63.9	(1.3)	0.3
Benefits paid	(12.3)	(18.6)	(0.4)	(0.5)
Settlements	(18.4)	(0.5)	—	—
Foreign exchange impact	5.5	2.1	—	—
Other	0.4	0.4	—	—
Ending projected benefit obligation	534.3	484.4	4.6	5.9
Change in plan assets:				
Beginning fair value	340.0	296.7	—	—
Actual return on plan assets	31.1	52.4	—	—
Employer contributions	11.8	7.7	0.4	0.5
Plan participants' contributions	0.3	0.4	—	—
Benefits paid	(12.2)	(18.6)	(0.4)	(0.5)
Settlements	(16.9)	(0.2)	—	—
Foreign exchange impact	4.1	1.6	—	—
Ending fair value	358.2	340.0	—	—
Funded status of the plan	$ (176.1)	$ (144.4)	$ (4.6)	$ (5.9)

Amounts recognized in the consolidated balance sheet consist of:

	Pension Benefits		Post-Retirement Benefits	
(millions of dollars)	**2020**	**2019**	**2020**	**2019**
Current liability	$ (1.4)	$ (1.1)	$ (0.3)	$ (0.4)
Non-current liability	(174.7)	(143.3)	(4.3)	(5.5)
Recognized liability	$ (176.1)	$ (144.4)	$ (4.6)	$ (5.9)

The current portion of pension liabilities is included in accrued compensation and related items.

Amounts recognized in accumulated other comprehensive income, net of related tax effects, consist of:

	Pension Benefits		Post-Retirement Benefits	
(millions of dollars)	**2020**	**2019**	**2020**	**2019**
Net actuarial (gain) loss	$ 119.0	$ 99.6	$ (4.2)	$ (3.7)
Prior service cost	0.1	0.1	—	—
Amount recognized end of year	$ 119.1	$ 99.7	$ (4.2)	$ (3.7)

The accumulated benefit obligation for all defined benefit pension plans was $501.7 million and $450.5 million at December 31, 2020 and 2019, respectively. The increase in MTI's pension obligation for 2020 is primarily attributable to the decrease in the discount rate. The accumulated benefit obligations and projected benefit obligations are in excess of the plan assets for each of the Company's defined benefit plans.

Changes in the Plan assets and benefit obligations recognized in other comprehensive income:

	Pension Benefits		Post-Retirement Benefits	
(millions of dollars)	**2020**	**2019**	**2020**	**2019**
Current year actuarial gain (loss)	$ (29.6)	$ (23.0)	$ 0.9	$ (0.2)
Amortization of actuarial (gain) loss	10.5	7.7	(0.5)	(0.6)
Amortization of prior service credit (gain) loss	—	—	—	—
Total recognized in other comprehensive income	$ (19.1)	$ (15.3)	$ 0.4	$ (0.8)

The components of net periodic benefit costs are as follows:

	Pension Benefits			Post-Retirement Benefits		
(millions of dollars)	**2020**	**2019**	**2018**	**2020**	**2019**	**2018**
Service cost	$ 7.7	$ 6.8	$ 8.1	$ 0.2	$ 0.2	$ 0.2
Interest cost	10.5	14.0	13.0	0.2	0.2	0.2
Expected return on plan assets	(20.1)	(18.2)	(20.2)	—	—	—
Amortization of prior service cost	—	—	—	—	—	(0.9)
Recognized net actuarial (gain) loss	13.9	10.1	10.7	(0.9)	(0.9)	(0.8)
Settlement/curtailment (gain) loss	6.4	(0.1)	4.4	—	—	—
Net periodic benefit cost	$ 18.4	$ 12.6	$ 16.0	$ (0.5)	$ (0.5)	$ (1.3)

Unrecognized prior service cost is amortized over the average remaining service period of each active employee.

The Company's funding policy for U.S. plans generally is to contribute annually into trust funds at a rate that provides for future plan benefits and maintains appropriate funded percentages. Annual contributions to the U.S. qualified plans are at least sufficient to satisfy regulatory funding standards and are not more than the maximum amount deductible for income tax purposes. The funding policies for the international plans conform to local governmental and tax requirements. The plans' assets are invested primarily in stocks and bonds.

Additional Information

The weighted average assumptions used to determine net periodic benefit cost in the accounting for the pension benefit plans and other benefit plans for the years ended December 31, 2020, 2019 and 2018 are as follows:

	Year Ended December 31,		
	2020	**2019**	**2018**
Discount rate	2.74%	3.75%	3.16%
Expected return on plan assets	6.32%	6.43%	6.40%
Rate of compensation increase	2.72%	3.01%	3.01%
Interest crediting rate	3.75%	2.57%	3.70%

The weighted average assumptions used to determine benefit obligations for the pension benefit plans and other benefit plans at December 31, 2020, 2019 and 2018 are as follows:

	Year Ended December 31,		
	2020	2019	2018
Discount rate	2.01%	2.75%	3.75%
Rate of compensation increase	2.98%	2.99%	3.01%

For 2020, 2019 and 2018, the discount rate was based on a Citigroup yield curve of high quality corporate bonds with cash flows matching our plans' expected benefit payments. The expected return on plan assets is based on our asset allocation mix and our historical return, taking into account current and expected market conditions. The actual return/(loss) on pension assets was approximately 9% in 2020, 15% in 2019 and (5)% in 2018.

The Company maintains a self-funded health insurance plan for its retirees. This plan provided that the maximum health care cost trend rate would be 5%. Effective June 2010, the Company amended its plan to change the eligibility requirement for retirees and revised its plan so that increases in expected health care costs would be borne by the retiree.

Plan Assets

The Company's pension plan weighted average asset allocation percentages at December 31, 2020 and 2019 by asset category are as follows:

	December 31,	
	2020	2019
Asset Category		
Equity securities	55.8%	55.1%
Fixed income securities	27.8%	29.1%
Real estate	0.3%	0.3%
Other	16.1%	15.5%
Total	100.0%	100.0%

The Company's pension plan fair values at December 31, 2020 and 2019 by asset category are as follows:

	December 31,	
(millions of dollars)	2020	2019
Asset Category		
Equity securities	$ 200.0	$ 187.5
Fixed income securities	99.7	98.8
Real estate	1.0	0.9
Other	57.5	52.8
Total	$ 358.2	$ 340.0

The following table presents domestic and foreign pension plan assets information at December 31, 2020, 2019 and 2018 (the measurement date of pension plan assets):

	U.S. Plans			International Plans		
(millions of dollars)	2020	2019	2018	2020	2019	2018
Fair value of plan assets	$ 271.6	$ 261.5	$ 227.1	$ 86.6	$ 78.5	$ 69.6

The following table summarizes our defined benefit pension plan assets measured at fair value as of December 31, 2020:

(millions of dollars)	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Pension Assets Fair Value as of December 31, 2020				
Equity securities				
US equities	$ 182.0	$ —	$ —	$ 182.0
Non-US equities	18.0	—	—	18.0
Fixed income securities				
Corporate debt instruments	80.4	19.3	—	99.7
Real estate and other				
Real estate	—	—	1.0	1.0
Other	0.3	49.9	7.3	57.5
Total assets	$ 280.7	$ 69.2	$ 8.3	$ 358.2

The following table summarizes our defined benefit pension plan assets measured at fair value as of December 31, 2019:

(millions of dollars)	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Pension Assets Fair Value as of December 31, 2019				
Equity securities				
US equities	$ 169.7	$ —	$ —	$ 169.7
Non-US equities	17.8	—	—	17.8
Fixed income securities				
Corporate debt instruments	82.6	16.2	—	98.8
Real estate and other				
Real estate	—	—	0.9	0.9
Other	0.4	45.4	7.0	52.8
Total assets	$ 270.5	$ 61.6	$ 7.9	$ 340.0

U.S. equities – This class included actively and passively managed common equity securities comprised primarily of large-capitalization stocks with value, core and growth strategies.

Non-U.S. equities – This class included actively managed common equity securities comprised primarily of international large-capitalization stocks.

Fixed income – This class included debt instruments issued by the US Treasury, and corporate debt instruments.

Real Estate and other – This class includes assets related to real estate and other assets such as insurance contracts.

Asset classified as Level 1 are valued using quoted prices on major stock exchange on which individual assets are traded. Our Level 2 assets are valued using net asset value. The net asset value is quoted on a private market that is not active; however, the unit price is based on the underlying investments that are traded on an active market. Our Level 3 assets are estimated at fair value based on the most recent financial information available for the underlying securities, which are not traded on active market, and represents significant unobservable input.

The following is a reconciliation of changes in fair value measurement of plan assets using significant unobservable inputs (Level 3):

(millions of dollars)		
Beginning balance at December 31, 2018	$	20.0
Purchases, sales, settlements		—
Actual return on plan assets still held at reporting date		0.9
Foreign exchange impact		0.1
Ending balance at December 31, 2019	$	21.0
Purchases, sales, settlements		—
Actual return on plan assets still held at reporting date		(12.8)
Foreign exchange impact		0.1
Ending balance at December 31, 2020	$	8.3

There were no transfers in or out of Level 3 during the year ended December 31, 2020 and 2019.

Contributions

The Company expects to contribute $11.3 million to its pension plans and $0.3 million to its other post-retirement benefit plan in 2021.

Estimated Future Benefit Payments

The following benefit payments, which reflect expected future service, as appropriate, are expected to be paid:

(millions of dollars)		Pension Benefits		Other Benefits
2021	$	24.0	$	0.3
2022	$	25.2	$	0.3
2023	$	27.3	$	0.3
2024	$	27.1	$	0.3
2025	$	26.7	$	0.3
2026-2030	$	133.4	$	1.7

Investment Strategies

The investment strategy for pension plan assets is to maintain a broadly diversified portfolio designed to both preserve and grow plan assets to meet future plan obligations. The Company's average rate of return on assets from inception through December 31, 2020 was approximately 9%. The Company’s assets are strategically allocated among equity, debt and other investments to achieve a diversification level that dampens fluctuations in investment returns. The Company’s long-term investment strategy is an investment portfolio mix of approximately 55%-65% in equity securities, 30%-35% in fixed income securities and 0%-15% in other securities.

Savings and Investment Plans

The Company maintains a voluntary Savings and Investment Plan (a 401(k) plan) for most non-union employees in the U.S. Within prescribed limits, the Company bases its contribution to the Savings and Investment Plan on employee contributions. The Company's contributions amounted to $5.2 million, $5.4 million and $5.4 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Note 18. Contingencies

The Company is party to a number of lawsuits arising in the normal course of our business. Certain of the Company's subsidiaries are among numerous defendants in a number of cases seeking damages for exposure to silica or to asbestos containing materials. Most of these claims do not provide adequate information to assess their merits, the likelihood that the Company will be found liable, or the magnitude of such liability, if any. We are unable to state an amount or range of amounts claimed in any of the lawsuits because state court pleading practices do not require identifying the amount of the claimed damage. The aggregate cost to the Company for the legal defense of these cases since inception continues to be insignificant. The majority of the costs of defense for these cases, excluding cases against our subsidiaries AMCOL International Corporation or American Colloid Company, which we acquired in 2014, are reimbursed by Pfizer Inc. pursuant to the terms of certain agreements entered into in connection with the Company's initial public offering in 1992. The Company is entitled to indemnification, pursuant to agreement, for liabilities related to sales prior to the initial public offering. The Company has settled only one silica lawsuit, for a nominal amount, and no asbestos lawsuits to date (not including any that may have been settled by AMCOL or American Colloid prior to completion of the acquisition). At this time, management anticipates that the amount of the Company's liability, if any, and the cost of defending such claims, will not have a material effect on its financial position or results of operations.

The Company and its subsidiaries are not party to any other material pending legal proceedings, other than routine litigation incidental to their businesses.

Note 19. Stockholders' Equity

Capital Stock

The Company's authorized capital stock consists of 100 million shares of common stock, par value $0.10 per share, of which 33,882,187 shares and 34,544,307 shares were outstanding at December 31, 2020 and 2019, respectively, and 1,000,000 shares of preferred stock, none of which were issued and outstanding.

Cash Dividends

Cash dividends of $6.8 million or $0.20 per common share were paid during 2020. In January 2021, a cash dividend of approximately $1.7 million or $0.05 per share, was declared, payable in the first quarter of 2021.

Stock Award and Incentive Plan

At the Company's 2020 Annual Meeting of Stockholders, the Company's stockholders ratified the adoption of an amendment and restatement of the Company's 2015 Stock Award and Incentive Plan (the "2015 Plan"), which provides for grants of incentive and non-qualified stock options, restricted stock, stock appreciation rights, stock awards or performance unit awards. This amendment and restatement increased the number of shares available for issuance pursuant to the 2015 Plan by 1,300,000 shares. The amendment and restatement also removed references to sections of the Internal Revenue Code that no longer apply, added a one-year minimum vesting requirement for all equity awards, subject to an exception of up to 5% of total shares available, and prohibited payment of dividends or dividend equivalents on unvested awards. Finally, the amendment and restatement also revised the definition of "change in control" in the 2015 Plan. The amendment and restatement of the Company's 2015 Plan by the Company's stockholders applies to all awards granted under the 2015 Plan after March 11, 2020; awards granted prior to such date are governed by the 2015 Plan as in effect prior to the adoption of such changes (or, for awards granted prior to May 2015, by the 2001 Stock Award and Incentive Plan, as amended and restated (together with the 2015 Plan, the "Plans")).

The Plans are administered by the Compensation Committee of the Board of Directors. Stock options granted under the Plans generally have a ten year term. The exercise price for stock options are at prices at or above the fair market value of the common stock on the date of the grant, and each award of stock options will vest ratably over a specified period, generally three years.

The following table summarizes stock option and restricted stock activity for the Plans:

		Stock Options		Restricted Shares	
	Shares Available for Grant	Shares	Weighted Average Exercise Price per Share ($)	Shares	Weighted Average Exercise Price per Share ($)
Balance January 1, 2018	1,036,505	996,839	$ 48.21	180,110	$ 58.57
Granted	(260,508)	191,147	76.09	69,361	76.26
Exercised/vested	—	(98,945)	33.83	(59,649)	56.44
Canceled	90,026	(34,782)	65.47	(55,244)	58.57
Balance December 31, 2018	866,023	1,054,259	54.04	134,578	68.64
Granted	(388,162)	271,261	54.44	116,901	54.51
Exercised/vested	—	(79,686)	27.26	(40,776)	60.79
Canceled	51,181	(18,214)	66.93	(32,967)	61.87
Balance December 31, 2019	529,042	1,227,620	55.83	177,736	62.40
Authorized	1,300,000	—	—	—	—
Granted	(394,290)	286,078	57.67	108,212	56.93
Exercised/vested	—	(93,099)	35.11	(43,702)	66.07
Canceled	97,494	(57,233)	63.92	(40,261)	65.42
Balance December 31, 2020	1,532,246	1,363,366	$ 57.29	201,985	$ 58.07

Note 20. Accumulated Other Comprehensive Income (Loss)

Accumulated other comprehensive income (loss) at December 31 comprised of the following components:

	December 31,	
(millions of dollars)	**2020**	**2019**
Cumulative foreign currency translation	$ (190.8)	$ (200.2)
Unrecognized pension costs (net of tax benefit of $64.6 in 2020 and $30.5 in 2019)	(114.9)	(96.1)
Unrealized gain (loss) on cash flow hedges (net of tax (benefit) expense of $(3.1) in 2020 and $0.3 in 2019)	(2.6)	5.9
	$ (308.3)	$ (290.4)

The following table summarizes the changes in other comprehensive income (loss) by component:

	Year Ended December 31,								
	2020			2019			2018		
(millions of dollars)	Pre-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount	Pre-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount	Pre-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount
Foreign currency translation adjustment	$ 10.9	$ —	$ 10.9	$ (29.9)	$ —	$ (29.9)	$ (67.9)	$ —	$ (67.9)
Pension plans:									
Net actuarial gains (losses) and prior service costs arising during the period	(37.9)	9.2	(28.7)	(30.6)	7.4	(23.2)	9.6	(1.8)	7.8
Amortization of net actuarial (gains) losses and prior service costs	13.4	(3.4)	10.0	9.4	(2.3)	7.1	12.1	(3.0)	9.1
Unrealized gains (losses) on cash flow hedges	(11.6)	3.1	(8.5)	0.3	(0.1)	0.2	1.5	0.1	1.6
Total other comprehensive income (loss)	$ (25.2)	$ 8.9	$ (16.3)	$ (50.8)	$ 5.0	$ (45.8)	$ (44.7)	$ (4.7)	$ (49.4)

The pre-tax amortization amounts of pension plans in the table above are included within the components of net periodic pension benefit costs (see Note 17) and the related tax amounts are included within provision (benefit) for taxes on income line within Consolidated Statements of Income.

Note 21. Accounting for Asset Retirement Obligations

The Company records asset retirement obligations in which the Company will be required to retire tangible long-lived assets. These are primarily related to its PCC satellite facilities and mining operations. The Company has also recorded the provisions related to conditional asset retirement obligations at its facilities. The Company has recorded asset retirement obligations at all of its facilities except where there are no contractual or legal obligations. The associated asset retirement costs are capitalized as part of the carrying amount of the long-lived asset.

The following is a reconciliation of asset retirement obligations as of December 31, 2020 and 2019:

	December 31,	
(millions of dollars)	**2020**	**2019**
Asset retirement obligation, beginning of period	$ 23.9	$ 23.4
Accretion expense	2.3	2.7
Other	1.1	1.1
Payments	(3.4)	(3.3)
Foreign currency translation	0.2	—
Asset retirement obligation, end of period	$ 24.1	$ 23.9

The Company mines various minerals using a surface mining process that requires the removal of overburden. In certain areas and under various governmental regulations, the Company is obligated to restore the land comprising each mining site to its original condition at the completion of the mining activity. This liability will be adjusted to reflect the passage of time, mining activities, and changes in estimated future cash outflows.

The current portion of the liability of approximately $0.4 million is included in other current liabilities and the long-term portion of the liability of approximately $23.7 million is included in other non-current liabilities in the Consolidated Balance Sheet as of December 31, 2020.

Accretion expense is included in cost of goods sold in the Company's Consolidated Statements of Income.

Note 22. Segment and Related Information

The Company determines its operating segments based on the discrete financial information that is regularly evaluated by its chief operating decision maker, our Chief Executive Officer, in deciding how to allocate resources and in assessing performance. The Company's operating segments are strategic business units that offer different products and serve different markets. They are managed separately and require different technology and marketing strategies.

The Company has four reportable segments: Performance Materials, Specialty Minerals, Refractories and Energy Services.

- The Performance Materials segment is a leading global supplier of bentonite and bentonite-related products, chromite and leonardite. This segment also provides products for non-residential construction, environmental and infrastructure projects worldwide, serving customers engaged in a broad range of construction projects.

- The Specialty Minerals segment produces and sells the synthetic mineral product precipitated calcium carbonate ("PCC") and processed mineral product quicklime ("lime"), and mines mineral ores then processes and sells natural mineral products, primarily limestone and talc.

- The Refractories segment produces and markets monolithic and shaped refractory materials and specialty products, services and application and measurement equipment, and calcium metal and metallurgical wire products.

- The Energy Services segment provides services to improve the production, costs, compliance, and environmental impact of activities performed in the oil and gas industry. This segment offers a range of services for offshore filtration and well testing to the worldwide oil and gas industry.

The accounting policies of the segments are the same as those described in the summary of significant accounting policies. The Company evaluates performance based on the operating income of the respective business units. The costs deducted to arrive at operating profit do not include several items, such as net interest or income tax expense. Depreciation expense related to corporate assets is allocated to the business segments and is included in their income from operations. However, such corporate depreciable assets are not included in the segment assets. Intersegment sales and transfers are not significant.

Segment information for the years ended December 31, 2020, 2019 and 2018 was as follows:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Net Sales			
Performance Materials	$ 752.8	$ 823.3	$ 828.1
Specialty Minerals	510.9	574.4	589.3
Refractories	258.1	298.1	311.9
Energy Services	73.0	95.2	78.3
Total	1,594.8	1,791.0	1,807.6
Income from Operations			
Performance Materials	103.6	97.1	116.8
Specialty Minerals	67.8	83.1	95.4
Refractories	35.5	39.8	45.4
Energy Services	5.2	7.8	4.5
Total	212.1	227.8	262.1
Depreciation, Depletion and Amortization			
Performance Materials	41.4	43.6	41.1
Specialty Minerals	39.6	40.4	38.2
Refractories	6.9	7.0	6.6
Energy Services	6.0	7.4	8.4
Total	93.9	98.4	94.3
Segment Assets			
Performance Materials	2,111.6	2,091.2	2,119.7
Specialty Minerals	559.6	525.1	511.9
Refractories	290.8	293.2	296.6
Energy Services	107.5	121.5	110.4
Total	3,069.5	3,031.0	3,038.6
Capital Expenditures			
Performance Materials	10.0	16.8	22.4
Specialty Minerals	46.5	37.7	42.4
Refractories	5.5	5.7	5.0
Energy Services	4.6	4.7	4.9
Total	66.6	64.9	74.7

A reconciliation of the totals reported for the operating segments to the applicable line items in the consolidated financial statements is as follows:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Income from Operations before Provision for Taxes on Income			
Income from operations for reportable segments	$ 212.1	$ 227.8	$ 262.1
Litigation expenses	(10.4)	(10.9)	—
Acquisition-related expenses	(3.1)	—	(1.7)
Unallocated corporate expenses	(10.7)	(8.2)	(4.5)
Consolidated income from operations	187.9	208.7	255.9
Non-operating deductions, net	(49.9)	(51.4)	(51.8)
Income from operations before provision for taxes and equity in earnings	138.0	157.3	204.1
Total Assets			
Total segment assets	3,069.5	3,031.0	3,038.6
Corporate assets	139.9	81.6	48.5
Consolidated total assets	3,209.4	3,112.6	3,087.1
Capital Expenditures			
Total segment capital expenditures	66.6	64.9	74.7
Corporate capital expenditures	0.2	0.1	1.2
Consolidated capital expenditures	66.8	65.0	75.9

Financial information relating to the Company's operations by geographic area was as follows:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Net Sales			
United States	$ 822.5	$ 962.4	$ 961.6
Canada/Latin America	70.5	80.2	83.7
Europe/Africa	410.0	435.3	443.4
Asia	291.8	313.1	318.9
Total International	772.3	828.6	846.0
Consolidated net sales	1,594.8	1,791.0	1,807.6
Long-Lived Assets			
United States	$ 1,723.2	$ 1,742.3	$ 1,767.7
Canada/Latin America	11.3	13.0	13.7
Europe/Africa	182.9	190.7	225.0
Asia	126.5	117.2	123.0
Total International	320.7	320.9	361.7
Consolidated long-lived assets	2,043.9	2,063.2	2,129.4

Net sales and long-lived assets are attributed to countries and geographic areas based on the location of the legal entity. No individual foreign country represents more than 10% of consolidated net sales or consolidated long-lived assets.

The Company's sales by product category are as follows:

	Year Ended December 31,		
(millions of dollars)	**2020**	**2019**	**2018**
Metalcasting	$ 258.1	$ 291.2	$ 328.9
Household, Personal Care & Specialty Products	380.2	376.6	348.5
Environmental Products	58.6	86.6	80.3
Building Materials	55.9	68.9	70.4
Paper PCC	308.4	364.9	378.5
Specialty PCC	69.3	69.1	66.9
Ground Calcium Carbonate	89.3	91.3	91.0
Talc	43.9	49.1	52.9
Refractory Products	212.3	244.8	261.1
Metallurgical Products	45.8	53.3	50.8
Energy Services	73.0	95.2	78.3
Total	$ 1,594.8	$ 1,791.0	$ 1,807.6

Note 23. Quarterly Financial Data (unaudited)

(millions of dollars, except per share data)	2020 Quarters First	Second	Third	Fourth
Net sales by segment				
Performance Materials segment	$ 186.2	$ 173.8	$ 190.6	$ 202.2
Specialty Minerals segment	137.1	109.8	125.1	138.9
Refractories segment	69.0	55.9	59.3	73.9
Energy Services segment	25.2	17.7	13.3	16.8
Net sales	417.5	357.2	388.3	431.8
Gross profit	106.8	88.9	98.4	111.3
Income from operations	57.7	27.2	48.5	54.5
Consolidated net income	39.6	14.9	29.3	32.0
Net income attributable to MTI	38.6	14.4	28.3	31.1
Basic earnings per share attributable to MTI shareholders	$ 1.12	$ 0.42	$ 0.83	$ 0.91
Diluted earnings per share attributable to MTI shareholders	$ 1.12	$ 0.42	$ 0.83	$ 0.91
Market price range per share of common stock:				
High	$ 58.91	$ 55.42	$ 53.34	$ 64.16
Low	$ 28.90	$ 31.91	$ 43.11	$ 51.10
Close	$ 32.48	$ 43.20	$ 49.23	$ 62.12
Dividends paid per common share	$ 0.05	$ 0.05	$ 0.05	$ 0.05

	2019 Quarters			
(millions of dollars, except per share data)	**First**	**Second**	**Third**	**Fourth**
Net sales by segment				
Performance Materials segment	$ 199.2	$ 215.4	$ 207.3	$ 201.4
Specialty Minerals segment	144.4	145.1	143.1	141.8
Refractories segment	73.8	77.5	73.4	73.4
Energy Services segment	20.3	25.8	25.5	23.6
Net sales	437.7	463.8	449.3	440.2
Gross profit	109.7	112.0	111.2	107.7
Income from operations	62.0	45.5	53.5	47.7
Consolidated net income	40.0	27.6	39.1	29.6
Net income attributable to Minerals Technologies Inc. (MTI)	39.1	26.6	38.0	29.0
Basic earnings per share attributable to MTI shareholders	$ 1.11	$ 0.76	$ 1.09	$ 0.83
Diluted earnings per share attributable to MTI shareholders	$ 1.11	$ 0.75	$ 1.08	$ 0.83
Market price range per share of common stock:				
High	$ 61.01	$ 63.20	$ 55.33	$ 58.12
Low	$ 49.47	$ 51.78	$ 45.55	$ 48.92
Close	$ 58.79	$ 53.51	$ 52.77	$ 57.63
Dividends paid per common share	$ 0.05	$ 0.05	$ 0.05	$ 0.05

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Minerals Technologies Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Minerals Technologies Inc. and subsidiaries (the Company) as of December 31, 2020 and 2019, the related consolidated statements of income, comprehensive income, changes in shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2020, and the related notes and financial statement schedule (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2020, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 19, 2021 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

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 are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

Critical Audit Matter

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

Measurement of projected pension benefit obligations

As discussed in Note 1 and Note 17 to the consolidated financial statements, the Company estimates the liability related to their pension plans using actuarial models that include assumptions about the Company's discount rates. The Company's projected pension benefit obligations were $534 million as of December 31, 2020.

We identified the measurement of the Company's projected pension benefit obligations as a critical audit matter. Specialized skills are required to understand the Company's assumptions. In particular, especially complex auditor judgement is required to assess the discount rate used in the projected pension benefit obligations.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls over the Company's pension process, including a control related to the Company's assessment of the discount rate utilized within the actuarial models. We obtained an understanding of the actuarial model used by the Company in selecting the discount rate for each plan and inquired as to whether there have been changes to this methodology in the current year. We also involved an actuarial professional with specialized skills and knowledge, who assisted in evaluating the Company's analysis of the discount rates and assessed the discount rates considering the timing and amount of benefit payments used in the determination of the projected pension benefit obligation.

(signed) KPMG LLP

We have served as the Company's auditor since 1992.
New York, New York
February 19, 2021

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors
Minerals Technologies Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Minerals Technologies Inc and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2020 and 2019, and the related consolidated statements of income, comprehensive income, changes in shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2020, and related notes and financial statement schedule (collectively, the consolidated financial statements), and our report dated February 19, 2021 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our 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.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

(signed) KPMG LLP

New York, New York
February 19, 2021

Management's Report On Internal Control Over Financial Reporting

Management of Minerals Technologies Inc. is responsible for the preparation, integrity and fair presentation of its published consolidated financial statements. The financial statements have been prepared in accordance with U.S. generally accepted accounting principles and, as such, include amounts based on judgments and estimates made by management. The Company also prepared the other information included in the annual report and is responsible for its accuracy and consistency with the consolidated financial statements.

Management is also responsible for establishing and maintaining effective internal control over financial reporting. The Company's internal control over financial reporting includes those policies and procedures that pertain to the Company's ability to record, process, summarize and report reliable financial data. The Company maintains a system of internal control over financial reporting, which is designed to provide reasonable assurance to the Company's management and board of directors regarding the preparation of reliable published financial statements and safeguarding of the Company's assets. The system includes a documented organizational structure and division of responsibility, established policies and procedures, including a code of conduct to foster a strong ethical climate, which are communicated throughout the Company, and the careful selection, training and development of our people.

The Board of Directors, acting through its Audit Committee, is responsible for the oversight of the Company's accounting policies, financial reporting and internal control. The Audit Committee of the Board of Directors is comprised entirely of outside directors who are independent of management. The Audit Committee is responsible for the appointment and compensation of the independent registered public accounting firm. It meets periodically with management, the independent registered public accounting firm and the internal auditors to ensure that they are carrying out their responsibilities. The Audit Committee is also responsible for performing an oversight role by reviewing and monitoring the financial, accounting and auditing procedures of the Company in addition to reviewing the Company's financial reports. The independent registered public accounting firm and the internal auditors have full and unlimited access to the Audit Committee, with or without management, to discuss the adequacy of internal control over financial reporting, and any other matters which they believe should be brought to the attention of the Audit Committee.

Management recognizes that there are inherent limitations in the effectiveness of any system of internal control over financial reporting, including the possibility of human error and the circumvention or overriding of internal control. Accordingly, even effective internal control over financial reporting can provide only reasonable assurance with respect to financial statement preparation and may not prevent or detect misstatements. Further, because of changes in conditions, the effectiveness of internal control over financial reporting may vary over time.

The Company assessed its internal control system as of December 31, 2020 in relation to criteria for effective internal control over financial reporting described in "Internal Control – Integrated Framework (2013)" issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on its assessment, the Company has determined that, as of December 31, 2020, its system of internal control over financial reporting was effective.

The consolidated financial statements have been audited by the independent registered public accounting firm, which was given unrestricted access to all financial records and related data, including minutes of all meetings of stockholders, the Board of Directors and committees of the Board. Reports of the independent registered public accounting firm, which includes the independent registered public accounting firm's attestation of the effectiveness of the Company's internal control over financial reporting are also presented within this document.

/s/ Douglas T. Dietrich
Chief Executive Officer

/s/ Matthew E. Garth
Senior Vice President, Finance and Treasury, Chief Financial Officer

/s/ Michael A. Cipolla
Vice President, Corporate Controller and Chief Accounting Officer

February 19, 2021

MINERALS TECHNOLOGIES INC. & SUBSIDIARY COMPANIES
SCHEDULE II – VALUATION AND QUALIFYING ACCOUNTS
(millions of dollars)

Description	Balance at Beginning of Period	Additions Charged to Costs, Provisions and Expenses	Deductions (a)	Balance at End of Period
Year Ended December 31, 2020				
Valuation and qualifying accounts deducted from assets to which they apply:				
Allowance for doubtful accounts	$ 12.9	2.6	(0.5)	$ 15.0
Year Ended December 31, 2019				
Valuation and qualifying accounts deducted from assets to which they apply:				
Allowance for doubtful accounts	$ 3.2	6.3	3.4	$ 12.9
Year Ended December 31, 2018				
Valuation and qualifying accounts deducted from assets to which they apply:				
Allowance for doubtful accounts	$ 4.2	3.2	(4.2)	$ 3.2

(a) Includes impact of write-offs, translation of foreign currencies and reclassifications for presentation purposes.

EXHIBIT 10.13

MINERALS TECHNOLOGIES INC. RETIREMENT PLAN

2020 Amendment and Restatement

MINERALS TECHNOLOGIES INC. RETIREMENT PLAN

WHEREAS, Minerals Technologies Inc. (hereinafter referred to as the "Employer") heretofore adopted the Minerals Technologies Inc. Retirement Annuity Plan (the "Retirement Annuity Plan"), for the benefit of its eligible Employees, effective as of October 22, 1992; and

WHEREAS, the Employer reserved the right to amend the Retirement Annuity Plan; and

WHEREAS, effective as of January 1, 2002, the Employer amended the Retirement Annuity Plan to provide that employees employed on or after January 1, 2002 would accrue benefits under a cash balance formula and that Participants who were accruing benefits under the Retirement Annuity Plan on December 31, 2001 generally would continue to accrue benefits under the career earnings benefit formula in effect on December 31, 2001, and in connection therewith, changed the name of the Retirement Annuity Plan to the "Minerals Technologies Inc. Retirement Plan" (the "Plan"); and

WHEREAS, prior to January 1, 2012, the Employer amended the Plan from time to time, including closing the Plan to new participants effective January 1, 2010,

WHEREAS, the Employer amended and restated the Plan effective January 1, 2012, and subsequently amended the Plan; and

WHEREAS, the Employer now desires to restate the Plan by incorporating all prior amendments; and

WHEREAS, it is intended that the Plan is to continue to be a qualified plan under Section 401(a) of the Code for the exclusive benefit of the Participants and their Beneficiaries;

NOW, THEREFORE, the Plan is hereby amended by restating the Plan, effective as of January 1, 2020, except where the provisions of the Plan (or the requirements of applicable law) shall otherwise specifically provide, in its entirety as follows:

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ARTICLE ONE--DEFINITIONS

For purposes of this Plan, unless the context or an alternative definition specified within another Article provides otherwise, the following words and phrases shall have the meanings indicated:

1.1 **"ACCRUED BENEFIT"** with respect to a Participant's Cash Balance Account, shall mean a monthly retirement benefit payable in the form of a single life annuity and commencing on a Participant's Normal Retirement Date, which is the Actuarial Equivalent of the Participant's Cash Balance Account (with Interest Credits under Section 4.1(d) projected to Normal Retirement Date at the interest crediting rate in effect at the date of determination).

"ACCRUED BENEFIT" with respect to a Participant's Career Earnings Formula, shall mean a monthly retirement benefit payable in a single life annuity, and commencing on a Participant's Normal Retirement Date, in an amount determined in accordance with Section 4.1(a) based on the Participant's Career Earnings as of the date of determination.

1.2 **"ACTUARIAL EQUIVALENT"** shall mean:

(1) Benefit Payable Under Cash Balance Formula.

(A) In the case of a benefit payable pursuant to Section 4.1(b), the amount payable in the form of a lump-sum payment shall be equal to the value of the Participant's Cash Balance Account as of the last day of the month prior to the month in which distribution occurs.

(B) In determining the amount of a benefit payable in the form of a single life annuity under Section 5.1, actuarial equivalence as of any given date shall be determined by applying to the Participant's Cash Balance Account, valued as of the annuity starting date, a factor determined on the basis of-

(i) an interest rate equal to the applicable interest rate (within the meaning of Code Section 417(e)(3)), determined for the full calendar month that is four (4) months prior to the month in which the annuity starting date occurs; and

(ii) for all such benefits payable on an annuity starting date that is on or prior to December 31, 2002, the 1983 Group Annuity Mortality Table weighted 50 percent male; and for all such benefit payments payable on an annuity starting date that is on or after January 1, 2003, and prior to January 1, 2008, the 1994 Group Annuity Reserve Table weighted 50 percent male, projected to 2002; or such other mortality assumption as shall be prescribed by the Secretary of the Treasury, which assumption shall be based on the prevailing commissioners' standard table described in Code Section 807(d)(5)(A) used to determine reserves for group annuity contracts issued on the date the determination is being made (without regard to any other subparagraph of Code Section 807(d)(5)); and for all such benefits payable on an annuity starting date that is on or after January, 2008, the "applicable mortality table" specified in Code Section 417(e)(3).

(C) In determining the amount of a benefit payable in the form of a "qualified joint and surviving annuity" under Section 5.2 or under an optional form available to a Participant under Section 5.3, actuarial equivalence as of any given date shall be determined by applying to the Participant's single life annuity as determined in Section 1.2(b)(1)(B), valued as of the annuity starting date, a factor determined on the basis of:

(i) an interest rate assumption of 7½%per annum; and

(ii) for all such benefits payable on an annuity starting date that is on or prior to December 31, 2002, the 1983 Group Annuity Mortality Table weighted 50 percent male; and for all such benefit payments payable on an annuity starting date that is on or after January 1, 2003 and prior to January 1, 2008, the 1994 Group Annuity Reserve Table weighted 50 percent male, projected to 2002; or such other mortality assumption as shall be prescribed by the Secretary of the Treasury, which assumption shall be based on the prevailing commissioners' standard table described in Code Section 807(d)(5)(A) used to determine reserves for group annuity contracts issued on the date the determination is being made (without regard to any other subparagraph of Code Section 807(d)(5)); and for all such benefits payable on an annuity starting date that is on or after January 1, 2008, the "applicable mortality table" specified in Code Section 417(e)(3).

(2) Benefit Payable Under Career Earnings Formula.

In determining the amount of a benefit payable in the form of a qualified joint and survivor annuity under Section 5.2, or a joint and contingent annuitant option and/or level income option under Section 5.3, and for purposes of determining any adjustment to be made to a Participant's Accrued Benefit under Section 5.5, actuarial equivalence as of any given date shall be determined using an interest rate assumption of 7½% per annum and the mortality table described in Section 1.2(b)(2)(B). In determining the amount of benefit payable in the form of a lump-sum payment under Section 5.3(d), and for purposes of determining whether the cash-out provisions of Section 5.1 shall be applicable, actuarial equivalence as of any given date shall be determined using:

(A) for such benefits payable on an annuity starting date occurring in Plan Years beginning before January 1, 2008, an interest rate equal to the annual rate of interest on 30-year Treasury securities or the generally accepted proxy therefore, in each case as specified by the Commissioner of the Internal Revenue Service for the full calendar month four (4) months prior to the month in which the annuity starting date occurs; for such benefits payable on an annuity starting date occurring on or after January 1, 2008 but before July 1, 2015, an interest rate equal to the “applicable interest rate” specified in Code Section 417(e)(3) for the full calendar month four (4) months prior to the month in which the annuity starting date occurs; for such benefits payable on an annuity starting date occurring on or after July 1, 2015 but before June 30, 2016, an interest rate equal to the lesser of the “applicable interest rate” specified in Code Section 417(e)(3) for the full calendar month four (4) months prior to (I) the month in which the annuity staring date occurs or (II) the Plan Year in which the annuity starting date occurs; and for such benefits payable on an annuity starting date occurring on or after July 1, 2016, an interest rate equal to the “applicable interest rate” specified in Code Section 417(e)(3) for the full calendar month four (4) months prior to the Plan Year in which the annuity starting date occurs; and

(B) for all such benefits payable on an annuity starting date that is on or prior to December 31, 2002, the 1983 Group Annuity Mortality Table weighted 50 percent male; and for all such benefit payments payable on an annuity starting date that is on or after January 1, 2003 and prior to January 1, 2008, the 1994 Group Annuity Reserve Table weighted 50 percent male, projected to 2002; or such other mortality assumption as shall be prescribed by the Secretary of the Treasury, which assumption shall be based on the prevailing commissioners' standard table described in Code Section 807(d)(5)(A) used to determine reserves for group annuity contracts issued on the date the determination is being made (without regard to any other subparagraph of Code Section 807(d)(5)); and for all such benefits payable on an annuity starting date that is on or after January 1, 2008, the "applicable mortality table" specified in Code Section 417(e)(3).

The benefit determined under this subsection shall in no event be less than the Participant's Accrued Benefit as of July 1, 1995, determined by applying a 5 percent assumed rate of interest in lieu of the applicable interest rate under Code Section 417(e)(3), wherever the same appears in this definition.

<u>1.3</u> **"ACTUARY"** shall mean an actuary enrolled under Federal practice, or a firm of actuaries which has on its staff such an actuary, appointed by the Administrator under whose supervision valuation reports and benefit calculations are performed for the Plan.

<u>1.4</u> **"ADMINISTRATOR" OR "PLAN ADMINISTRATOR"** shall mean the Plan Administrator appointed in accordance with the provisions of Section 8.1.

<u>1.5</u> **"ANNUAL PAY CREDITS"** shall mean the amounts credited to a Participant's Cash Balance Account in accordance with Section 4.1(c).

<u>1.6</u> **"ANNIVERSARY YEAR"** shall mean (1) the twelve-month period following the date on which an Employee first begins his employment with the Employer, as well as successive twelve-month periods thereafter, and (2) the twelve- month period following the date on which an Employee returns to the employ of the Employer after incurring a Break in Service as well as successive twelve-month periods thereafter. No Anniversary Year shall be credited for purposes of vesting unless in such Anniversary Year the Employee has completed 1,000 or more Hours of Service for the Employer.

<u>1.7</u> **"BENEFICIARY"** shall mean any person, trust, organization or estate entitled to receive a death benefit under the Plan on the death of a Participant (pursuant to Article Five with respect to the Participant's death after commencement of benefits to the Participant, and pursuant to Article Six with respect to the Participant's death before commencement of benefits to the Participant).

<u>1.8</u> **"BREAK IN SERVICE"** shall have the meaning as set forth in Section 2.2.

<u>1.9</u> **"CAREER EARNINGS"** shall mean the Participant's aggregate Earnings during his period of Credited Service, except that:

(1) if the Participant was employed on October 1, 2006, the Participant's Earnings for each calendar year prior to 2003 shall be the average of such Participant's Earnings during the five consecutive calendar years prior to 2003 during which the Participant rendered Credited Service which yield the highest average, provided such Participant's Earnings are not reduced thereby; and

(2) if the Participant was employed on April 1, 1998, but terminated employment prior to October 1, 2006, the Participant's Earnings for each calendar year prior to 1998 shall be the average of such Participant's Earnings during the five (5) consecutive calendar years prior to 1998 during which the Participant rendered Credited Service which yield the highest average, provided such Participant's Earnings are not reduced thereby; and

(3) if the Participant was employed on July 1, 1995, but terminated employment prior to April 1, 1998, the Participant's Earnings for each calendar year prior to 1995 shall be the average of such Participant's Earnings during the five (5) consecutive calendar years prior to 1995 during which the Participant rendered Credited Service which yield the highest average; provided such Participant's Earnings are not reduced thereby; and

(4) if the Participant was employed on October 22, 1992, but terminated employment before July 1, 1995, the Participant's Earnings for each calendar year prior to 1992 shall be the average of such Participant's Earnings during the five (5) consecutive calendar years prior

to 1992 during which the Participant rendered Credited Service which yield the highest average, provided such Participant's Earnings are not reduced thereby; and

(5) in each case, only the Participant's Earnings during his last thirty-five (35) years of Credited Service shall be counted; provided, however, that, such a calculation shall not lessen such Participant's Career Earnings below the result of a prior calculation.

1.10 **"CAREER EARNINGS FORMULA"** shall mean the benefit formula described in Section 4.l(a).

1.11 **"CASH BALANCE ACCOUNT"** shall mean the notional account deemed to have been established for each Participant for the purpose of determining each Participant's benefit under the Cash Balance Formula.

This notational account shall be established and maintained for bookkeeping purposes only; benefits under the Plan shall be paid from the general assets of the Trust in the amounts, in the forms, and at the times provided, under the terms of the Plan.

When applying any statutory or Plan limitation and/or minimum benefit that is expressed in terms of an annuity to the benefit derived from the Cash Balance Account, the limit shall be applied to the annuity derived from the Cash Balance Account that is payable at the time and in the form corresponding to the Plan limitation or minimum benefits, determined under the terms of the Plan.

1.12 **"CASH BALANCE FORMULA"** shall mean the benefit formula described in Section 4.1(b).

1.13 **"CODE"** shall mean the Internal Revenue Code of 1986, as amended from time to time.

1.14 **"COMPANY"** shall mean Minerals Technologies Inc.

1.15 **"CREDITED SERVICE"** shall mean Service on which a Participant's benefits are based, in accordance with the provisions of Section 2.1.

1.16 **"DEFERRED RETIREMENT DATE"** shall mean the date of retirement of a Participant after his Normal Retirement Date.

1.17 **"DISABILITY" or "DISABLED"** shall mean the inability of a Participant, who is a participant in a long-term disability plan of the Employer, to perform his duties for the Employer as a result of any bodily injury or disease or mental infirmity and for which the Participant is receiving disability benefits under such long-term disability plan. A Participant who suffers a Disability shall be considered Disabled only during the period in which he is receiving disability benefits under such long-term disability plan.

1.18 **"DISABILITY LEAVE STATUS"** shall mean the leave status described in Section 4.3(a).

1.19 **"EARNINGS"**

(1) Items Included. Earnings shall mean actual salary, wages, bonus (except as otherwise provided below), and other remuneration earned by an Employee from an Employer for his service with an Employer, as determined by such Employer. Earnings shall include pre-tax contributions under (A) the Company's Savings and Investment Plan, (B) a cafeteria plan under Code section 125 and (C) a transportation fringe benefit plan under Code section 132(f)(4). Earnings shall also include earnings from Pfizer, Inc. to the extent that Pfizer, Inc. has transferred the accumulated benefit obligation of such person under the Pfizer Inc. Retirement Annuity Plan to the Company under the terms and conditions of the Reorganization Agreement between Pfizer Inc. and the Company dated as of September 28, 1992.

(2) Items Excluded. Earnings shall not include any part of the cost of any employee benefit (other than pre-tax contributions under (A) the Company's Savings and Investment Plan,

(B) a cafeteria plan under Code section 125 or (C) under a transportation fringe benefit plan under Code section 132(f)(4)), including, without limitation, stock options, perquisites and group insurance, matching contributions under the Company's Savings and Investment Plan, or of any expense reimbursement, including, without limitation, relocation costs, or of any remuneration received in the form of salary continuance or lump-sum severance by an Employee while no longer providing services to the Company. No part of any bonus or other remuneration forming part of the compensation of any Employee shall be used to determine benefits under the Plan, if such bonus should cause such benefit to become discriminatory under the applicable provisions of the Code.

In addition to other applicable limitations set forth in the Plan, and notwithstanding any other provision of the Plan to the contrary, the annual Earnings of each Participant taken into account under the Plan shall not exceed the applicable limit under Section 40l(a)(17) of the Code for the relevant calendar year ($285,000 for the 2020 calendar year), as adjusted by the Secretary of the Treasury or his delegate for increases in the cost of living in accordance with Section 401(a)(17)(B) of the Code. The cost-of-living adjustment in effect for a calendar year applies to any period, not exceeding twelve (12) months, over which Earnings are determined (determination period) beginning in such calendar year. If a determination period consists of fewer than twelve (12) months, the annual Earnings limit shall be multiplied by a fraction, the numerator of which is the number of months in the determination period, and the denominator of which is twelve (12).

For purposes of determining who is a Highly-Compensated Employee, Earnings shall mean compensation as defined in Section 414(q)(4) of the Code.

Any Earnings paid after the Participant's severance from employment with the Employer (except for compensation attributable to the pay period in which the severance from employment occurred) shall not be taken into account for purposes of determining a Participant's Accrued Benefit.

1.20 **"EFFECTIVE DATE."** The Effective Date of this restated Plan, on and after which it supersedes the terms of the existing Plan document, is January 1, 2020, except where the provisions of the Plan (or the requirements of applicable law) shall otherwise specifically provide. The rights of any Participant who terminated employment with the Employer prior to the applicable date shall be established under the terms of the Plan and Trust as in effect at the time of the Participant's termination from employment (subject to any subsequent elimination of benefits as permitted by law or regulation), unless the Participant subsequently returns to employment with the Employer, or unless otherwise provided under the terms of the Plan. Rights of spouses and Beneficiaries of such Participants shall also be governed by those documents.

1.21 **"EMPLOYEE"** shall mean a common law employee of the Employer.

1.22 **"EMPLOYER"** shall mean the Company and any subsidiary or affiliate of which, with the approval of the board of directors of the Company, has adopted the Plan and shall include any successor(s) thereto which adopt this Plan. If, under state law, the Employer at any time is not governed by directors but instead by its stockholders, reference herein to the board of directors shall be deemed to refer to the individual(s) empowered to vote on the Employer's affairs.

1.23 **"EMPLOYMENT DATE"** shall mean the first date as of which an Employee is credited with an "Hour of Service," provided that in the case of a Break in Service, his Employment Date shall be the first date thereafter as of which he is credited with an Hour of Service.

1.24 **"HIGHLY-COMPENSATED EMPLOYEE"** shall mean any Employee of the Employer who:

(a) was a five percent (5%) owner of the Employer (as defined in Code Section 416(i)(l)) at any time during the "determination year" or "look-back year"; or

(b) earned more than $125,000 of Earnings from the Employer during the "look-back year". The $125,000 amount shall be adjusted at the same time and in the same manner as under Section 415(d) of the Code.

An Employee who separated from Service prior to the "determination year" shall be treated as a Highly-Compensated Employee for the "determination year" if such Employee was a Highly- Compensated Employee when such Employee separated from Service, or was a Highly-Compensated Employee at any time after attaining age fifty-five (55).

For purposes of this Section, the "determination year" shall be the Plan Year for which a determination is being made as to whether an Employee is a Highly-Compensated Employee. The "look-back year" shall be the twelve (12)-month period immediately preceding the "determination year".

1.25 **"HOUR OF SERVICE"** shall have the meaning set forth below:

(a) An Hour of Service is each hour for which an Employee is paid, or entitled to payment, for the performance of duties for the Employer, during the applicable computation period.

(b) An Hour of Service is each hour for which an Employee is paid, or entitled to payment, by the Employer 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. Notwithstanding the preceding sentence,

(i) No more than five hundred and one (501) Hours of Service shall be credited under this paragraph (b) to any Employee on account of any single continuous period during which the Employee performs no duties (whether or not such period occurs in a single computation period). Hours under this paragraph shall be calculated and credited pursuant to Section 2530.200b-2 of the Department of Labor Regulations which is incorporated herein by reference;

(ii) An hour for which an Employee is directly or indirectly paid, or entitled to payment, on account of a period during which no duties are performed shall not be credited to the Employee if such payment is made or due under a plan maintained solely for the purpose of complying with applicable workmen's compensation, or unemployment compensation or disability insurance laws; and

(iii) Hours of Service shall not be credited for a payment which solely reimburses an Employee for medical or medically related expenses incurred by the Employee.

For purposes of this paragraph (b), a payment shall be deemed to be made by or due from the Employer regardless of whether such payment is made by or due from the Employer directly, or indirectly through, among others, a trust fund, or insurer, to which the Employer contributes or pays premiums and regardless of whether contributions made or due to the trust fund, insurer or other entity are for the benefit of particular Employees or are on behalf of a group of Employees in the aggregate.

(c) An Hour of Service is each hour for which back pay, irrespective of mitigation of damages, is either awarded or agreed to by the Employer. The same Hours of Service shall not be credited both under paragraph (a) or paragraph (b), as the case may be, and under this paragraph (c). Thus, for example, an Employee who receives a back pay award following a determination that he was paid at an unlawful rate for Hours of Service previously credited shall not be entitled to additional credit for the same Hours of Service. Crediting of Hours of Service for back pay awarded or agreed to with respect to periods described in paragraph (b) shall be subject to the limitations set forth in that paragraph.

(d) Hours of Service under this Section shall be determined under the terms of the Family and Medical Leave Act of 1993 and the Uniformed Services Employment and Reemployment Rights Act of 1994.

With respect to periods of employment prior to July 1, 2005, each Employee shall be credited with Hours of Service on the basis of an assumed one hundred and ninety (190) Hours of Service per month for each month for which the Employee would have received at least one (1) Hour of Services in accordance with this definition, to the extent that it does not result in crediting Hours of Service more than once with respect to any period.

With respect to periods of employment after June 30, 2005, Hours of Service shall be determined from records of actual hours worked and hours for which the Employer makes payment or for which payment is due from the Employer, subject to the limitations enumerated above, to the extent that it does not result in crediting Hours of Service more than once with respect to any period.

1.26 **"INTEREST CREDITS"** shall mean the amounts credited to a Participant's Cash Balance Account in accordance with Section 4.l(d).

1.27 **"LEASED EMPLOYEE"** shall mean any person who, pursuant to an agreement between the Employer and any other person or organization, has performed services for the Employer (determined in accordance with Section 414(n)(6) of the Code) on a substantially full-time basis for a period of at least one year, where such services are performed under the primary direction or control of the Employer. A person shall not be considered a Leased Employee if the total number of Leased Employees does not exceed twenty percent (20%) of the Nonhighly- Compensated Employees employed by the Employer, and if any such person is covered by a money purchase pension plan providing (a) a nonintegrated employer contribution rate of at least ten percent (10%) of compensation as defined in Section 9.2(b)(2) of the Plan; (b) immediate participation; and (c) full and immediate vesting.

1.28 **"NONHIGHLY-COMPENSATED EMPLOYEE"** shall mean any Employee of the Employer who is not a Highly-Compensated Employee.

1.29 **"NORMAL RETIREMENT AGE"** shall mean a Participant's sixty-fifth (65th) birthday if the Participant commenced employment on or before July 31, 2002, or the later of the date the Employee attains age sixty-five (65) or the date the Employee completes five (5) years of Credited Service, if the Participant commenced employment on or after August 1, 2002.

1.30 **"NORMAL RETIREMENT DATE"** shall mean the first day of the month coincident with or next following the date the Participant attains his Normal Retirement Age.

1.31 **"PARTICIPANT"** shall mean any Employee or former Employee who is eligible to participate in the Plan or whose Beneficiary may be eligible to receive any such benefit.

1.32 **"PLAN"** shall mean the Minerals Technologies Inc. Retirement Plan as set forth herein and as it may be amended from time to time.

1.33 **"PLAN YEAR"** shall mean the twelve (12)-consecutive month period beginning January 1 and ending December 31.

1.34 **"PRIMARY SOCIAL SECURITY BENEFIT"** shall mean the annual amount available to the Participant at age 65, or later if the Participant retires after age 65, under the Old Age Insurance provisions of Title II of the Social Security Act in effect at this termination of employment, without regard to any increases in the wage base or benefit levels that take effect after the date of termination of employment, subject to the following:

(a) A Participant's Primary Social Security Benefit shall be determined (1) with respect to the period prior to the Participant's termination of employment, by applying a salary sale which is the actual change in average wages from year to year as determined by the Social Security Administration, projected backwards, from the Participant's Earnings for the calendar year in which the Participant's termination of employment occurs (or the Participant's Earnings during the calendar year immediately preceding the calendar year in which the Participant's termination of employment occurs, if Earnings during such year are greater) and (2) in the event that the Participant's termination of employment occurs prior to attainment of age 65, by assuming that the Participant's Earnings as determined in (1) will continue to be earned by the Participant until age 65. Notwithstanding the foregoing, if a Participant whose termination of employment occurs prior to attainment of age 65 retires pursuant to Section 4.4(b)(2)(B), such Participant's Primary Social Security Benefit shall be estimated by assuming that the Participant will not receive any income after retirement which would be treated as wages for purposes of the Social Security Act.

(b) Notwithstanding the foregoing, actual salary history will be used to calculate the Primary Social Security Benefit if this will result in a larger benefit under the Career Earnings Formula for the Participant, but only if documentation of such history is provided by the Participant within two years after the later of his termination of employment or the date the Participant receives notice of his benefits under the Plan.

1.35 **"SPOUSE"** shall mean, whether or not capitalized, with respect to any Participant, an individual to whom a Participant is legally married under the law of any domestic or foreign jurisdiction having the legal authority to sanction marriages, and references to a "married" Participant means a Participant who is legally married under the law of any domestic or foreign jurisdiction having the legal authority to sanction marriages.

1.36 **"TRUST"** shall mean the Trust Agreement entered into between the Employer and the Trustee forming part of this Plan, together with any amendments thereto.

1.37 **"TRUST FUND"** shall mean any and all property held by the Trustee pursuant to the Trust Agreement, together with income therefrom.

1.38 **"TRUSTEE"** shall mean the Trustee or Trustees appointed by the Employer, and any successors thereto.

1.38 **"VALUATION DATE"** shall mean the annual date selected by the Actuary, in accordance with the requirements of applicable law, as of which Plan assets are valued and liabilities determined for purposes of an actuarial valuation.

ARTICLE TWO--SPECIAL SERVICE RULES

Service is the period of employment credited under the Plan. Definitions and special rules related to Service are as follows:

2.1 **CREDITED SERVICE.** A Participant shall be credited with a year of "Credited Service" for each Anniversary Year during which he completes at least one thousand (1,000) Hours of Service. No fractional years of Credited Service shall be credited to a Participant, except for purposes of determining (i) the Primary Social Security Benefit offset amount pursuant to Section 4.l(a)(2), and (ii) a Participant's Career Earnings and his eligibility for early retirement under Sections 4.4(b)(2)(A) and (B), in which event the Participant's Credited Service shall be determined on the basis of the months of employment with the Employer during the fractional Anniversary Year without regard to whether the Participant completes one thousand (1,000) or more Hours of Service within such periods. For purposes of the preceding sentence, a month of employment shall be credited with respect to the Participant's first and last month of employment with the Employer if the Participant is employed for at least fifteen (15) days in each such month.

With respect to any Participant who was an active participant in the Pfizer Inc. Retirement Annuity Plan (the "Pfizer Plan") immediately prior to October 22, 1992, and who commenced employment with the Employer on or after October 22, 1992 and prior to June 1, 1993, Credited Service shall include any service credited to such Participant under the Pfizer Plan provided such Participant was an active participant under the Pfizer Plan immediately prior to such Participant's employment by the Employer.

In addition, Credited Service shall include service with an employer other than an Employer or "related group member" (within the meaning of Section 2.5(b)) which service is recognized as Credited Service pursuant to Schedule D. Except as otherwise provided, Prior Service of a Participant shall also be included in the Participant's Credited Service. For such purposes, "Prior Service" shall mean service rendered by a person who is in the service of the Employer before the date on which he becomes a Participant and who continues in service on and after the date he becomes a Participant.

2.2 **BREAK IN SERVICE.** A Break in Service shall be a twelve (12)-month computation period (as used for measuring years of Credited Service), in which an Employee or Participant is not credited with at least five hundred and one (501) Hours of Service.

2.3 **CESSATION OF EMPLOYMENT AND RETURN TO SERVICE.** An Employee who returns to employment after a Break in Service shall retain credit for his pre-Break years of Credited Service, provided, however, that if, when the Employee incurred his Break in Service, he had not completed sufficient years of Credited Service to be credited with a vested benefit under the Plan, his pre-Break years of Credited Service shall be disregarded if the number of consecutive Breaks in Service equals or exceeds the greater of five (5) or the number of pre-Break years of Credited Service, provided, however, that the Credited Service that such Employee had prior to the Break in Service shall not be disregarded pursuant to this section if the Employee completes at least twenty-four (24) consecutive months of Credited Service following his reemployment.

If a reemployed Employee does not forfeit his Credited Service as provided above, solely for purposes of determining his Career Earnings, the last calendar year in which he rendered Credited Service shall be treated as being consecutive with the first calendar year in which he renders Credited Service after his reemployment.

Notwithstanding the foregoing, for purposes of determining a Participant's Accrued Benefit under the Career Earnings Formula, following reemployment, no Credited Service shall be credited for any Anniversary Year subsequent to a Participant's separation from service with the Employer if such reemployment occurs on or after January 1, 2002.

2.4 **LEAVE OF ABSENCE.** A Participant on an unpaid leave of absence pursuant to the Employer's normal personnel policies shall be credited with Hours of Service at his regularly- scheduled weekly rate while on such leave provided the Employer acknowledges in writing that the leave is with its approval. These Hours of Service shall be credited only for purposes of determining if a Break in Service has occurred and, unless specified otherwise by the Employer in writing, shall not be credited for any other purpose under the Plan. Hours of Service during a paid leave of absence shall be credited as provided in Section 1.25.

For any individual who is absent from work for any period by reason of the individual's pregnancy, birth of the individual's child, placement of a child with the individual in connection with the individual's adoption of the child, or by reason of the individual's caring for the child for a period beginning immediately following such birth or adoption, the Plan shall treat as Hours of Service, solely for determining if a Break in Service has occurred, the following Hours of Service:

(a) the Hours of Service which otherwise normally would have been credited to such individual but for such absence; or

(b) in any case where the Administrator is unable to determine the Hours of Service, on the basis of an assumed eight (8) hours per day.

Except as otherwise provided herein, in no event shall more than five hundred and one (501) of such hours be credited by reason of such period of absence. The Hours of Service shall be credited in the computation period (used for measuring years of Credited Service) which starts after the leave of absence begins. However, the Hours of Service shall instead be credited in the computation period in which the absence begins if it is necessary to credit the Hours of Service in that computation period to avoid the occurrence of a Break in Service.

Notwithstanding the foregoing, time spent on an authorized leave of absence shall be credited for the purpose of computing length of service and benefits payable under the Career Earnings Formula on the following basis: Participants shall receive credit for each full year spent on authorized leave of absence for each full year of Credited Service that they render to the Employer following return to active service, except that time spent on authorized leave of absence for medical reasons shall be credited without requirement of subsequent Credited Service and time spent on civic leave shall be credited upon return to active service.

2.5 **SERVICE WITH RELATED COMPANIES.**

(a) *Service with Related Group Participants.* Except as otherwise provided, for each Plan Year in which the Employer is a member of a "related group", as hereinafter defined, all service of an Employee or Leased Employee (hereinafter collectively referred to as "Employee" solely for purposes of this Section 2.5(a)) with any one or more members of such related group shall be treated as employment by the Employer for purposes of determining his years of Credited Service (except for purposes of benefit accrual). The transfer of employment by any such Employee to another member of the related group shall not be deemed to constitute a retirement or other termination of employment by the Employer for purposes of the Plan, but the Employee shall be deemed to have continued in employment with the Employer for purposes of determining his years of Credited Service (except for purposes of benefit accrual). For purposes of this subsection (b), "related group" shall mean the Employer and all corporations, trades or businesses (whether or not incorporated) which constitute a controlled group of corporations with the Employer, a group of trades or businesses under common control with the Employer, or an affiliated service group, within the meaning of Section 414(b), Section 414(c), or Section 414(m), respectively, of the Code or any other entity required to be aggregated under Code Section 414(o).

(b) *Construction.* This Section is included in the Plan to comply with Code provisions regarding the crediting of service, and not to extend any additional rights to Employees in ineligible classifications other than as required by the Code and the regulations thereunder.

2.6 **COMPLIANCE WITH USERRA.** Notwithstanding any provisions of the Plan to the contrary, Employees shall receive service credit with respect to periods of qualified military service (within the meaning of Section 414(u)(5) of the Code) to the extent required under said Section 414(u).

2.7 **HEART ACT TREATMENT OF DIFFERENTIAL WAGE PAYMENTS.** For years beginning after December 31, 2008, (i) a Participant receiving a differential wage payment, as defined by Code Section 3401(h)(2), shall be treated as an Employee of the Employer making the payment, (ii) the differential wage payment shall be treated as Earnings, and (iii) the Plan shall not be treated as failing to meet the requirements of any provision described in Code Section 414(u)(l)(C) by reason of any contribution or benefit which is based on the differential wage payment.

2.8 **SERVICE CREDIT FOR EMPLOYEES ON STRIKE**. With respect to a collectively bargained Employee at the Cloquet location who is on strike in 2015, Hours of Service and Credited Service under this Article II shall include periods while the Employee is on strike. Hours of Service shall be determined by assuming that the Employee continued working during the strike period at the Employee's regularly scheduled working hours immediately before he or she went on strike. The service credited under this Section 2.8 shall not duplicate any other period of service otherwise credited under the Plan.

ARTICLE THREE--PLAN PARTICIPATION

3.1 **PARTICIPATION.** All Employees participating in the Plan prior to the Plan's restatement shall continue to be Participants, subject to the terms hereof.

Notwithstanding any provision of the Plan to the contrary, effective January 1, 2010, no Employee shall become a Participant, and any Participant who terminates employment, transfers employment to an excluded class of Employees (as described below), or otherwise ceases to be an active Participant in the Plan shall not again become an active Participant and shall not accrue any further benefits under the Plan at any future date as a result of reemployment or for any other reason.

In no event, however, shall any Employee (or other individual) participate under the Plan while he is: (i) included in a unit of Employees covered by a collective bargaining agreement between the Employer and the Employee representatives under which retirement benefits were the subject of good faith bargaining, unless the terms of such bargaining agreement expressly provides for the inclusion in the Plan; (ii) employed as an independent contractor on the payroll records of the Employer (regardless of any subsequent reclassification by the Employer, any governmental agency or court); or (iii) employed as a Leased Employee.

ARTICLE FOUR--PLAN BENEFITS

4.1 **NORMAL RETIREMENT BENEFIT.** Subject to the following provisions hereof, each Participant who retires at his Normal Retirement Date shall be entitled to receive a monthly retirement benefit determined as of such date. A Participant's right to his benefit shall be nonforfeitable upon reaching his Normal Retirement Age and shall be payable under the rules specified in Article Five. The amount of such annual benefit, expressed as a straight life annuity, shall be equal to the benefit determined under the applicable formula set forth below:

(a) **Career Earnings Formula.** The Career Earnings Formula shall be used to determine the Normal Retirement benefit of each Participant who was an Employee of the Employer on December 31, 2001; provided, however, that, in the case of a Participant who, following his termination of employment with the Employer, is reemployed by the Employer on or after January 1, 2002, the Career Earnings Formula shall not be applicable with respect to the Participant's period of employment with the Employer which occurs subsequent to the date of the Participant's reemployment. The benefit payable at the Normal Retirement Date of a Participant under the Career Earnings Formula shall be equal to the greater of:

(1) 1.4% of the Participant's Career Earnings; or

(2) 1.75% of the Participant's Career Earnings, less 1.50% of his Primary Social Security Benefit,

multiplied by his years of Credited Service, to a maximum of thirty-five (35) years of Credited Service.

Notwithstanding the foregoing, unless otherwise provided herein, each Section 401(a)(17) Participant's Accrued Benefit under the Career Earnings Formula shall be the greater of the Accrued Benefit determined for such Participant under (A) or (B) below:

(A) the Section 401(a)(17) Participant's Accrued Benefit determined with respect to the benefit formula applicable for the Plan Year beginning on or after January 1, 1994, as applied to such Participant's total years of Credited Service taken into account under the Career Earnings Formula for the purposes of benefit accrual, or

(B) the sum of:

(i) the Section 401(a)(17) Participant's Accrued Benefit as of the last day of the last Plan Year beginning before January I, 1994, frozen in accordance with Section 1.401(a)(4)-13 of the Treasury Regulations, and

(ii) the Section 401(a)(17) Participant's Accrued Benefit determined under the benefit formula applicable for the Plan Year beginning on or after January 1, 1994, as applied to such Participant's years of Credited Service for Plan Years beginning on or after January 1, 1994, for purposes of benefit accrual.

For purposes of this subsection, a "Section 40l(a)(17) Participant" means a Participant whose Accrued Benefit as of a date on or after the first day of the first Plan Year beginning on or after January 1, 1994, is based on Career Earnings for a year beginning prior to the first day of the first Plan Year beginning on or after January 1, 1994, that exceeded $150,000.

In the case of any group or class of Participants, the Employer may limit the Prior Service (within the meaning of Section 2.1) of persons included in such group or class to service rendered on and after a date to be determined by the Employer.

Except in the case of a person in the service of a corporation which becomes an Employer, the Prior Service benefits of any Participant who was absent from the Employer during all or part of the calendar year next preceding the date he becomes a Participant, because of sickness, Disability, service in the armed forces of the United States, or like reasons beyond his control, and who entered the service of his Employer prior to such calendar year, shall be computed by crediting to him as Earnings for such calendar year the following Earnings:

(I) all Earnings actually received by such Participant in such calendar year before or after the period of absence from his Employer and

(II) the Earnings he would have received in such calendar year during the period of absence based on a forty-hour (40) week at his straight-time rate of pay at the time of leaving his Employer and any increased rate to which he would have been entitled as a result of automatic length-of-service increases or a general increase, and any bonuses or other payments made in such calendar year during such period of absence to which he would normally have been entitled.

(b) **Cash Balance Formula.** The Cash Balance Formula shall be used to determine the Normal Retirement benefit of each Participant whose employment with the Employer commences on or after January 1, 2002. The Cash Balance Formula shall also be used to determine the Normal Retirement benefit of any Participant who is reemployed by the Employer on or after January 1, 2002, with respect to the determination of such Participants' Normal Retirement Benefit attributable to service occurring subsequent to his reemployment date. Under no circumstances shall a Participant accrue benefits under the Career Earnings Formula and the Cash Balance Formula with respect to the same periods of Credited Service. The benefit payable at the Normal Retirement Date of a Participant under the Cash Balance Formula shall be equal to the sum of-

(1) Annual Pay Credits pursuant to Section 4.l(c); and

(2) Interest Credits pursuant to Section 4.1(d).

(c) **Annual Pay Credits.** As of the first day of each Plan Year, an Annual Pay Credit shall be credited to the Cash Balance Account of each Participant whose benefit is determined under the Cash Balance Formula (including each such Participant who retired, died, or otherwise terminated during the prior Plan Year), who received Earnings during the prior Plan Year. The Annual Pay Credit shall equal such Participant's Earnings for the prior Plan Year multiplied by five percent (5%). Notwithstanding the foregoing, in the final year of a Participant's employment, an Annual Pay Credit shall be credited to such Participant's account, calculated by multiplying such Participant's Earnings in the current Plan Year up to the Participant's termination date by five percent (5%).

(d) **Interest Credits.** Interest Credits based on the amount of the Participant's Cash Balance Account as of the last day of each Plan Year shall be added to the Cash Balance Account of each Participant whose benefit is determined under the Cash Balance Formula as of the last day of the Plan Year, prior to the crediting of any Annual Pay Credit or other credit for the following Plan Year. In the final year of employment of each such Participant, interest at the same rate as used in determining the Interest Credit on the last day of the Plan Year in which the Participant's employment is terminated, shall be credited on a pro rata basis up to the date such Participant's benefits commence to the Participant's Cash Balance Account as of January 1 of the Plan Year in which the Participant's employment terminates. Effective January 21, 2004, the preceding sentence shall only apply if the Participant elects to receive his benefit prior to the end of the Plan Year in which the Participant's employment terminates and no additional Interest Credit shall be applied as of the end of the Plan Year to any Annual Pay Credit accrued to a Participant's Cash Balance Account based on his Earnings in the final year of the Participant's employment where the Participant elected to receive his benefit prior to the end of the Plan Year in which the Participant's employment terminates. Except as provided below, Interest Credits shall cease once benefit payments have commenced to the Participant.

If a Participant who is receiving benefits in any form other than a lump-sum payment is re-employed, interest hereunder shall not be credited to the Participant's Cash Balance Account used to determine such benefits but shall be credited to a new Cash Balance Account established on behalf of such Participant, provided that such a Participant who is re-employed on or after January 1, 2010 shall not be entitled to any further Annual Pay Credits or Interest Credits.

The rate of interest for Interest Credits for Plan Years beginning after December 31, 2004 shall be the one-year constant maturity Treasury Bond rate (or generally accepted proxy therefor (as published by the U.S. Federal Reserve Board)) for the month of November of the immediately preceding Plan Year plus one percentage point. The rate of interest for Interest Credits for Plan Years beginning on January 1, 2002 through January 1, 2004 shall be the twelve (12)-month average of the thirty (30)-year constant maturity Treasury Bond rates (or the generally accepted proxy therefor) as published by the U.S. Federal Reserve Board, determined for the twelve (12)-months ending in November of the immediately preceding year. Notwithstanding any other provision of the Plan to the contrary, an Employer reserves the right to change the interest rate used to determine the Interest Credits at any time prior to the end of the Plan Year in which such credit is added to the Participant's Cash Balance Account.

Effective for Plan Years beginning after December 31, 2007, and solely with respect to Participants who have one (1) Hour of Service on or after December 31, 2007, the interest rate used for Interest Credits for any Plan Year shall not exceed a market rate of return. In addition, and regardless of the rate specified in the Plan, an Interest Credit (or equivalent amount) of less than zero shall in no event result in the Cash Balance Account or similar amount being less than the Pay Credits to such Participant’s Cash Balance Account, reduced to reflect the value of any prior distributions. This requirement applies only as of an annuity starting date as of which a distribution of the Participant’s entire vested remaining benefit under the Plan’s Cash Balance Formula commences.

Notwithstanding the foregoing, upon termination of the Plan,

(i) if the interest credit rate (or equivalent amount) under the Plan is a variable rate, the rate of interest used to determine Accrued Benefits under the Plan attributable to the Cash Balance Account shall be equal to the average of the rates of interest used under the Plan during the five (5) year period ending on the termination date; and

(ii) with respect to the portion of the Accrued Benefit attributable to the Cash Balance Account, the interest rate and mortality table used to determine the amount of any benefit under the Plan payable in the form of an annuity at Normal Retirement Date shall be the rate and table specified under the Plan for such purpose as of the termination date, except that if such interest rate is a variable rate, the interest rate shall be determined under the rules of subclause (i) above.

The foregoing provisions shall be operated and interpreted in accordance with Section 411(b)(5) of the Code (as amended from time to time) and regulatory guidance issued thereunder.

<u>4.2</u> **DEFERRED RETIREMENT BENEFIT.** A Participant who retires from employment with the Employer after his Normal Retirement Date shall be eligible to receive distribution of his vested Accrued Benefit following his Deferred Retirement Date. In no event, however, shall distribution of the Participant's vested Accrued Benefit be made or commence later than the Participant's required beginning date, as defined in Section 5.8(f)(iv).

To the extent required by law, in the event a Participant is employed after attaining age seventy and one-half (70½), his Accrued Benefit shall be actuarially increased, to take into account the period after age 70½ in which the Participant was not receiving any benefits under the Plan, in accordance with Section 40l(a)(9)(C)(iii) of the Code and regulatory guidance thereunder. To the extent permitted by the Code, including Code Section 411(b)(1)(H), any such actuarial increase shall be offset against benefit accruals for periods of service after the Participant’s attainment of age 70-1/2.

Notwithstanding any other provision of this Plan, with respect to the period from a Participant's Normal Retirement Date to his termination of employment, the Participant shall receive benefit payments under this Plan for each month in which he is compensated for fewer than 40 Hours of Service.

<u>4.3</u> **DISABILITY.**

(a) **Effect of Disability on Benefits Under the Career Earnings Formula.** Upon becoming Disabled, a Participant who has completed at least three (3) years of Credited Service shall be eligible for Disability Leave Status. Such status may be terminated or suspended by the Administrator if at any time before Normal Retirement Age the Participant again engages in regular full-time employment, fails or refuses to undergo any medical examination ordered by the Administrator, or the Administrator determines on the basis of a medical examination that the Participant has sufficiently recovered to engage in regular full-time employment. While on Disability Leave Status, a Participant shall be credited with Credited Service, and with Earnings at the same rate as he had earned in the calendar year prior to the calendar year in which he became Disabled, until the Participant retires, dies, reached his Normal Retirement Age, or his Disability Leave Status is sooner terminated or suspended.

(b) **Effect of Disability on Benefits Under the Cash Balance Formula.** If a Participant who has completed at least three (3) years of Credited Service and who is an Employee suffers a Disability prior to termination, and, for reasons thereof, the Participant's status as an Employee ceases, then such Participant shall continue to be credited with Annual Pay Credits and Interest Credits during the period of such Disability as described below and as provided in Section 4.1, as if the individual were still actively employed. For the purpose of determining a Disabled Participant's Annual Pay Credits for any Plan Year, such Participant's Earnings for any period of Disability shall be equal to the Participant's Earnings during the full calendar year immediately preceding the date of such Disability (annualized in the event the Participant did not receive twelve (12) full months of Earnings). Additionally, years of Credited Service (determined on the basis of the Participant's regularly scheduled Hours of Service as of the date immediately preceding the date of such Disability) shall continue to be credited during the period in which credits continue to be credited to the Participant's Cash Balance Account. Annual Pay Credits for a Plan Year shall be determined based on the Disabled Participant's attained age and Anniversary Years (including the additional service described above) as of the immediately preceding December 31. However, such credits shall cease upon the earliest to occur of:

(1) the day on which the Participant's long-term disability plan payments cease;

(2) the day the Participant dies;

(3) the date the Participant begins to receive benefit payments under the Plan; or

(4) the fifth (5^{th}) anniversary of the last day the Participant was actively at work prior to such Disability, as determined by the Administrator.

4.4 **VESTING AND EARLY COMMENCEMENT.**

(a) **Commencement of Vested Benefits at Normal Retirement Date.** A Participant who terminates employment with the Employer, for any reason other than his death, Disability or termination of employment on or after his Normal Retirement Date, after completing at least three (3) years of Credited Service shall be entitled to receive a benefit commencing at his Normal Retirement Date calculated in accordance with Section 4.1, the monthly amount of which, if such benefit were paid in the form of a single life annuity, shall be equal to the Participant's Accrued Benefit. Subject to the provisions of Article Five, any benefit payable under his Section shall be made pursuant to the provision of Article Five.

(b) Commencement of Vested Retirement Benefits Before Normal Retirement Date.

(1) Provisions Applicable to Accrued Benefits Attributable to the Cash Balance Formula. Subject to the provisions of Article Five, a Participant who terminates employment after completing three (3) or more years of Credited Service shall be entitled to elect that the benefit payable pursuant to the Cash Balance Formula, if any, commence on the first day of any month coincident with or next following his termination up to his Normal Retirement Date.

(2) Provisions Applicable to Commencement of Vested Retirement Benefits Attributable to the Career Earnings Formula. The benefit determined under the Career Earnings Formula of a Participant whose termination from employment date occurs prior to his Normal Retirement Date shall not commence until the Participant's Normal Retirement Date, except as follows:

(A) A Participant whose termination from employment occurs on or after the Participant's attainment of age fifty-five (55) and following his completion of at least ten (10) years of Credited Service may elect to commence his benefit as of the first day of any month prior to the Participant's Normal Retirement Date. If such a Participant elects an annuity starting date that is prior to the Participant's Normal Retirement Date, the retirement benefit payable as of such date shall equal the Participant's Accrued Benefit multiplied by the applicable percentages contained in Schedule A;

(B) A Participant whose termination from employment occurs on or after the date as of which the sum of the Participant's age and the Participant's years of Credited Service equal or exceed a total of ninety (90) years, may elect to commence his benefit as of the first day of any month on or after the Participant's attainment of age fifty-five (55) and prior to the Participant's Normal Retirement Date. If such a Participant elects an annuity starting date that is prior to the Participant's Normal Retirement Date, the benefit payable as of such date shall equal the Participant's Accrued Benefit multiplied by the applicable percentages contained in Schedule B;

(C) A Participant whose termination from employment occurs on or after the date as of which the Participant has completed three (3) or more years of Credited Service, but prior to the date as of which the Participant satisfies the requirements of Sections 4.4(b)(2)(A) and (B), such Participant may elect to commence his benefit as of the first day of any month prior to the Participant's Normal Retirement Date on or after the Participant has attained age fifty-five (55). If such a Participant elects an annuity starting date that is prior to the Participant's Normal Retirement Date, the benefit payable as of such date shall equal the Participant's Accrued Benefit multiplied by the applicable percentages contained in Schedule C.

(D) The foregoing notwithstanding, the benefit of a Participant who has completed at least three (3) years or Credited Service shall in no event be less than the benefit to which the Participant would have been entitled had he terminated employment on December 31, 1993, under the terms and conditions of the Plan as then in effect (the "1993 Annuity"). A Participant may elect to receive his 1993 Annuity, if any, prior to attaining age fifty-five (55) but in no event prior to attaining age fifty (50). If such a Participant elects an annuity starting date for this 1993 Annuity that is prior to the Participant attaining age fifty-five (55), the benefit payable as of such date shall equal the Participant's 1993 Annuity, reduced by 4% for each year (or portion thereof determined on a monthly basis) that it is received prior to age sixty-five (65), measured from the annuity starting date.

If a Participant makes such an election, the remaining portion of his Accrued Benefit, if any, determined as of the date he elects to receive the 1993 Annuity and expressed as a benefit payable at age sixty-five (65), shall be the amount obtained by subtracting the Participant's reduced 1993 Annuity from the product of his Accrued Benefit multiplied by the Actuarial Factor. The resulting net benefit amount, if any, shall then be divided by the Actuarial Factor to obtain the remaining benefit payable at age sixty-five (65). For purposes of this computation, the "Actuarial Factor" shall mean the product of 40% multiplied by the Actuarial Equivalent benefit of an annual benefit of $1 commencing at age fifty-five (55), determined as of the date the Participant begins to receive his 1993 Annuity. The remaining portion of the Accrued Benefit so determined shall be payable under the terms and conditions of the Plan in effect at the Participant's termination of employment.

A Participant who terminates employment with a vested right to his 1993 Annuity may elect to receive the 1993 Annuity in any of the optional forms of benefit available to such Participant as in effect under the Plan on December 31, 1993.

(E) The nonvested portion of a Participant's Accrued Benefit shall be forfeited as of the earlier of (i) the last day of the Plan Year in which the Participant receives distribution of his vested Accrued Benefit, or (ii) the last day of the Plan Year in which the Participant incurs five (5) consecutive Breaks in Service. For this purpose, a Participant who is not vested in any portion of his Accrued Benefit as of the date he separates from service shall be deemed to have received distribution of his Accrued Benefit as of the end of the Plan Year following the Plan Year in which he terminates employment.

4.5 ADJUSTMENT FOR IN-SERVICE PAYMENTS.

In the case of a Participant whose benefit payments commence prior to his termination from employment:

(a) Retirement benefits payable under the Career Earnings Formula shall be reduced to reflect the Actuarial Equivalent value of amounts previously paid to the Participant; and

(b) the Participant's benefit determined under the Cash Balance Formula shall be adjusted, if appropriate, in each calendar year beginning after the Participant's annuity starting date, to reflect changes in his Accrued Benefit resulting from adjustments to the Participant's Cash Balance Account for the next preceding calendar year.

4.6 TRANSFER OF EMPLOYMENT.

Except as otherwise specified herein, in the case of a Participant who transfers from employment with an Employer to a "related group member" (within the meaning of Section 2.5) which has not adopted the Plan, such Participant shall not earn Credited Service for Anniversary Years during which the Participant is employed by such related group member, nor shall the Participant's Earnings be recognized with respect to such period. No Annual Pay Credits shall be made to the Participant's Cash Balance Account with respect to the period of such Participant's employment with such related group member, however, such Participant's Cash Balance Account shall continue to be credited with Interest Credits during such period until the end of the month prior to the month in which payment under the Plan commences.

ARTICLE FIVE--TIME AND MODE OF DISTRIBUTION OF PLAN BENEFITS

5.1 **NORMAL FORM OF BENEFIT.** In the case of an unmarried Participant, the normal form of benefit shall be a single-life annuity. Under such form, monthly benefits shall be paid for the lifetime of the Participant. For a married Participant, the provisions of Section 5.2 shall apply in lieu of this Section. Alternatively, a Participant shall be permitted to select any of the available options in Section 5.3, subject to the restrictions contained in Section 5.3.

Notwithstanding the foregoing, if the Actuarial Equivalent lump sum value of the Participant's vested Accrued Benefit does not exceed $1,000, the Participant's entire vested Accrued Benefit shall be distributed to the Participant (or, in the event of the Participant's death, his Beneficiary) in a lump-sum payment as soon as administratively practicable following the date the Participant retires, dies or otherwise terminates from employment.

5.2 **JOINT AND SURVIVOR ANNUITY.** For any Participant who is married on his "annuity starting date" (defined below), his benefit under the Plan shall be paid in the form of a "qualified joint and survivor annuity" (defined below) unless the Participant, with the consent of his spouse, elects to waive such form of benefit during the election period described in paragraph (d) below; provided, however, that the consent of the Participant's spouse shall not be required if the Participant selects an option set forth in Section 5.3(b) with his spouse as his Beneficiary.

(a) The "qualified joint and survivor annuity" means an annuity for the life of the Participant with a survivor annuity for the life of the Participant's surviving spouse equal to fifty percent (50%) of the amount of the annuity payable during the joint lives of the Participant and the Participant's spouse. The qualified joint and survivor annuity shall be the Actuarial Equivalent of the Participant's Accrued Benefit payable in the normal form specified under Section 5.1 for an unmarried Participant.

(b) The Participant may elect to waive the qualified joint and survivor annuity form of benefit at any time during the election period. Such an election must be made in writing on a form acceptable to the Administrator. However, an election to waive the qualified joint and survivor annuity shall not take effect unless (1) the Participant's spouse consents in writing to the election, (2) the election designates a specific alternate Beneficiary, if applicable, which may not be changed without spousal consent (unless the Participant's spouse expressly permits designations by the Participant without any further spousal consent), (3) the spouse's consent acknowledges the effect of the election, and (4) the spouse's consent is witnessed by a notary public. In addition, a Participant's waiver of the qualified joint and survivor annuity shall not be effective unless the election designates a form of benefit payment which may not be changed without spousal consent (or the Participant's spouse expressly permits designation by the Participant without any further spousal consent). Notwithstanding the foregoing, spousal consent hereunder shall not be required if it is established to the satisfaction of the Administrator that the spouse's consent cannot be obtained because such spouse cannot be located, or because of such other circumstances as may be prescribed in Section 417 of the Code or regulatory guidance promulgated thereunder.

(c) Any consent by a spouse obtained under this Section (or establishment that the consent of a spouse may not be obtained) shall be effective only with respect to such spouse. A consent that permits designations by the Participant without any requirement of further consent by such spouse must acknowledge that the spouse has the right to limit consent to a specific Beneficiary, and/or a specific form of benefit where applicable, and that the spouse voluntarily elects to relinquish either or both of such rights. No consent obtained under this provision shall be valid unless the Participant has received notice as provided below. In addition, any waiver made in accordance with this Section may be revoked at any time prior to the commencement of benefits under the Plan in accordance with procedures established by the Administrator. A Participant is not limited to the number of revocations or elections that may be made hereunder.

(d) The "election period" under this Section shall be the one hundred eighty (180) days) period prior to the "annuity starting date," which date shall be the first day of the first period in which an amount is payable as an annuity or, if such benefit is not payable as an annuity, the first day on which the Participant may begin to receive a distribution from the Plan.

(e) The Administrator shall provide to each Participant, not less than thirty (30) days, and not more than one hundred eighty (180) days) days, prior to the annuity starting date, a written explanation of:

(1) the terms and conditions of the qualified joint and survivor annuity;

(2) the Participant's right to make, and the effect of, an election to waive such annuity;

(3) the right of the Participant's spouse regarding the required spousal consent to an election to waive the qualified joint and survivor annuity;

(4) the right to make, and the effect of, a revocation of an election to waive such annuity; and

(5) the relative values of the forms of benefit available under the Plan.

The description of a Participant's right, if any, to defer distribution shall also describe the consequences of failing to defer receipt of the distribution in accordance with the requirements of applicable law.

(f) Notwithstanding anything contained herein to the contrary, if the Actuarial Equivalent lump sum value of a Participant's Accrued Benefit does not exceed $1,000, distribution of the Participant's vested Accrued Benefit shall be made in the form of a lump-sum payment in accordance with the provisions of Section 5.1 above.

A Participant who elects to waive the "qualified joint and survivor annuity" form of benefit shall be entitled to elect the "qualified optional survivor annuity" at any time during the applicable election period. Any such election shall not be subject to the spousal consent requirements of Section 5.2(b). Furthermore, the written explanation of the joint and survivor annuity shall explain the terms and conditions of the qualified optional survivor annuity.

For such purposes, the term "qualified optional survivor annuity" means an annuity:

(1) for the life of the Participant, with a survivor annuity for the life of the spouse which is equal to the "applicable percentage" of the amount of the annuity which is payable during the joint lives of the Participant and his or her spouse; and

(2) which is the Actuarial Equivalent of the Participant's Accrued Benefit payable in the normal form specified under Section 5.1 for an unmarried Participant.

Such term also includes any annuity in a form having the effect of an annuity described in the preceding sentence.

The "applicable percentage" shall be based on the survivor annuity percentage (i.e., the percentage which the survivor annuity under the Plan's qualified joint and survivor annuity bears to the annuity payable during the joint lives of the Participant and his or her spouse). For this purpose, if the survivor annuity percentage is less than seventy-five percent (75%), then the "applicable percentage" shall be seventy-five percent (75%); otherwise, the "applicable percentage" shall be fifty percent (50%).

<u>5.3</u> **OPTIONAL FORMS OF BENEFIT PAYMENTS.** In lieu of the normal forms of benefit described under Sections 5.1 and 5.2, a Participant may elect to receive (with the consent of his spouse, if required under Section 5.2) any of the alternative forms of benefit described below, provided that a Participant who has not satisfied the requirements of Section 4.4(b)(2)(A) or Section 4.4(b)(2)(B) as of his date of termination of employment may not elect the forms of payment described in Sections 5.3(b), (c), or (d), except that a Participant with a benefit under the Cash Balance Formula may elect a lump sum form of payment under Section 5.3(d):

(a) A monthly benefit payable to and during the lifetime of the Participant with benefit payments ceasing in the month of the Participant's death; or

(b) A monthly benefit payable to and during the lifetime of the Participant with the provision that after his death, a monthly benefit at the rate of 50%, 75% or 100% of his monthly benefit shall then be paid to and during the lifetime of his designated Beneficiary; provided, however, that payments under this option shall be restricted to the extent required to ensure compliance with minimum distribution incidental death benefit requirement of Section 40l(a)(9) of the Code and the regulations promulgated thereunder; or

(c) If the Participant's benefit is to commence prior to the Participant's Normal Retirement Date, the Participant may elect to convert the benefit otherwise payable to him into a benefit of an Actuarial Equivalent value of such amount so that with his expected Social Security benefit, he shall receive, so far as possible, the same amount each year before and after such expected Social Security benefit commences. A Participant whose benefit commences before he reaches age sixty-two (62) may elect the level income option based on his Social Security benefit as of age sixty-two (62) or his Social Security benefit as of age sixty-five (65). A Participant whose benefit commences after he reaches age sixty- two (62) may only elect the level income option based on his Social Security benefit as of age sixty-five (65). Monthly payments shall terminate upon the death of the Participant unless the Participant elected the level income option in conjunction with the "qualified joint and survivor annuity under Section 5.2 or the joint and contingent annuity option described in Section 5.3(b), in which event payments shall continue pursuant to such election if the Participant's spouse or Beneficiary, as applicable, survives the Participant.

A Participant may not elect this level income option if the Participant's monthly payments under the option would be equal to zero (0) following the Participant's attainment of age sixty-two (62) or age sixty-five (65), as applicable, nor may a Participant elect this option in conjunction with a 75% joint and contingent annuity option described in Section 5.3(b).

(d) With respect to a benefit determined under the Career Earnings Formula, a Participant may elect to receive his benefit in the form of a lump sum payment; provided that (i) the election to receive such lump sum must be made no later than the end of the second calendar month following the Participant's retirement and (ii) distribution must be made no later than the second calendar month following the Participant's retirement. Such lump sum shall be the Actuarial Equivalent of the Participant's Accrued Benefit. With respect to a benefit determined under the Cash Balance Formula, a Participant may elect to receive his benefit in the form of a lump sum, which lump sum shall be equal to the amount credited to his Cash Balance Account as of the last day of the month next preceding his benefit commencement date.

Separately with respect to the portion of a Participant’s Accrued Benefit determined under Section 4.1(a) (the “Career Earnings Benefit”) and the portion of a Participant’s Accrued Benefit determined under Section 4.1(b) (the “Cash Balance Benefit”), for purposes of this paragraph each separately an “Accrued Benefit”, the Participant or Beneficiary may elect to divide the Participant’s Accrued Benefit into Career Earnings Benefit and Cash Balance Benefit portions as described in this section. A Participant or Beneficiary may elect a combination of distribution options for the divided portions of the Participant’s Accrued Benefit to the following extent: A Participant or Beneficiary who elects to bifurcate the Participant’s Accrued Benefit may divide the benefit between no more than two distribution forms, with either the Cash Balance Benefit or the Career Earnings Benefit portion payable in a lump sum (A) to the Participant, as described in Section 5.3(d), and, the Career Earnings Benefit or the Cash Balance Benefit portion payable, as applicable, in one of the other optional forms available as described in this Section 5.3 (subject to the requirements of Sections 5.1 and 5.2), or (B) to the Beneficiary, as described in Section 6.1 or 6.2, as applicable, and the Career Earnings Benefit portion or the Cash Balance Benefit portion, as applicable, payable as provided under Section 6.1 or 6.2, as applicable. If a Participant or Beneficiary elects to divide the Participant’s Accrued Benefit, the amount of the distribution payable with respect to the Accrued Benefit shall be determined in accordance with the method for calculating the amount of a distribution payable in the optional form elected for that portion as if that portion were the Participant’s entire Accrued Benefit.

Any of the alternative forms of benefit set forth shall be the Actuarial Equivalent to the normal form of benefit described in Section 5.1 for an unmarried Participant.

Benefit elections shall be made and filed in accordance with uniform administrative procedures established by the Administrator.

If the Beneficiary dies after the election of an option but prior to the commencement of payments to the Participant, the election shall be null and void and the Participant may elect any alternative form of payment, subject to the foregoing provisions of the Article Five. If the Beneficiary dies following the commencement of monthly payments to a Participant under Section 5.3(b) or (c), payment of the monthly benefit shall continue only to the Participant.

<u>5.4</u> **REVOCATION OR CHANGE OF OPTIONAL FORM.** A Participant may revoke or change any election previously made, or deemed to be made under this Article Five, at any time prior to benefit commencement in accordance with procedures established by the Administrator, subject to the spousal consent and other requirements of this Article Five. A Participant is not limited to the number of revocations or elections that may be made hereunder. Once payments commence, there can be no revocation or change to the form of benefit or, if applicable, to the Beneficiary under a joint and survivor form of benefit.

<u>5.5</u> **TIME OF COMMENCEMENT OF RETIREMENT PAYMENTS.** Subject to the following provisions of this Section, unless the Participant elects otherwise, distribution of the Participant's vested Accrued Benefit shall be made or commence no later than the sixtieth (60) day after the latest of the close of the Plan Year in which: (a) the Participant attains age sixty-five (65) (or Normal Retirement Date, if earlier), (b) occurs the 10th anniversary of the year in which the Participant commenced participation in the Plan, or (c) the Participant terminates service with the Employer. However if the Actuarial Equivalent lump-sum value of the Participant's vested Accrued Benefit exceeds $1,000, distribution of his benefit shall not commence prior to such Participant's Normal Retirement Date unless the Participant otherwise elects in writing.

If a Participant terminates employment for any reason other than retirement, Disability or death, distribution of his vested Accrued Benefit shall normally commence as soon as administratively practical following the close of the Plan Year in which he attains his Normal Retirement Date.

In no event, however, shall distribution of the Participant's vested Accrued Benefit be made or commence later than the Participant's required beginning date, as defined in Section 5.8(f)(iv).

<u>5.6</u> **REEMPLOYMENT.** In the case of a Participant who is reemployed before January 1, 2010 by the Employer after he has received or begun

to receive benefits under the Plan, such Participant's participation in the Plan shall resume as of the date of such Participant's reemployment and benefit payments under the Plan shall be suspended during the period of his reemployment with respect to benefits accrued prior to such reemployment, subject to the terms of the Plan then in effect. In the case of a Participant who is reemployed on or after January 1, 2010 by the Employer after he had received or begun to receive benefits under the Plan, such Participant's participation in the Plan shall not resume for purposes of benefit accrual and benefit payment shall not be suspended.

5.7 **NOTICE TO EMPLOYEES.** If a Participant's monthly retirement benefits are suspended under Section 5.6 or due to continued employment past Normal Retirement Age, the Administrator shall notify the Participant of the suspension; such notice shall contain such information and shall be given at such time as may be required by applicable law or regulation.

5.8 MINIMUM DISTRIBUTION RULES.

(a) General Rules.

(i) Application. The provisions of this Section 5.8 shall apply for purposes of determining required minimum distributions.

(ii) Precedence. The requirements of this Section 5.8 shall take precedence over any inconsistent provisions of the Plan; provided, however, that this Section 5.8 shall not require the Plan to provide any form of benefit, or any option, not otherwise provided under Section 5.1, 5.2, or 5.3.

(iii) Requirements of Treasury Regulations Incorporated. All distributions required under this Section shall be determined and made in accordance with the Treasury regulations under Section 401(a)(9) of the Code, including the incidental death benefit requirement in Section 401(a)(9)(G) and regulatory guidance issued thereunder.

(iv) TEFRA Section 242(b)(2) Elections. Notwithstanding the other provisions of this Section, other than subsection (i) above, distributions may be made under a designation made before January 1, 1984, in accordance with Section 242(b)(2) of the Tax Equity and Fiscal Responsibility Act (TEFRA) and the provisions of the Plan that relate to Section 242(b)(2) of TEFRA.

(b) Time and Manner of Distributions.

(i) Required Beginning Date. The Participant's entire interest shall be distributed, or begin to be distributed, to the Participant no later than the Participant's required beginning date.

(ii) Death of Participant Before Distributions Begin. If the Participant dies before distributions begin, the Participant's entire interest shall be distributed, or begin to be distributed, no later than as follows:

(1) If the Participant's surviving spouse is the Participant's sole designated Beneficiary, then, except as provided in the Plan, distributions to the surviving spouse shall begin by December 31 of the calendar year immediately following the calendar year in which the Participant died, or by December 31 of the calendar year in which the Participant would have attained age 70 1/2, if later.

(2) If the Participant's surviving spouse is not the Participant's sole designated Beneficiary, and if distribution is to be made over the life of, or over a period certain not exceeding the life expectancy of, the designated Beneficiary (if permitted or required under Section 5.3 or Article Six), distribution to the designated Beneficiary shall begin by December 31 of the calendar year immediately following the calendar year in which the Participant died.

(3) If there is no designated Beneficiary as of September 30 of the year following the year of the Participant's death, or if the provisions of subsection (1) and (2) do not otherwise apply, the Participant's entire interest shall be distributed by December 31 of the calendar year containing the fifth annual anniversary of the Participant's death.

(4) If the Participant's surviving spouse is the Participant's sole designated Beneficiary and the surviving spouse dies after the Participant but before distributions to the surviving spouse begin, this Section 5.8(b)(ii), other than Section 5.8(b)(ii)(l), shall apply as if the surviving spouse were the Participant.

For purposes of this Section 5.8(b)(ii) and Section 5.8(e), distributions are considered to begin on the Participant's required beginning date (or, if Section 5.8(b)(ii)(4) applies, the date distributions are required to begin to the surviving spouse under Section 5.8(b)(ii)(l)). If annuity payments irrevocably commence to the Participant before the Participant's required beginning date (or to the Participant's surviving spouse before the date distributions are required to begin to the surviving spouse under Section 5.8(b)(ii)(l)), the date distributions are considered to begin is the date distributions actually commence.

(iii) Form of Distribution. 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 shall be made in accordance with Sections 5.8(c), 5.8(d) and 5.8(e). If the Participant's interest is distributed in the form of an annuity purchased from an insurance company, distributions thereunder shall be made in accordance with the requirements of Section 40l(a)(9) of the Code and the Treasury regulations. Any part of the Participant's interest which is in the form of an individual account described in Section 414(k) of the Code shall be distributed in a manner satisfying the requirements of Section 40l(a)(9) of the Code and the Treasury regulations that apply to individual accounts.

(c) <u>**Determination of Amount to be Distributed Each Year.**</u>

(i) **General Annuity Requirements.** If the Participant's interest is paid in the form of an annuity under the Plan, payments under the annuity shall satisfy the following requirements:

(1) the annuity distributions shall be paid in periodic payments made at intervals not longer than one year;

(2) the distribution period shall be over a life (or lives) or over a period certain not longer than the period described in Section 5.8(d) or 5.8(e);

(3) once payments have begun over a period certain, the period certain shall not be changed even if the period certain is shorter than the maximum permitted;

(4) payments shall either be nonincreasing or increase only as follows:

(A) by an annual percentage increase that does not exceed the annual percentage increase in a cost-of-living index that is based on prices of all items and issued by the Bureau of Labor Statistics;

(B) to the extent of the reduction in the amount of the Participant's payments to provide for a survivor benefit upon death, but only if the Beneficiary whose life was being used to determine the distribution period described in Section 5.8(d) dies or is no longer the Participant's Beneficiary pursuant to a qualified domestic relations order within the meaning of Section 414(p);

(C) to provide cash refunds of employee contributions upon the Participant's death; or

(D) to pay increased benefits that result from a Plan amendment.

(ii) **Amount Required to be Distributed by Required Beginning Date.** The amount that must be distributed on or before the Participant's required beginning date (or, if the Participant dies before distributions begin, the date distributions are required to begin under Section 5.8(b)(ii)(l) or (ii)(2)) is the payment that is required for one payment interval. The second payment need not be made until the end of the next payment interval even if that payment interval ends in the next calendar year. Payment intervals are the periods for which payments are received, e.g., bi-monthly, monthly, semi-annually, or annually. All of the Participant's benefit accruals as of the last day of the first distribution calendar year shall be included in the calculation of the amount of the annuity payments for payment intervals ending on or after the Participant's required beginning date.

(iii) **Additional Accruals After First Distribution Calendar Year.** Any additional benefits accruing to the Participant in a calendar year after the first distribution calendar year shall be distributed beginning with the first payment interval ending in the calendar year immediately following the calendar year in which such amount accrues.

(d) <u>**Requirements for Annuity Distributions that Commence During Participant's Lifetime.**</u>

(i) **Joint Life Annuities Where the Beneficiary Is Not the Participant's Spouse.** If the Participant's interest is being distributed in the form of a joint and survivor annuity for the joint lives of the Participant and a nonspouse Beneficiary, annuity payments to be made on or after the Participant's required beginning date to the designated Beneficiary after the Participant's death must not at any time exceed the applicable percentage of the annuity payment for such period that would have been payable to the Participant using the table set forth in Q&A-2 of Section l.40l(a)(9)-6 of the Treasury regulations. If the form of distribution combines a joint and survivor annuity for the joint lives of the Participant and a nonspouse Beneficiary and a period certain annuity, the requirement in the preceding sentence shall apply to annuity payments to be made to the designated Beneficiary after the expiration of the period certain.

(ii) **Period Certain Annuities.** Unless the Participant's spouse is the sole designated Beneficiary and the form of distribution is a period certain and no life annuity, the period certain for an annuity distribution commencing during the Participant's lifetime may not exceed the applicable distribution period for the Participant under the Uniform Lifetime Table set forth in Section l.40l(a)(9)-9 of the Treasury regulations for the calendar year that contains the annuity starting date. If the annuity starting date precedes the year in which the Participant reaches age 70, the applicable distribution period for the Participant is the distribution period for age 70 under the Uniform Lifetime Table set forth in Section l.40l(a)(9)-9 of the Treasury regulations plus the excess of 70 over the age of the Participant as of the Participant's birthday in the year that contains the annuity starting date. If the Participant's spouse is the Participant's sole designated Beneficiary and the form of distribution is a period certain and no life annuity, the period certain may not exceed the longer of the Participant's applicable distribution period, as determined under this Section 5.8(d), or the joint life and last survivor expectancy of the Participant and the Participant's spouse as determined under the Joint and Last Survivor Table set forth in Section l.40l(a)(9)-9 of the Treasury regulations, using the Participant's and spouse's attained ages as of the Participant's and spouse's birthdays in the calendar year that contains the annuity starting date.

(e) <u>**Requirements for Minimum Distributions Where Participant Dies Before Distributions Begin.**</u>

(i) **Participant Survived by Designated Beneficiary.** Except as provided in the Plan, if the Participant dies before the date distribution of his or her interest begins and there is a designated Beneficiary, the Participant's entire interest shall be distributed, beginning no later than the time described in Section 5.8(b)(ii)(1) or (ii)(2), over the life of the designated Beneficiary or over a period certain not exceeding:

(1) unless the annuity starting date is before the first distribution calendar year, the life expectancy of the designated Beneficiary determined using the Beneficiary's age as of the Beneficiary's birthday in the calendar year immediately following the calendar year of the Participant's death; or

(2) if the annuity starting date is before the first distribution calendar year, the life expectancy of the designated Beneficiary determined using the Beneficiary's age as of the Beneficiary's birthday in the calendar year that contains the annuity starting date.

(ii) **No Designated Beneficiary.** If the Participant dies before the date distributions begin and there is no designated Beneficiary as of September 30 of the year following the year of the Participant's death, distribution of the Participant's entire interest shall be completed by December 31 of the calendar year containing the fifth annual anniversary of the Participant's death.

(iii) **Death of Surviving Spouse Before Distributions to Surviving Spouse Begin.** If the Participant dies before the date distribution of his or her interest begins, the Participant's surviving spouse is the Participant's sole designated Beneficiary, and the surviving spouse dies before distributions to the surviving spouse begin, this Section 5.8(e) shall apply as if the surviving spouse were the Participant, except that the time by which distributions must begin shall be determined without regard to Section 5.8(b)(ii)(1).

(f) **Definitions.**

(i) **Designated Beneficiary.** The individual who is designated as the Beneficiary under Section 5.3, 6.1 or 6.2 of the Plan, as applicable, and is the designated Beneficiary under Section 40l(a)(9) of the Internal Revenue Code and Section 1.401(a)(9)-4 of the Treasury regulations.

(ii) **Distribution Calendar Year.** 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 pursuant to Section 5.8(b)(ii).

(iii) **Life expectancy.** Life expectancy as computed by use of the Single Life Table in Section l.40l(a)(9)-9 of the Treasury regulations.

(iv) **Required beginning date.** In no event shall distribution of the Participant's vested Accrued Benefit be made or commence later than the April 1st following the end of the calendar year in which the Participant attains age seventy and one- half (70½), or, except for a Participant who is a five percent (5%) owner of the Employer (within the meaning of Section 401(a)(9)(C) of the Code), if later, the April 1st following the calendar year in which the Participant retires from employment with the Employer (the "required beginning date").

5.9 **ELIGIBLE ROLLOVER DISTRIBUTIONS.** Notwithstanding the foregoing provisions of this Article Five, the provisions of this Section 5.9 shall apply to distributions made under the Plan.

(a) A "Distributee" (as hereinafter defined) may elect, at the time and in the manner prescribed by the Administrator, to have any portion of an "eligible rollover distribution" (as hereinafter defined) paid directly to an eligible retirement plan specified by the Distributee in a direct rollover.

(b) Definitions:

(i) *Eligible Rollover Distribution.* An eligible rollover distribution is any distribution made to the Distributee, except that an eligible rollover distribution does not include: any distribution that is one of a series of substantially equal periodic payments (not less frequently than annually) made for the life (or life expectancy) of the Distributee or the joint lives (or joint life expectancies) of the Distributee and the Distributee's designated Beneficiary, or for a specified period of ten (10) years or more; any distribution to the extent such distribution is required under Section 401(a)(9) of the Code; any hardship distribution. A portion of a distribution shall not fail to be an eligible rollover distribution merely because the portion consists of after-tax employee contributions which are not includible in gross income

(ii) *Eligible Retirement Plan.* An eligible retirement plan is an individual retirement account described in Section 408(a) of the Code, an individual retirement annuity described in Section 408(b) of the Code, a Roth IRA described in Code Section 408A(b) (subject to the requirement of applicable law), an annuity plan described in Section 403(a) of the Code, a qualified trust described in Section 401(a) of the Code, an annuity contract described in Section 403(b) of the Code and 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 which agrees to separately account for amounts transferred into such plan from this Plan, that accepts the Distributee's eligible rollover distribution. The definition of eligible retirement plan shall also apply in the case of a distribution to a surviving spouse, or to a spouse or former spouse who is an alternate payee under a qualified domestic relations order, as defined in Section 414(p) of the Code. Notwithstanding the foregoing, (A) with respect to any after-tax contributions, an eligible retirement plan is an individual retirement account or annuity described in Section 408(a) or 408(b) of the Code, a qualified plan or a 403(b) plan that agrees to separately account for amounts so transferred, including accounting separately for the portion(s) of such distribution which are includable, and not includable, in gross income, and (B) for a Distributee who is a non-spouse "designated beneficiary," an eligible retirement plan is an

individual retirement account (or other permissible eligible retirement plan) established by or for the Beneficiary for purposes of receiving the distribution.

(iii) *Distributee.* A Distributee includes an Employee or former Employee. In addition, the Employee's or former Employee's surviving spouse, and the Employee's or former Employee's spouse or former spouse who is an alternate payee under a qualified domestic relations order, as defined in Section 414(p) of the Code, are Distributees with regard to the interest of the spouse and former spouse. Moreover, a non-spousal Beneficiary who is a "designated beneficiary" under Code Section 401(a)(9)(E) and the regulations promulgated thereunder is a Distributee.

(iv) *Direct Rollover.* A direct rollover is a payment by the Plan to the eligible retirement plan specified by the Distributee.

(c) If a distribution is one to which Sections 40l(a)(11) and 417 of the Code do not apply, such distribution may commence less than thirty (30) days after the notice required under Section 1.41l(a)-l l(c) of the Income Tax Regulations is given, provided that:

(i) the Administrator clearly informs the Participant that the Participant has a right to a period of at least thirty (30) days after receiving the notice to consider the decision of whether or not to elect a distribution (and, if applicable, a particular distribution option); and

(ii) the Participant, after receiving the notice, affirmatively elects a distribution.

(d) If a distribution is one to which Sections 40l(a)(11) and 417 of the Code applies, the distribution may commence less than thirty (30) days, but not less than seven (7) days, after the notice required under Section l.417(a)(3)-1 of the Income Tax Regulations is given, provided, that the requirements of paragraphs (c)(i) and (c)(ii) above are satisfied with respect to both the Participant and the Participant's spouse, if applicable.

5.10 **RETROACTIVE BENEFIT PAYMENTS.** In the event that the amount of a monthly benefit to any retired or terminated Participant cannot be determined for any reason (including lack of information as to whether the Participant is still living or whether he is married) on the date payment is to commence under this Article Five, payment shall be made retroactive to such date no later than sixty (60) days after the date on which the amount of such monthly benefit can be determined, and shall be adjusted in accordance with procedures established by the Plan Administrator from time to time to reflect delayed payment.

Furthermore, if the written notification described in Section 5.2(e) is furnished to a Participant on or after the Participant's annuity starting date, then (i) the Participant's election period shall not end until 30 days after such notification is provided, and (ii) distributions must commence to such a Participant not more than 180 days after (or longer if distribution has not yet occurred by such 180th day solely for administrative reasons) such notification is provided (in which case the annuity starting date affirmatively elected by the Member shall be referred to as the "Retroactive Annuity Stating Date" and shall be deemed to have occurred on the date such Participant's Plan benefits first became payable). Notwithstanding any provision of the Plan to the contrary, for purposes of the foregoing, Plan benefits shall only be provided based on a Retroactive Annuity Starting Date if all of the following conditions are satisfied:

(a) The Participant affirmatively elects to use the Retroactive Annuity Starting Date.

(b) The Participant's spouse, as of the time distributions actually commence (including an alternate payee who is treated as the Participant's spouse under a qualified domestic relations order as defined in Code section 414(p)), consents to the Retroactive Annuity Starting Date election in a manner that satisfies the spousal consent requirements set forth herein. However, such spousal consent is not required where the amount of such spouse's survivor annuity payments using the Retroactive Annuity Starting Date are no less than the amount that the survivor payments to such spouse would have been under an optional form of benefit that would satisfy the requirements to be a "qualified joint and survivor annuity" under Code section 417(b) and has an annuity starting date after the date that the notification was provided.

(c) The distribution (including appropriate interest rate adjustments) to the Participant provided based on the Retroactive Annuity Starting Date would satisfy the requirements of Code section 415, if the date the distribution commences is substituted for the annuity starting date for all purposes, including for purposes of determining the applicable interest rate and mortality table; provided, however, that such requirement is not applicable in the case of a distribution that commences 12 months or less from the Retroactive Annuity Starting Date, unless the form of benefit is a form of benefit subject to the valuation rules of Code Section 417(e)(3).

(d) Future periodic payments with respect to a Participant who elects a Retroactive Annuity Starting Date are the same as the future periodic payments, if any, that would have been paid to such Participant had payments actually commenced on the Retroactive Annuity Starting Date. In addition, in the case of a form of benefit that would have been subject to Code section 417(e)(3) if distributions had commenced as of the Retroactive Annuity Starting Date, the distribution must be no less than the benefit produced by applying the applicable interest rate and the applicable mortality table determined as of the date the distribution commences to the annuity form that corresponds to the annuity form that was used to determine the benefit amount as of the Retroactive Annuity Starting Date. In the case of either future periodic payments described in the first sentence of this subsection (d) or payments subject to Code section 417(e)(3) described in the second sentence of this subsection (d), the Participant must receive a make-up amount to reflect any missed payments, with an appropriate adjustment for interest, at a rate of interest equal to the applicable interest rate for one-year Treasury-Bills plus 1%, compounded monthly, from the date the payments would have been made to the date payments actually commenced.

ARTICLE SIX--DEATH BENEFITS

6.1 **UNMARRIED PARTICIPANT.** In the case of a Participant who has no surviving spouse and dies after having completed at least three (3) years of Credited Service but prior to his annuity starting date (within the meaning of Section 5.2(d)), his retirement benefit under the Cash Balance Formula, if any, shall be payable to his Beneficiary in a single lump-sum cash distribution as soon as practicable following the applicable date described in Section 6.2. In the case of the death of an unmarried Participant before his annuity starting date, no benefit shall be payable under the Career Earnings Formula.

6.2 MARRIED PARTICIPANT**.**

(a) **Automatic Preretirement Surviving Spouse Benefit.** In the case of a Participant who has a surviving spouse to whom he was married throughout the one (1)-year period ending on the date of his death, and who dies prior to his annuity starting date (within the meaning of Section 5.2(d)), the preretirement death benefit payable to such Participant's surviving spouse shall be a single life annuity. The amount of such single life annuity under the Cash Balance Formula shall be detern1ined based on the spouse's life and shall be the Actuarial Equivalent of the benefit that would have been payable to the Participant in the form of a lump-sum benefit determined on the date of the Participant's death. Such preretirement surviving spouse benefit shall commence at the end of the month following the month in which the Participant would have attained his Normal Retirement Date or earlier, if the spouse so elects. The amount of such single life annuity under the Career Earnings Formula shall be determined as if (i) the Participant's separation from service had occurred on the day immediately preceding his date of death (if he had not previously incurred a separation from service), (ii) the Participant had survived to the day immediately preceding his earliest possible annuity starting date, (iii) the Participant had elected to receive his retirement benefit in the form of an qualified joint and survivor annuity pursuant to Section 5.2, and (iv) the Participant died immediately following such election. Such preretirement surviving spouse benefit, payable for the life of the surviving spouse, shall commence at the end of the month following the month in which the Participant would have attained his Normal Retirement Date or earlier, if the spouse so elects. Provided, however, that if the spouse elects to receive such benefit prior to the earliest retirement age under the Plan, such benefit shall be further reduced using the applicable actuarial assumption set forth in Section 1.2 to reflect such early commencement.

With respect to a Participant who dies before June 26, 2013, solely for purposes of this Section 6.2 and solely with respect to a Participant's Accrued Benefit in excess of the Participant's Accrued Benefit as of December 31, 2008 ("post- 2008 Accrued Benefits"), a person who would, prior to June 26, 2013, otherwise have been considered the Participant's spouse under the Plan, except that he or she is the same sex as the Participant, shall be treated in the same manner as a spouse for purposes of determining the preretirement death benefit payable under this Section 6.2 under the Career Earnings Formula with respect to a Participant's post-2008 Accrued Benefits. Such Participant shall be considered to be a married Participant for purposes of the last sentence of Section 6.1 with respect to such post-2008 Accrued Benefits.

(b) **Lump-Sum Option.** In lieu of an automatic preretirement surviving spouse benefit under Section 6.2(a), a surviving spouse may elect to receive a lump-sum benefit equal to the value of the Participant's Cash Balance Account as of the last day of the month in which the Participant's termination of employment or death occurs, but not less than the amount determined in accordance with the factors in Section 1.2. With respect to a surviving spouse who elects to receive a single sum payment of the present value of the qualified preretirement survivor annuity with respect to the Participant’s Cash Balance Benefit, the amount of the distribution payable with respect to that portion of the benefit shall be determined in accordance with the method for calculating the amount of a distribution payable in the optional form elected for that portion as if that portion were the Participant’s entire Accrued Benefit.

(c) **Waiver of Preretirement Surviving Spouse Benefit.** With respect to a Participant's Accrued Benefit attributable to the Cash Balance Formula, a married Participant may waive the automatic preretirement surviving spouse benefit in accordance with the provisions of this Section 6.2(c).

(1) **Notice Requirements.** The Administrator shall provide each Participant with a written explanation with respect to the automatic preretirement surviving spouse benefit comparable to that required in Section 5.2(e), regarding the qualified joint and surviving annuity, within whichever of the following periods that ends last:

(A) the period beginning on the first day of the Plan Year in which the Participant attains age thirty-two (32) and ending on the last day of the Plan Year in which the Participant attains age thirty-four (34); (B) a reasonable period after an Employee becomes a Participant; or (C) a reasonable period after the joint and survivor rules become applicable to the Participant. A reasonable period described in clauses

(B) and (C) is the period beginning one year before and ending one year after the applicable event. If the Participant's severance from service date is before the date the Participant attains age thirty-five (35), clauses (A), (B) and (C) shall not apply and the Administrator must provide the written explanation within the period beginning one year before and ending one year after the Participant's severance from service date.

(2) **Election Period.** A Participant's waiver of the automatic preretirement surviving spouse benefit is not valid unless (A) the Participant makes the waiver election no earlier than the first day of the Plan Year in which he attains age thirty-five (35) and (B) the Participant's spouse satisfies the consent requirements described in Section 6.2(c)(3). The spouse's consent to the waiver of the automatic preretirement surviving spouse benefit shall be irrevocable, unless the Participant revokes the waiver election. Irrespective of the time of election requirements described in clause (A) of the first sentence of this Section 6.2(c)(2), if the Participant's severance from service date occurs prior to the first day of the Plan Year in which he attains age thirty-five (35), the Administrator shall accept a waiver election with respect to the Participant's benefit attributable to his service prior to his severance from service date. Furthermore, if a Participant who has not separated from service makes a valid waiver election, except for the timing requirement of clause (A) of the first sentence of this Section 6.2(c)(2), the Administrator shall accept that election as valid, but only until the first day of the Plan Year in which the Participant attains age thirty-five (35).

(3) **Elections.** A Participant may elect to waive the automatic preretirement surviving spouse benefit or revoke such election at any time during the applicable election periods described in Section 6.2(c)(2)(A) and (B). An election shall only be given effect if (i) the spouse of the Participant consents in writing to such election, (ii) such election designates another Beneficiary or Beneficiaries to receive the death benefit in the form of a lump-sum benefit which may not be changed without written spousal consent (or the consent of the spouse expressly permits designations by the Participant without the requirements of further consent by the spouse), and (iii) the spouse's consent acknowledges the effect of such election and such consent is witnessed by a notary public. If it is established to the satisfaction of the Administrator that a Participant has no spouse, that his spouse may not be located, or that such other circumstances as the Secretary of the Treasury may prescribe by regulations have occurred, then spousal consent shall not be required. Any spousal consent or lack of requirement of such consent shall only be effective with respect to such spouse.

<u>6.3</u> **AMOUNTS NOT EXCEEDING $1,000.** Notwithstanding the foregoing provisions of this Article Six, if the Actuarial Equivalent value of a benefit payable under this Article does not exceed one-thousand dollars ($1,000), such benefit shall be paid in a single lump-sum payment.

<u>6.4</u> **DESIGNATION OF BENEFICIARY.** Each Participant shall designate a Beneficiary in a manner acceptable to the Administrator to receive payment of any death benefit payable under the Plan if such Beneficiary should survive the Participant. However, no Participant who is married shall be permitted to designate a Beneficiary other than his spouse unless the Participant's spouse has signed a written consent witnessed by a notary public which provides for the designation of an alternate Beneficiary.

Subject to the above, Beneficiary designations may include primary and contingent Beneficiaries, and may be revoked or amended at any time in similar manner or form, and the most recent designation shall govern. A designation of a Beneficiary made by a Participant shall cease to be effective upon his marriage or remarriage. In addition, a spousal Beneficiary designation shall cease to be effective upon the divorce of the Participant and such spouse. In the absence of an effective designation of Beneficiary, or if no designated Beneficiary is surviving as of the date of the Participant's death, any death benefit shall be paid to the surviving spouse of the Participant, or, if no surviving spouse, to the Participant's estate. Notification to Participants of the death benefits under the Plan and the method of designating a Beneficiary shall be given at the time and in the manner provided by regulations and rulings under the Code.

In the event a Beneficiary survives the Participant, but dies before receipt of all payments due that Beneficiary hereunder, any benefits remaining to be paid to the Beneficiary shall be paid to the Beneficiary's estate.

<u>6.5</u> **HEART ACT DEATH BENEFITS UNDER USERRA.** In accordance with the provisions of the Heroes Earnings Assistance and Relief Act of 2008 ("HEART Act") and solely in the case of a Participant's death occurring on or after January 1, 2007, if a Participant dies while performing qualified military service (as defined in Code Section 414(u)), the Beneficiary(ies) (or surviving spouse, if the qualified joint and survivor annuity or qualified pre-retirement survivor annuity rules apply) of the Participant shall be entitled to any additional benefits (other than benefit accruals relating to the period of qualified military service) provided under the Plan as if the Participant had resumed employment and then terminated employment on account of death. In addition, vesting service credit for the deceased Participant's period of qualified military service shall be credited to the extent required by Code Section 401(a)(37).

The provisions of this Section 6.5 shall be interpreted consistent with, and governed by, Section 414(u)(9) of the Code and regulatory guidance issued thereunder.

ARTICLE SEVEN--EMPLOYER CONTRIBUTIONS

7.1 **EMPLOYER CONTRIBUTIONS.** The Employer shall retain an Actuary to assist it in determining the amount of contributions to be made under the Plan. The contribution of the Employer may be paid to the Trustee on any date or dates which the Employer may select and shall be made in the form of cash or checks made payable to the Trustee, or in the form of property acceptable to the Trustee under the terms of the Trust.

7.2 **FORFEITURES.** No forfeiture under the Plan shall be applied to increase the benefits that any Participant or Beneficiary would otherwise receive. Any amounts forfeited shall be held in the Trust Fund and used to reduce the contributions of the Employer and/or to pay Plan expenses.

ARTICLE EIGHT--ADMINISTRATION OF THE PLAN

8.1 **RESPONSIBILITY FOR PLAN AND TRUST ADMINISTRATION.** The Plan shall be administered by a committee (the "Retirement Committee") which shall be appointed by the Board of Directors of the Company. The Retirement Committee shall be the Plan Administrator and shall be responsible for the general administration of the Plan. However, the Retirement Committee shall have no responsibility for or control over the investment of Plan assets. The investment of the assets of the Plan shall be managed by a separate committee (the "Plan Assets Committee"), which shall also be appointed by the Board of Directors of the Company, except to the extent that such responsibility has been allocated or delegated as hereinafter otherwise provided. The Retirement Committee and the Plan Assets Committee are each referred to as a "Committee" in this Article Eight. The Board of Directors of the Company shall have the sole authority to appoint and remove any member of the Committees, and to amend or terminate, in whole or in part the Plan or the Trust. The Company, through the Committees shall have the responsibility for the administration of the Plan, which is specifically described in the Plan and the related Trust. Each of the Retirement Committee and the Plan Assets Committee shall be a "named fiduciary" and the Retirement Committee shall be the "Plan Administrator," for purposes of the Code and the Employee Retirement Income Security Act of 1974, as amended.

8.2 **OPERATION OF THE COMMITTEE.** Each Committee shall consist of at least three (3) persons appointed by the Board of Directors of the Company. Members of the Committees may resign at any time upon due notice in writing. The Board of Directors of the Company may remove any member of any Committee at any time, with or without cause. Vacancies in each Committee shall be filled by the Board of Directors of the Company as soon as is reasonably possible after the vacancy occurs. Until a new appointment is made, the remaining member or members of each Committee shall have full authority to act as such Committee. Any member of a Committee may resign by delivering his written resignation to the Secretary of the Company (the "Secretary") and the other members of the Committee. Any such resignation shall become effective upon its receipt by the Secretary or on any other date as is agreed to by the chairman of the Committee and the resigning member. Each Committee shall act by a majority of its members at the time in office, and such action may be taken either by vote at a meeting (including a telephone meeting) or by consent in writing without a meeting. Each Committee shall hold meetings (including telephone meetings) upon such notice and at such times and places as it may from time to time determine. Notice of a meeting need not be given to any member of a Committee who submits a signed waiver of notice before or after the meeting or who attends a meeting (including a telephone meeting). Each Committee may adopt such rules and appoint such subcommittees as it deems desirable for the conduct of its affairs and the administration of the Plan, and may appoint one of its members as its chairman. Each Committee shall elect a secretary, who need not be a member of the Committee, who shall record the minutes of its proceedings and shall perform such other duties as may from time to time be assigned to him. Any person dealing with a Committee shall be entitled to rely upon a certificate of any member of such Committee, or its secretary, as to any act or determination of the Committee. Each Committee may delegate such duties or powers, as it deems necessary to carry out the administration of the Plan.

The Secretary (or other authorized officer of the Company) shall certify to the Trustee the names and authorized signatures of the members of each Committee and, as changes take place in membership, the names and signatures of new members. Each Committee may authorize one or more of its respective members to execute any document or documents on its behalf, in which event the applicable Committee shall notify the Trustee in writing of such action and the name or names of those so designated. The Trustee thereafter shall accept and rely conclusively upon any direction or document executed by such member or members as representing action by the Committee until such time as the Committee shall file with the Trustee a written revocation of such designation.

8.3 **POWERS AND DUTIES OF THE RETIREMENT COMMITTEE.** The Retirement Committee shall be a "named fiduciary," within the meaning of section 402(a) of ERISA, with respect to the operation and administration of the Plan and, except to the extent otherwise provided herein, shall administer the Plan in accordance with its terms and shall have all powers necessary to carry out its duties hereunder. The Retirement Committee shall determine, in a uniform and nondiscriminatory manner, all questions concerning the administration, interpretation and application of the Plan. Any such determination by the Retirement Committee shall be conclusive and binding on all persons. In addition:

(A) the Retirement Committee shall determine the names of Participants, surviving spouses and Beneficiaries and the amounts that are payable to them from the Trust Fund in accordance with the provisions of the Plan;

(B) the Retirement Committee shall keep in convenient form such data as shall be necessary for actuarial valuations of the contingent assets and liabilities of the Plan and for checking the experience thereof;

(C) the Retirement Committee shall determine the manner in which the funds of the Plan shall be dispensed including the form of voucher or waiver to be used in making disbursements and the due notification of persons authorized to approve and sign the same.

(D) the Retirement Committee shall determine whether a judgment, decree or order, including approval of a property settlement agreement, made pursuant to a state domestic relations law, including a community property law, that relates to the provision of child support, alimony payments, or marital property rights of a spouse, former spouse, child, or other dependent of the Participant is a qualified domestic relations order within the meaning of Code section 414(p), and shall give the required notices and segregate any amounts that may be subject to such order if it is a qualified domestic relations order, and shall administer the distributions required by any such qualified domestic relations order; and

(E) the Retirement Committee is authorized to make such rules and regulations as may be necessary to carry out the provisions of the Plan and shall determine any questions arising in the administration, interpretation and application of the Plan, which determination shall be conclusive and binding on all parties. The Retirement Committee is also authorized to provide, on a nondiscriminatory basis, for accelerated vesting and to purchase or arrange for payment of an appropriate annuity or any other form of payment or to permit the immediate distribution of Plan benefits in those cases involving groups of Employees involuntarily terminated, including, but not limited to, cases involving groups of Employees who involuntarily cease to render Credited Service due to a liquidation, sale, or other means of terminating the parent-subsidiary or controlled group relationship with an Employer or the sale or other transfer to a third party of all or substantially all of the assets used by an Employer in a trade or business conducted by an Employer, when the Retirement Committee determines that such action is appropriate to prevent inequities with respect to such Employees, and the determination of the Committee in such matters shall be conclusive and binding on all parties. Further, the Retirement Committee, upon the written request of the Company's Vice President-Organization and Human Resources, is authorized, with respect to a Participant of the Plan who has three (3) or more years of Credited Service and who is transferred to the purchaser of a portion of the Company's operations, effective the day after the closing date of the sale, to grant additional Credited Service and additional credit for age under the Plan, on a nondiscriminatory basis, in each case up to one percent for each year of Credited Service, and to advance the date through which a Participant's Earnings are calculated hereof, so as to prevent hardship with respect to his participation in said purchaser's pension plan. The Retirement Committee is also authorized, with respect to a Participant (i) whose Accrued Benefit is attributable to the Cash Balance Formula and (ii) who has completed at least three (3) years of Credited Service and (iii) who is transferred to the purchaser of a portion of the Company's operations, effective as of the day after the closing date of the sale, to grant additional Annual Pay Credits and Interest Credits, on a nondiscriminatory basis, so as to prevent hardship with respect to his participation in said purchaser's pension plan. The Retirement Committee is also authorized to waive, either in whole or in part, the percentage reductions for early commencement of retirement benefits set forth herein, on a nondiscriminatory basis, in those cases where groups of Employees have terminated employment either as a result of a reduction in the work force or for similar economic reasons, and, the determination of the Retirement Committee shall be conclusive and binding on all parties. The Retirement Committee is also authorized to adopt such rules and regulations as it may consider necessary or desirable for the conduct of its affairs and the transaction of its business, including, but not limited to, the power on the part of the Retirement Committee to act without formally convening and to provide that action of the Retirement Committee may be expressed by written instrument signed by a majority of its members. The Retirement Committee may retain legal counsel (who may be counsel for the Company) when and if it is found necessary to do so and may also employ such other assistants, clerical or otherwise, as may be requisite, and expend such monies as may be requisite in their work. All of these expenses of the Retirement Committee and the reasonable expenses of the Trustee in the administration of the trust as well as for actuarial services may be paid out of the Trust Fund to the extent permissible under applicable law. In exercising such powers and authorities, the Retirement Committee shall at all times exercise good faith, apply standards of uniform application and refrain from arbitrary action.

8.4 DUTIES OF THE PLAN ASSETS COMMITTEE

(a) The Plan Assets Committee shall have exclusive authority and fiduciary responsibility under the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), (i) to appoint and remove investment advisers, if any, under the Plan and the Trust, (ii) to direct the segregation of assets of the Trust Fund into an investment adviser account or accounts at any time, and from time to time to add to or withdraw assets from such investment adviser account or accounts as it deems desirable or appropriate and also to direct the Employer's contribution or any portion thereof into any of the accounts maintained under the Trust, (iii) to direct the Trustee to enter into an agreement or agreements with an insurance company or companies designated by the Plan Assets Committee as provided in the Trust, (iv) to establish investment guidelines for areas other than those set forth above and, within such guidelines, to direct the Trustee to purchase and sell securities or to enter into one or more agreements with one or more companies, partnerships or joint ventures and to transfer assets of the Trust Fund to such entities for purposes of investment therein; provided however, that, except as expressly set forth above, the Plan Assets Committee shall have no responsibility for or control over the investment of the Plan assets held in the Trust Fund established hereunder. In addition, the Plan Assets Committee shall receive the reports and recommendations of the Actuary designated by the Company concerning actuarial assumptions to be adopted on subjects including, but not limited to, Employee turnover, rate of mortality, disability rate, ages at actual retirement, rate of pay increases, investment income and size of participant group, and make such recommendations and determinations based upon such reports and recommendations as it may deem necessary or appropriate. The Plan Assets Committee may appoint or employ such persons as it deems necessary to render advice with respect to any responsibility of the Plan Assets Committee under the Plan. The Plan Assets Committee may allocate to any one or more of its members any responsibility that it may have under the Plan and may designate any other person or persons to carry out any responsibility of the Plan Assets Committee under the Plan. Any person may serve in more than one fiduciary capacity with respect to the Plan. Members of the Plan Assets Committee may resign at any time upon due notice in writing. The Board of Directors of the Company may remove any Plan Assets Committee members and appoint others in their places. The Plan Assets Committee may act by a majority of its members.

(b) The Plan Assets Committee is authorized to make such rules and regulations as may be necessary to carry out its duties under the Plan. The Plan Assets Committee is also authorized to adopt such rules and regulations as it may consider necessary or desirable for the conduct of its affairs and the transaction of its business, including, but not limited to, the power on the part of the Plan Assets Committee to act without formally convening and to provide that action of the Plan Assets Committee may be expressed by written instrument signed by a majority of its members. The Plan Assets Committee may retain legal counsel (who may be counsel for the Company) when and if it be found necessary to do so and may also employ such other assistants, clerical or otherwise, as may be requisite, and expend such monies as may be requisite in their work. All of these expenses of the Plan Assets Committee as well as expenses for investment counseling may be paid out of the Trust Fund to the extent permissible under applicable law.

8.5 **STANDARD OF DUTY.** The members of the Retirement Committee and the Plan Assets Committee, as well as the Trustee, shall discharge their duties with respect to the Plan solely in the interests of the Participants and their Beneficiaries and in accordance with Section 404 of ERISA (as defined under Section 8.4).

8.6 **FUNDING AND INVESTMENT POLICY.** The Plan Assets Committee shall establish an investment policy and funding policy consistent with the objectives of the Plan and the requirements of Title I of ERISA (as defined under Section 8.4). The Plan Assets Committee shall at least annually review such policy and method. In establishing and reviewing such policy and method, the Plan Assets Committee shall endeavor to determine the Plan's short-term and long-term financial needs, taking into account the need for liquidity to pay benefits and the need for investment growth. The general objective of the funding policy and method shall be at all times to maintain a balance between safety in capital investment and investment return. All actions of the Plan Assets Committee taken to carry out the purposes of this Section 8.6, and the reasons therefor shall be recorded in the minutes of the Plan Assets Committee and shall be made available to the Company's Board of Directors and senior financial officers of the Company. Notwithstanding anything herein to the contrary, the Retirement Committee or the Plan Assets Committee may provide for the funding of the payment of any benefits prescribed by the Plan through the purchase of immediate or deferred annuities, as the case may be, from any governmental agency or insurance company or companies, approved by the Company.

8.7 **COMPENSATION AND EXPENSES.** The members of the Retirement Committee and the Plan Assets Committee shall serve without compensation for services as such. All expenses of the Retirement Committee and the Plan Assets Committee that are properly allocable to the Plan shall be paid out of the Trust Fund, to the extent permissible under applicable law, unless paid by the Employer. Such expenses shall include any expenses incidental to the functioning of the Retirement Committee and the Plan Assets Committee, including, but not limited to, fees of independent accountants, enrolled actuaries, legal counsel, investment advisors and other specialists and other expenses

8.8 **NON-LIABILITY AND INDEMNIFICATION.** To the extent permitted by law, the Retirement Committee, the Plan Assets Committee, the Company's Boards of Directors of the Employer, and their respective officers shall not be liable for the directions, actions or omissions of any agent, legal or other counsel, accountant or any other expert who has agreed to the performance of administrative duties in connection with the Plan or Trust. The Committees, the Boards of Directors of the Employer, and their officers shall be entitled to rely upon all certificates, reports, data, statistics, analyses and opinions which may be made by such experts and shall be fully protected in respect to any action taken or suffered by them in good faith reliance upon any such certificates, reports, data, statistics, analyses or opinions; all action so taken or suffered shall be conclusive upon each of them and upon all persons having or claiming to have any interest in or under the Plan.

Each member of each of the Retirement Committee, the Plan Assets Committee, and the Company's Board of Directors, shall be indemnified by the Company against all costs and expenses (including counsel fees but excluding any amount representing a settlement unless such settlement be approved by the Board of Directors of the Company) reasonably incurred by or imposed upon him, in connection with or resulting from any action, suit or proceeding, to which he may be made a party by reason of his being or having been a member of the Retirement Committee or the Plan Assets Committee, as applicable (whether or not he continues to be a member of such Committee at the time when such cost or expense is incurred or imposed), to the full extent permitted by law. The foregoing rights of indemnification shall not be exclusive of other rights to which any member of the Retirement Committee or the Plan Assets Committee may be entitled as a matter of law.

8.9 **CLAIMS PROCEDURE.** Pursuant to procedures established by the Administrator, claims for benefits under the Plan made by a Participant or Beneficiary (the "claimant") must be submitted in writing to the Administrator. Approved claims shall be processed and instructions issued to the Trustee or custodian authorizing payment as claimed.

If a claim is denied in whole or in part, the Administrator shall notify the claimant within ninety (90) days after receipt of the claim (or within one hundred eighty (180) days, if special circumstances require an extension of time for processing the claim, and provided written notice indicating the special circumstances and the date by which a final decision is expected to be rendered is given to the claimant within the initial ninety (90) day period).

The notice of the denial of the claim shall be written in a manner calculated to be understood by the claimant and shall set forth the following:

(i) the specific reason or reasons for the denial of the claim;

(ii) the specific references to the pertinent Plan provisions on which the denial is based;

(iii) a description of any additional material or information necessary to perfect the claim, and an explanation of why such material or information is necessary;

(iv) a statement that any appeal of the denial must be made by giving to the Administrator, within sixty (60) days after receipt of the denial of the claim, written notice of such appeal, such notice to include a full description of the pertinent issues and basis of the claim; and

(v) a statement about the claimant's right to bring civil action under Section 502(a) under ERISA if the claim is denied on review.

Upon denial of a claim in whole or part, the claimant (or his duly authorized representative) shall have the right to submit a written request to the Administrator for a full and fair review of the denied claim, to be permitted to review documents (free of charge) pertinent to the denial, and to submit issues and comments in writing. Any appeal of the denial must be given to the Administrator within the period of time prescribed under (a)(iv) above. If the claimant (or his duly authorized representative) fails to appeal the denial to the Administrator within the prescribed time, the Administrator's adverse determination shall be final, binding and conclusive.

The Administrator may hold a hearing or otherwise ascertain such facts as it deems necessary and shall render a decision which shall be binding upon both parties. The Administrator shall advise the claimant of the results of the review within sixty (60) days after receipt of the written request for the review, unless special circumstances require an extension of time for processing, in which case a decision shall be rendered as soon as possible but not later than one hundred twenty (120) days after receipt of the request for review. If such extension of time is required, written notice of the extension shall be furnished to the claimant prior to the commencement of the extension. The decision of the review shall be written in a manner calculated to be understood by the claimant and shall include specific reasons for the decision, specific references to the pertinent Plan provisions on which the decision is based, the claimant's right to receive free of charge upon written request, reasonable access to and copies of, all Plan documents, records, and other information relevant to the claim, and a statement about the claimant's right to bring a civil action under Section 502(a) of ERISA. The decision of the Administrator shall be final, binding and conclusive.

8.10 **TRUST AGREEMENT.** The Board of Directors of the Company shall have the authority to appoint or remove the Trustee of the Trust with respect to the Plan. The Trustee shall have the authority necessary to carry out its duties under this Plan. The Trust Agreement entered into by and between the Employer and the Trustee, including any supplements or amendments thereto, or any successor Trust Agreement, is incorporated by reference herein.

ARTICLE NINE--EARLY TERMINATION RESTRICTIONS/BENEFIT LIMITATIONS

9.1 BENEFIT RESTRICTIONS.

(a) *Restriction of Benefits upon Plan Termination*. Notwithstanding any other provision of the Plan to the contrary, in the event the Plan is terminated, the benefit of any Highly- Compensated Employee shall be limited to a benefit that is nondiscriminatory under Code Section 40l(a)(4).

(b) *Restrictions on Distributions*. Notwithstanding any other provision of the Plan to the contrary, in any Plan Year, the payment of benefits to or on behalf of a Restricted Employee shall not exceed an amount equal to the payments that would be made to or on behalf of the Restricted Employee in that Plan Year under a single life annuity that is the Actuarial Equivalent of the sum of the Participant's Accrued Benefit and the Participant's other benefits, if any, under the Plan; provided, however, that this limitation shall not apply in any Plan Year in which any one of the following requirements is satisfied:

(1) After taking into account payment to or on behalf of the Restricted Employee of all benefits payable to or on behalf of that Restricted Employee under the Plan, the value of Plan assets must equal or exceed 110 percent of the value of current liabilities (determined in accordance with the Code and regulatory guidance).

(2) The value of the benefits payable to or on behalf of the Restricted Employee must be less than one percent of the value of current liabilities (determined in accordance with the Code and regulatory guidance) before distribution.

(3) The value of the benefits payable to or on behalf of the Restricted Employee must not exceed the amount described in Code Section 41l(a)(11)(A).

(c) *"Restricted Employee" Defined.* For purposes of this Section 9.1, the term "Restricted Employee" means any of the twenty-five (25) highest paid Highly Compensated Employees.

The provisions of this Section 9.1 are intended to comply with the requirements of Treasury Regulation 1.401(a)(4)-5(b) and shall be interpreted accordingly.

9.2 LIMITATION ON BENEFITS.

(a) *Rules:* Except as otherwise provided herein, the provisions of this Section 9.2 shall apply with respect to annuity starting dates (as defined in Section 5.2(d)) commencing on or after the first day of the limitation year or Plan Year beginning on or after July 1, 2007. The following rules shall limit benefits payable under the Plan:

(1) The annual benefit otherwise payable to a Participant at any time shall not exceed the maximum permissible amount (as hereinafter defined). No Participant may accrue a benefit in excess of that amount.

(2) If the Participant makes nondeductible Employee contributions under the terms of the Plan, such contributions, which are credited for the limitation year, shall, except for purposes of subsection (3) below, be treated as an annual addition to a qualified defined contribution plan for purposes of these rules.

(3) The limitation in subsection (1) shall be deemed satisfied if the annual benefit payable to a Participant is not more than $1,000 multiplied by the Participant's number of years of participation or portions thereof (not to exceed ten (10)) with the Employer, provided the Participant has never participated in a qualified defined contribution plan maintained by the Employer.

(4) If a Participant is, or has ever been, covered under more than one defined benefit plan maintained by the Employer, the sum of the Participant's annual benefits from all such plans may not exceed the maximum permissible amount. Benefits shall be reduced under any other defined benefit plan before under this Plan unless such other plan(s) is terminated, in which event liabilities shall be limited in this Plan.

(b) *Definitions:* The following definitions are applicable to this Section:

(1) Annual benefit: A retirement benefit under the Plan which is payable annually in the form of a straight life annuity. A benefit payable in a form other than a straight life annuity shall be adjusted pursuant to the rules of Section 1.415(b)-1(c) of the Income Tax Regulations before applying the limitations of this Section.

(2) Compensation: For purposes of determining maximum permitted benefits under this Section, all of a Participant's earned income, wages, salaries, fees for professional services, and other amounts received (without regard to whether or not an amount is paid in cash) for personal services actually rendered in the course of employment with the Employer maintaining the Plan, to the extent that the amounts are includible in gross income (or to the extent amounts would have been received and includible in

gross income but for an election under Code Sections 125(a), 132(f)(4), 402(e)(3), 402(h)(l)(B), 402(k) or 457(b)), including, but 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, reimbursements or other expense allowances under a nonaccountable plan (as described in Section l.62-2(c) of the Income Tax Regulations), and excluding the following:

(A) Contributions (other than elective contributions described in Code Section 402(e)(3), 408(k)(6), 408(p)(2)(A)(i), or 457(b)), made by the Employer to a plan of deferred compensation (including a simplified employee pension described in Code Section 408(k) or a simple retirement account described in Code Section 408(p), and whether or not qualified) which are not included in the Employee's gross income for the taxable year in which contributed, and any distributions from a plan of deferred compensation (whether or not qualified).

(B) Amounts realized from the exercise of a nonstatutory stock option, or when restricted stock (or other property) held by the Employee either becomes freely transferable or is no longer subject to a substantial risk of forfeiture;

(C) Amounts realized from the sale, exchange or other disposition of stock acquired under a statutory stock option;

(D) Other amounts that receive special tax benefits, such as premiums for group- term life insurance (but only to the extent that the premiums are not includible in the gross income of the Participant and are not salary reduction amounts that are described in Code Section 125);

(E) Other items of remuneration that are similar to any of the items listed in A, B, C or D; and

(F) Amounts in excess of the limitation under Code Section 40l(a)(17) in effect for the calendar year in which the limitation year begins.

Compensation shall be measured on the basis of compensation paid in the limitation year and shall include Compensation paid by the later of two and one- half (2½) months after a Participant's severance from employment with the Employer maintaining the Plan or the end of the limitation year that includes the date of the Participant's severance from employment with the Employer maintaining the Plan, if the payment is regular Compensation for services during the Participant's regular working hours, or Compensation for services outside the Participant's regular working hours (such as overtime or shift differential), commissions, bonuses, or other similar payments, and, absence a severance from employment, the payments would have been paid to the Participant while the Participant continued in employment with the Employer. Any payments not described above shall not be considered Compensation if paid after severance from employment, even if they are paid by the later of two and one-half (2½) months after the date of severance from employment or the end of the limitation year that includes the date of severance from employment, except, payments to an individual who does not currently perform services for the Employer by reason of qualified military service (within the meaning of Code Section 414(u)(1)) to the extent these payments do not exceed the amounts the individual would have received if the individual had continued to perform services for the Employer rather than entering qualified military service.

For years beginning after December 31, 2008, Compensation shall also include differential wage payments as defined by Code Section 3401(h)(2).

(3) Defined Benefit Dollar Limitation: The "defined benefit dollar limitation" is $230,000 as adjusted, effective January I of each year, under Section 415(d) of the Code in such manner as the Secretary shall prescribe, and payable in the form of a straight life annuity. A limitation as adjusted under Code Section 415(d) shall apply to limitation years ending with or within the calendar year for which the adjustment applies.

(4) Employer: This term refers to the Employer that adopts the Plan, and all Participants of a controlled group of corporations (as defined in Section 414(b) of the Code, as modified by Code Section 415(h)), commonly-controlled trades or businesses (as defined in Code Section 414(c) as modified by Code Section 415(h)), or affiliated service groups (as defined in Code Section 414(m)) of which the Employer is a part, or any other entity required to be aggregated with the Employer under Code Section 414(o).

(5) Highest Average Compensation: This means the average Compensation for the three (3) consecutive limitation years with the Employer that produces the highest average.

(6) Limitation year: This shall mean the calendar year.

(7) Maximum permissible amount: The "maximum permissible amount" is the lesser of the defined benefit dollar limitation or one hundred percent (100%) of the Participant's Highest Average Compensation (the "defined benefit compensation limitation") (both adjusted where required, as provided in (A) and, if applicable, in (B) or (C) below).

(A) If the Participant has fewer than 10 years of participation in the Plan, the defined benefit dollar limitation shall be multiplied by a fraction, (i) the numerator of which is the number of years (or part thereof) of participation in the Plan and (ii) the denominator of which is 10. In the case of a Participant who has fewer than 10 years of service with the Employer, the defined benefit compensation limitation shall be multiplied by a fraction, (i) the numerator of which is the number of years (or part thereof) of service with the Employer and (ii) the denominator of which is 10.

(B) If the benefit of a Participant begins prior to age 62, the defined benefit dollar limitation shall be adjusted in accordance with the rules set forth in Section l.415(b)-l(d) of the Income Tax Regulations, including the use of the applicable mortality table (within the meaning of Section 417(e)(3) of the Code).

(C) If the benefit of a Participant begins after the Participant attains age 65, the defined benefit dollar limitation shall be adjusted in accordance with the rules set forth in Section l.415(b)-l(e) of the Income Tax Regulations, including the use•of the applicable mortality table (within the meaning of Section 417(e)(3) of the Code).

Notwithstanding the foregoing, a benefit that is payable in a form other than a straight life annuity and that is subject to Section 417(e)(3) of the Code shall be adjusted to an actuarial straight life annuity that is equal to:

(i) **Annuity Starting Date in Plan Years Beginning After 2005.** If the annuity starting date of the Participant's form of benefit is in a Plan Year beginning after 2005, the actuarially equivalent straight life annuity is equal to the greatest of (I) the annual amount of straight life annuity commencing at the same annuity starting date that has the same actuarial present value as the Participant's form of benefit, computed using the interest rate specified in the Plan and the mortality table (or other tabular factor) specified in the Plan for adjusting benefits in the same form; (II) the annual amount of the straight life annuity commencing at the same annuity starting date that has the same actuarial present value as the Participant's form of benefit, computed using a 5.5 percent interest rate assumption and the applicable mortality table under Section 417(e)(3) of the Code and (III) the annual amount of the straight life annuity commencing at the same annuity starting date that has the same actuarial present value as the Participant's form of benefit, computed using the applicable interest rate under Regulation Section l.417(e)-l(d)(3) and the applicable mortality table under Section 417(e)(3) of the Code, divided by 1.05. Notwithstanding the foregoing, in the case of a plan maintained by an eligible employer (as defined in Section 408(p)(2)(C)(i) of the Code), clause (III) of the preceding sentence shall not apply.

(ii) **Annuity Starting Date in Plan Years Beginning 2004 or 2005.** If the annuity starting date of the Participant's form of benefit is in a Plan Year beginning 2004 or 2005, the actuarially equivalent straight life annuity is equal to the annual amount of the straight life annuity commencing at the same annuity starting date that has the same actuarial present value as the Participant's form of benefit, computed using whichever of the following produces the greater annual amount: (I) the interest rate specified in the Plan and the mortality table (or other tabular factor) specified in the Plan for adjusting benefits in the same form; and (II) a 5.5 percent interest rate assumption and the applicable mortality table under Regulation Section 1.417(e)-1(d)(2).

9.3 **LIMITATIONS APPLICABLE BASED ON FUNDING OR BANKRUPTCY**

1. Limitations Applicable If the Plan's Adjusted Funding Target Attainment Percentage Is Less Than 80 Percent, But Not Less Than 60 Percent. Notwithstanding any other provisions of the Plan, if the Plan's adjusted funding target attainment percentage for a Plan Year is less than 80 percent (or would be less than 80 percent to the extent described in Subsection 1(b) below) but is not less than 60 percent, then the limitations set forth in this Subsection 1 apply.

(a) 50 Percent Limitation on Single Sum Payments, Other Accelerated Forms of Distribution, and Other Prohibited Payments. A Participant or Beneficiary is not permitted to elect, and the Plan shall not pay, a single sum payment or other optional form of benefit that includes a prohibited payment with an annuity starting date on or after the applicable Section 436 measurement date, and the Plan shall not make any payment for the purchase of an irrevocable commitment from an insurer to pay benefits or any other payment or transfer that is a prohibited payment, unless the present value of the portion of the benefit that is being paid in a prohibited payment does not exceed the lesser of:

(i) 50 percent of the present value of the benefit payable in the optional form of benefit that includes the prohibited payment; or

(ii) 100 percent of the PBGC maximum benefit guarantee amount (as defined in § l.436-l(d)(3)(iii)(C) of the Treasury Regulations).

The limitation set forth in this Subsection 1(a) does not apply to any payment of a benefit which under § 411(a)(11) of the Internal Revenue Code may be immediately distributed without the consent of the Participant. If an optional form of benefit that is otherwise available under the terms of the Plan is not available to a Participant or Beneficiary as of the annuity starting date because of the application of the requirements of this Subsection l(a), the Participant or Beneficiary is permitted to elect to bifurcate the benefit into unrestricted and restricted portions (as described in § l.436-1(d)(3)(iii)(D) of the Treasury Regulations). The Participant or Beneficiary may also elect any other optional form of benefit otherwise available under the Plan at that annuity starting date that would satisfy the 50 percent/PBGC maximum benefit guarantee amount limitation described in this Subsection l(a), or may elect to defer the benefit in accordance with any general right to defer commencement of benefits under the Plan.

A Participant or Beneficiary may elect to divide the benefit into restricted and unrestricted portions as described in this section. A Participant or Beneficiary may elect a combination of distribution options for the divided portion of the benefit to the following extent: A Participant or Beneficiary who elects to bifurcate the benefit may divide the benefit between no more than two distribution forms, with the unrestricted portion payable in a single sum payment or other optional form of benefit that is a prohibited payment (A) to the Participant, as described in Section 5.3(d), and the restricted portion payable in one of the other optional forms described in Section 5.3 (subject to the requirements of Sections 5.1 and 5.2) or (B) to the Beneficiary, as described in Section 6.2(c) or 6.3, as applicable, and the restricted portion payable as provided under Section 6.2(b). Notwithstanding the foregoing, if the Participant or Beneficiary elects to defer receipt of the restricted portion, the Participant or Beneficiary may subsequently elect to receive the restricted portion in any optional form available (for a Participant, under Section 5.3 (subject to the requirements of Sections 5.1 and 5.2); for a Beneficiary, under Section 6.2) when the limitation described in this Section 9.3(1)(a) ceases to apply. If a Participant or Beneficiary elects to divide the benefit, the amount of the distribution payable with respect to each specified portion of the benefit shall be determined in accordance with the method for calculating the amount of a distribution payable in the optional form elected for that portion as if that portion were the Participant's entire Accrued Benefit.

(b) Plan Amendments Increasing Liability for Benefits. No amendment to the Plan that has the effect of increasing liabilities of the Plan by reason of increases in benefits, establishment of new benefits, changing the rate of benefit accrual, or changing the rate at which benefits become nonforfeitable shall take effect in a Plan Year if the adjusted funding target attainment percentage for the Plan Year is:

(i) Less than 80 percent; or

(ii) 80 percent or more, but would be less than 80 percent if the benefits attributable to the amendment were taken into account in determining the adjusted funding target attainment percentage.

The limitation set forth in this Subsection l(b) does not apply to any amendment to the Plan that provides a benefit increase under a Plan formula that is not based on compensation, provided that the rate of such increase does not exceed the contemporaneous rate of increase in the average wages of Participants covered by the amendment.

2. Limitations Applicable If the Plan's Adjusted Funding Target Attainment Percentage Is Less Than 60 Percent. Notwithstanding any other provisions of the Plan, if the Plan's adjusted funding target attainment percentage for a Plan Year is less than 60 percent (or would be less than 60 percent to the extent described in Subsection 2(b) below), then the limitations in this Subsection 2 apply.

(a) Single Sums, Other Accelerated Forms of Distribution, and Other Prohibited Payments Not Permitted. A Participant or Beneficiary is not permitted to elect, and the Plan shall not pay, a single sum payment or other optional form of benefit that includes a prohibited payment with an annuity starting date on or after the applicable Section 436 measurement date, and the Plan shall not make any payment for the purchase of an irrevocable commitment from an insurer to pay benefits or any other payment or transfer that is a prohibited payment. The limitation set forth in this Subsection 2(a) does not apply to any payment of a benefit which under § 411(a)(11) of the Internal Revenue Code may be immediately distributed without the consent of the Participant.

(b) Shutdown Benefits and Other Unpredictable Contingent Event Benefits Not Permitted to Be Paid. An unpredictable contingent event benefit with respect to an unpredictable contingent event occurring during a Plan Year shall not be paid if the adjusted funding target attainment percentage for the Plan Year is:

(i) Less than 60 percent; or

(ii) 60 percent or more, but would be less than 60 percent if the adjusted funding target attainment percentage were redetermined applying an actuarial assumption that the likelihood of occurrence of the unpredictable contingent event during the Plan Year is 100 percent.

(c) Benefit Accruals Frozen. Benefit accruals under the Plan shall cease as of the applicable Section 436 measurement date. In addition, if the Plan is required to cease benefit accruals under this Subsection 2(c), then the Plan is not permitted to be amended in a manner that would increase the liabilities of the Plan by reason of an increase in benefits or establishment of new benefits.

3. Limitations Applicable If the Plan Sponsor Is In Bankruptcy. Notwithstanding any other provisions of the Plan, a Participant or Beneficiary is not permitted to elect, and the Plan shall not pay, a single sum payment or other optional form of benefit that includes a prohibited payment with an annuity starting date that occurs during any period in which the Plan sponsor is a debtor in a case under title 11, United States Code, or similar Federal or State law, except for payments made within a Plan Year with an annuity starting date that occurs on or after the date on which the Plan's enrolled actuary certifies that the Plan's adjusted funding target attainment percentage for that Plan Year is not less than 100 percent. In addition, during such period in which the Plan sponsor is a debtor, the Plan shall not make any payment for the purchase of an irrevocable commitment from an insurer to pay benefits or any other payment or transfer that is a prohibited payment, except for payments that occur on a date within a Plan Year that is on or after the date on which the Plan's enrolled actuary certifies that the Plan's adjusted funding target attainment percentage for that Plan Year is not less than 100 percent. The limitation set forth in this Subsection 3 does not apply to any payment of a benefit which under § 411(a)(11) of the Internal Revenue Code may be immediately distributed without the consent of the Participant.

4. Provisions Applicable After Limitations Cease to Apply.

(a) Resumption of Prohibited Payments. If a limitation on prohibited payments under Subsection l(a), Subsection 2(a), or Subsection 3 applied to the Plan as of a Section 436 measurement date, but that limit no longer applies to the Plan as of a later Section 436 measurement date, then that limitation does not apply to benefits with annuity starting dates that are on or after that later Section 436 measurement date.

(b) Resumption of Benefit Accruals. If a limitation on benefit accruals under Subsection 2(c) applied to the Plan as of a Section 436 measurement date, but that limitation no longer applies to the Plan as of a later Section 436 measurement date, then benefit accruals shall resume prospectively and that limitation does not apply to benefit accruals that are based on service on or after that later Section 436 measurement date, except as otherwise provided under the Plan. The Plan shall comply with the rules relating to partial years of participation and the prohibition on double proration under Department of Labor regulation 29 CFR § 2530.204- 2(c) and (d).

(c) Shutdown and Other Unpredictable Contingent Event Benefits. If an unpredictable contingent event benefit with respect to an unpredictable contingent event that occurs during the Plan Year is not permitted to be paid after the occurrence of the event because of the limitation of Subsection 2(b), but is permitted to be paid later in the same Plan Year (as a result of additional contributions or pursuant to the enrolled actuary's certification of the adjusted funding target attainment percentage for the Plan Year that meets the requirements of§ 1.436-l(g)(5)(ii)(B) of the Treasury: Regulations), then that unpredictable contingent event benefit shall be paid, retroactive to the period that benefit would have been payable under the terms of the Plan (determined without regard to Subsection 2(b)). If the unpredictable contingent event benefit does not become payable during the Plan Year in accordance with the preceding sentence, then the Plan is treated as if it does not provide for that benefit.

(d) Treatment of Plan Amendments That Do Not Take Effect. If a Plan amendment does not take effect as of the effective date of the amendment because of the limitation of Subsection 1(b) or Subsection 2(c), but is permitted to take effect later in the same Plan Year (as a result of additional contributions or pursuant to the enrolled actuary's certification of the adjusted funding target attainment percentage for the Plan Year that meets the requirements of§ 1.436-1(g)(5)(ii)(C) of the Treasury Regulations), then the Plan amendment must automatically take effect as of the first day of the Plan Year (or, if later, the original effective date of the amendment). If the Plan amendment cannot take effect during the same Plan Year, then it shall be treated as if it were never adopted, unless the Plan amendment provides otherwise.

5. Notice Requirement. See Section 101(j) of ERISA for rules requiring the Plan administrator of a single employer defined benefit pension Plan to provide a written notice to Participants and Beneficiaries within 30 days after certain specified dates if the Plan has become subject to a limitation described in Subsection l(a), Subsection 2, or Subsection 3.

6. Methods to Avoid or Terminate Benefit Limitations. See § 436(b)(2), (c)(2), (e)(2), and
(f) of the Internal Revenue Code and § 1.436-l(f) of the Treasury Regulations for rules relating to employer contributions and other methods to avoid or terminate the application of the limitations set forth in Subsections 1 through 3 for a Plan Year. In general, the methods a Plan sponsor may use to avoid or terminate one or more of the benefit limitations under Subsections 1 through 3 for a Plan Year include employer contributions and elections to increase the amount of Plan assets which are taken into account in determining the adjusted funding target attainment percentage, making an employer contribution that is specifically designated as a current year contribution that is made to avoid or terminate application of certain of the benefit limitations, or providing security to the Plan.

7. Special Rules.

(a) Rules of Operation for Periods Prior to and After Certification of Plan's Adjusted Funding Target Attainment Percentage.

(i) In General. Section 436(h) of the Internal Revenue Code and§ 1.436-l(h) of the Treasury Regulations set forth a series of presumptions that apply (1) before the Plan's enrolled actuary issues a certification of the Plan's adjusted funding target attainment percentage for the Plan Year and (2) if the Plan's enrolled actuary does not issue a certification of the Plan's adjusted funding target attainment percentage for the Plan Year before the first day of the 10^{th} month of the Plan Year (or if the Plan's enrolled actuary issues a range certification for the Plan Year pursuant to

§ l .436- l(h)(4)(ii) of the Treasury Regulations but does not issue a certification of the specific adjusted funding target attainment percentage for the Plan by the last day of the Plan Year). For any period during which a presumption under § 436(h) of the Internal Revenue Code and § 1.436-l(h) of the Treasury Regulations applies to the Plan, the limitations under Subsections 1 through 3 are applied to the Plan as if the adjusted funding target attainment percentage for the Plan Year were the presumed adjusted funding target attainment percentage determined under the rules of § 436(h) of the Internal Revenue Code and§ 1.436-l(h)(l), (2), or (3) of the Treasury Regulations. These presumptions are set forth in Subsection 7(a)(ii) though (iv).

(ii) Presumption of Continued Underfunding Beginning First Day of Plan Year. If a limitation under Subsection 1, 2, or 3 applied to the Plan on the last day of the preceding Plan Year, then, commencing on the first day of the current Plan Year and continuing until the Plan's enrolled actuary issues a certification of the adjusted funding target attainment percentage for the Plan for the current Plan Year, or, if earlier, the date Subsection 7(a)(iii) or Subsection 7(a)(iv) applies to the Plan:

(1) The adjusted funding target attainment percentage of the Plan for the current Plan Year is presumed to be the adjusted funding target attainment percentage in effect on the last day of the preceding Plan Year; and

(2) The first day of the current Plan Year is a Section 436 measurement date.

(iii) Presumption of Underfunding Beginning First Day of 4th Month. If the Plan's enrolled actuary has not issued a certification of the adjusted funding target attainment percentage for the Plan Year before the first day of the 4th month of the Plan Year and the Plan's adjusted funding target attainment percentage for the preceding Plan Year was either at least 60 percent but less than 70 percent or at least 80 percent but less than 90 percent, or is described in§ 1.436-l(h)(2)(ii) of the Treasury Regulations, then, commencing on the first day of the 4th month of the current Plan Year and continuing until the Plan's enrolled actuary issues a certification of the adjusted funding target attainment percentage for the Plan for the current Plan Year, or, if earlier, the date Subsection 7(a)(iv) applies to the Plan:

(1) The adjusted funding target attainment percentage of the Plan for the current Plan Year is presumed to be the Plan's adjusted funding target attainment percentage for the preceding Plan Year reduced by 10 percentage points; and

(2) The first day of the 4th month of the current Plan Year is a Section 436 measurement date.

(iv) Presumption of Underfunding On and After First Day of 10th Month. If the Plan's enrolled actuary has not issued a certification of the adjusted funding target attainment percentage for the Plan Year before the first day of the 10th month of the Plan Year (or if the Plan's enrolled actuary has issued a range certification for the Plan Year pursuant to § l.436- 1(h)(4)(ii) of the Treasury Regulations but has not issued a certification of the specific adjusted funding target attainment percentage for the Plan by the last day of the Plan Year), then, commencing on the first day of the 10th month of the current Plan Year and continuing through the end of the Plan Year:

(1) The adjusted funding target attainment percentage of the Plan for the current Plan Year is presumed to be less than 60 percent; and

(2) The first day of the 10th month of the current Plan Year is a Section 436 measurement date.

(b) New Plans, Plan Termination, Certain Frozen Plans, and Other Special Rules.

(i) First 5 Plan Years. The limitations in Subsection 1(b), Subsection 2(b), and Subsection 2(c) do not apply to a new plan for the first 5 plan years of the plan, determined under the rules of § 436(i) of the Internal Revenue Code and§ 1.436-l(a)(3)(i) of the Treasury Regulations.

(ii) Plan Termination. The limitations on prohibited payments in Subsection l(a), Subsection 2(a), and Subsection 3 do not apply to prohibited payments that are made to carry out the termination of the Plan in accordance with applicable law. Any other limitations under this section of the Plan do not cease to apply as a result of termination of the Plan.

(iii) Exception to Limitations on Prohibited Payments Under Certain Frozen Plans. The limitations on prohibited payments set forth in Subsections l(a), 2(a), and 3 do not apply for a Plan Year if the terms of the Plan, as in effect for the period beginning on September 1, 2005, and continuing through the end of the Plan Year, provide for no benefit accruals with respect to any Participants. This Subsection 7(b)(iii) shall cease to apply as of the date any benefits accrue under the Plan or the date on which a Plan amendment that increases benefits takes effect.

(iv) Special Rules Relating to Unpredictable Contingent Event Benefits and Plan Amendments Increasing Benefit Liability. During any period in which none of the presumptions under Subsection 7(a) apply to the Plan and the Plan's enrolled actuary has not yet issued a certification of the Plan's adjusted funding target attainment percentage for the Plan Year, the limitations under Subsection 1(b) and Subsection 2(b) shall be based on the inclusive presumed adjusted funding target attainment percentage for the Plan, calculated in accordance with the rules of§ 1.436-l(g)(2)(iii) of the Treasury Regulations.

(c) Special Rules Under PRA 2010.

(i) Payments Under Social Security Leveling Options. For purposes of determining whether the limitations under Subsection l(a) or 2(a) apply to payments under a social security leveling option, within the meaning of § 436(j)(3)(C)(i) of the Internal Revenue Code, the adjusted funding target attainment percentage for a Plan Year shall be determined in accordance with the "Special Rule for Certain Years" under§ 436(j)(3) of the Internal Revenue Code and any Treasury Regulations or other published guidance thereunder issued by the Internal Revenue Service.

(ii) Limitation on Benefit Accruals. For purposes of determining whether the accrual limitation under Subsection 2(c) applies to the Plan, the adjusted funding target attainment percentage for a Plan Year shall be determined in accordance with the "Special Rule for Certain Years" under § 436(j)(3) of the Internal Revenue Code (except as provided under Section 203(b) of the Preservation of Access to Care for Medicare Beneficiaries and Pension Relief Act of 2010, if applicable).

(d) Interpretation of Provisions. The limitations imposed by this section of the Plan shall be interpreted and administered in accordance with § 436 of the Internal Revenue Code and § 1.436-1 of the Treasury Regulations.

8. Definitions. The definitions in the following Treasury Regulations apply for purposes of Subsections 1 through 7: § 1.436-l(j)(l) defining adjusted funding target attainment percentage; § 1.436-1(j)(2) defining annuity starting date; §1.436-1(j)(6) defining prohibited payment; § 1.436-1(j)(8) defining Section 436 measurement date; and § 1.436- 1(j)(9) defining an unpredictable contingent event and an unpredictable contingent event benefit.

9. Effective Date. The rules in Subsections 1 through 8 are effective for Plan Years beginning after December 31, 2009. For Plan Years beginning before January 1, 2010, the provisions of Section 436 of the Internal Revenue Code are hereby incorporated by reference.

ARTICLE TEN--AMENDMENT AND TERMINATION

10.l **AMENDMENT.** Subject to the provisions of Article Eight, the Company, by action of its Board of Directors, shall have the right to amend, alter or modify the Plan at any time, or from time to time, in whole or in part. Any such amendment shall become effective under its terms upon adoption by the Company. The Retirement Committee may make administrative changes to qualify or maintain the Plan as a plan meeting the requirements of ERISA and Code Section 40l(a) and the Treasury regulations issued thereunder. However, no amendment affecting the duties, powers or responsibilities of the Trustee may be made without the written consent of the Trustee. No amendment (including a change in the actuarial basis for determining optional or early retirement benefits) shall be made to the Plan which shall:

(a) deprive any Participant without his consent of any portion of his Accrued Benefit prior to the date of such action. Notwithstanding the preceding sentence, a Participant's Accrued Benefit may be reduced to the extent permitted under Section 412(d)(2) of the Code. For purposes of this paragraph, a Plan amendment which has the effect of (1) eliminating or reducing an early retirement benefit or a retirement-type subsidy, or (2) eliminating an optional form of benefit, with respect to benefits attributable to service before the amendment shall be treated as reducing Accrued Benefits. In the case of a retirement- type subsidy, these provisions shall apply only with respect to a Participant who satisfies (either before or after the amendment) the pre-amendment conditions for the subsidy. In general, a retirement-type subsidy is a subsidy that continues after retirement, but does not include a qualified disability benefit, a medical benefit, a social security supplement, a death benefit (including life insurance); or

(b) make it possible, except as otherwise provided herein, for any part of the corpus or income of the Trust Fund (other than such part as may be required to pay taxes and administrative expenses) to be used for or diverted to purposes other than the exclusive benefit of the Participants or their Beneficiaries; or

(c) alter the schedule for vesting in Accrued Benefits with respect to any Participant who has completed three (3) or more years of Credited Service without his consent, or deprive any Participant of the nonforfeitable part of his Accrued Benefit.

Notwithstanding the other provisions of this Section or any other provisions of the Plan to the contrary, any amendment or modification of the Plan may be made retroactively, if necessary, or appropriate to conform to or to satisfy the conditions of any law, governmental regulation or ruling and to meet the requirements of the Employee Retirement Income Security Act of 1974, as it may be amended.

10.2 **TERMINATION OF THE PLAN.** The Board of Directors reserves the right to discontinue contributions under the Plan and to terminate the Plan in whole or in part with respect to a specific group of Employees. In the event of full or partial termination, Employees affected thereby shall have a nonforfeitable right to their Accrued Benefits, to the extent funded. The

Administrator, upon full termination, shall cause the assets of the Plan to be allocated for the purposes set forth in, and in the order of priorities established by, Section 4044 of ERISA. Any residual assets remaining thereafter shall be returned to the Employer. The Employer shall not be liable to Participants for benefits other than those which can be provided by the Plan's assets.

ARTICLE ELEVEN--TOP-HEAVY PROVISIONS

11.1 **APPLICABILITY.** Only to the extent required by applicable law, the provisions of this Article shall become applicable in any Plan Year in which the Plan is a Top-Heavy Plan. The determination of whether the Plan is a Top-Heavy Plan shall be made each Plan Year by the Administrator.

11.2 **DEFINITIONS.** For purposes of this Article, the following definitions shall apply:

(a) **"Key Employee":** Key Employee means any Employee or former Employee (including any deceased Employee) who at any time during the Plan Year that includes the determination date was an officer of the Employer having annual Compensation greater than $185,000 (as adjusted under Section 416(i)(l) of the Code), a five percent (5%) owner of the Employer, or a one percent (1%) owner of the Employer having annual Compensation of more than $150,000. For this purpose, annual Compensation means Compensation within the meaning of Section 415(c)(3) of the Code. The determination of who is a Key Employee (including the terms "five percent (5%) owner" and "one percent (1%) owner") shall be made in accordance with Section 416(i)(l) of the Code and the applicable regulations and other guidance of general applicability issued thereunder.

(b) **"Top-Heavy Plan":**

(1) The Plan shall constitute a "Top-Heavy Plan" if any of the following conditions exist:

(A) The top-heavy ratio for the Plan exceeds sixty percent (60%) and the Plan is not part of any required aggregation group or permissive aggregation group of plans; or

(B) The Plan is a part of a required aggregation group of plans (but is not part of a permissive aggregation group) and the top-heavy ratio for the group of plans exceeds sixty percent (60%); or

(C) The Plan is a part of a required aggregation group of plans and part of a permissive aggregation group and the top-heavy ratio for the permissive aggregation group exceeds sixty percent (60%).

(2) If the Employer maintains one or more defined contribution plans (including any simplified employee pension plan funded with individual retirement accounts or annuities) and the Employer maintains or has maintained one or more defined benefit plans which have covered or could cover a Participant in this Plan, the top- heavy ratio is a fraction, the numerator of which is the sum of account balances under the defined contribution plans for all Key Employees and the actuarial equivalents of accrued benefits under the defined benefit plans for all Key

Employees, and the denominator of which is the sum of the account balances under the defined contribution plans for all Participants and the actuarial equivalents of accrued benefits under the defined benefit plans for all Participants. Both the numerator and denominator of the top-heavy ratio shall include any distribution of an account balance or an accrued benefit made in the one (1)-year period ending on the determination date and any contribution due to a defined contribution pension plan but unpaid as of the determination date. In determining the accrued benefit of a non-Key Employee who is participating in a plan that is part of a required aggregation group, the method of determining such benefit shall be either (a) in accordance with the method, if any, that uniformly applies for accrual purposes under all plans maintained by the Employer or any related employer under Code Section 414, or (b) if there is no such method, as if such benefit accrued not more rapidly than the slowest accrual rate permitted under the fractional accrual rate of Code Section 41l(b)(l)(C).

(3) For purposes of (1) and (2) above, the value of accrued benefits and the actuarial equivalents of accrued benefits shall be determined as of the most recent Valuation Date that falls within or ends with the twelve (12)-month period ending on the determination date. The account balances and accrued benefits of a Participant who is not a Key Employee but who was a Key Employee in a prior year shall be disregarded. The accrued benefits and account balances of Participants who have performed no Hours of Service with any employer maintaining the plan for the one (1)-year period ending on the determination date shall be disregarded. The calculations of the top-heavy ratio, and the extent to which distributions, rollovers, and transfers are taken into account shall be made under Section 416 of the Code and regulations issued thereunder. Deductible Employee contributions shall not be taken into account for purposes of computing the top-heavy ratio. When aggregating plans, the value of account balances and accrued benefits shall be calculated with reference to the determination dates that fall within the same calendar year.

(4) Definition of terms for Top-Heavy status:

(A) **"Top-heavy ratio"** shall mean the following:

(1) If the Employer maintains one (1) or more defined benefit plans and the Employer has never maintained any defined contribution plans which have covered or could cover a Participant in this Plan, the top-heavy ratio is a fraction, the numerator of which is the sum of the Accrued benefits of all Key Employees as of the determination date (including any part of any Accrued benefit distributed in the one (1)-year period ending on the determination date), and the denominator of which is the sum of the Accrued benefits (including any part of any such benefit distributed in the one (1)-year period ending on the determination date) of all Participants as of the determination date.

(B) **"Permissive aggregation group"** shall mean the required aggregation group of plans plus any other plan or plans of the Employer which, when considered as a group with the required aggregation group, would continue to satisfy the requirements of Section 40l(a)(4) and 410 of the Code.

(C) **"Required aggregation group"** shall mean (1) each qualified plan of the Employer (including any terminated plan) in which at least one Key Employee participates, and (2) any other qualified plan of the Employer which enables a plan described in (1) to meet the requirements of Section 40l(a)(4) or 410 of the Code.

(D) **"Determination date"** shall mean, for any Plan Year subsequent to the first Plan Year, the last day of the preceding Plan Year. For the first Plan Year of the Plan, "determination date" shall mean the last day of that Plan Year.

(E) **"Valuation Date"** shall mean the last day of the Plan Year.

(F) Actuarial equivalence shall be based on the interest and mortality rates utilized to determine actuarial equivalence when benefits are paid from any defined benefit plan. If no rates are specified in said plan, the following shall be utilized: pre- and post-retirement interest -- five percent (5%); post-retirement mortality based on the Unisex Pension (1984) Table.

(5) <u>Determination of Present Values and Amounts.</u> This paragraph 5 shall apply for purposes of determining the present values of Accrued Benefits and the amounts of account balances of Employees as of the determination date.

(A) **Distributions During Year Ending on the Determination Date.** The present values of Accrued Benefits and the amounts of account balances of an Employee as of the determination date shall be increased by the distributions made with respect to the Employee under the Plan and any plan aggregated with the Plan under Section 416(g)(2) of the Code during the 1-year period ending on the determination date. The preceding sentence shall also apply to distributions under a terminated plan which, had it not been terminated, would have been aggregated with the Plan under Section 416(g)(2)(A)(i) of the Code. In the case of a distribution made for a reason other than severance from employment, death, or disability, this provision shall be applied by substituting a "5-year period" for "1-year period."

(B) **Employees Not Performing Services During Year Ending on the Determination Date.** The Accrued Benefits and accounts of any individual who has not performed services for the Employer during the 1-

year period ending on the determination date shall not be taken into account.

11.3 MINIMUM BENEFIT FOR ANY PLAN YEAR IN WHICH THE PLAN IS A TOP- HEAVY PLAN.

(a) This minimum benefit shall be provided in the Plan for any Plan Year in which the Plan is a Top-Heavy Plan, subject to the provisions below. Each Participant who is a non-Key Employee and who has been credited with at least one thousand (1,000) Hours of Service shall accrue a benefit, to be provided solely by Employer contributions and expressed as a life annuity commencing at Normal Retirement Date, of two percent (2%) of his or her highest compensation averaged for the five (5) consecutive years for which the Participant had the highest compensation (as that term is defined in Section 9.2(b)). The minimum accrual shall be determined without regard to any Social Security benefit provided by Employer contributions under that system. If the benefit is received by such Participant in a form other than a single life annuity, such Participant must receive an amount that is that form of benefit's Actuarial Equivalent. If the benefit commences at a date other than at Normal Retirement Date, it must be equal to the Actuarial Equivalent of the minimum single life annuity benefit commencing at Normal Retirement Date.

(b) A non-Key Employee shall mean any Employee or former Employee including the Beneficiary of a deceased Employee or former Employee who was not a Key Employee during the Plan Year ending on the determination date.

(c) The minimum accrued benefit, when expressed as a life annuity commencing at Normal Retirement Date, shall not exceed twenty percent (20%) of the Participant's average compensation.

(d) The provisions in subsection (a) shall be applied so that there is no duplication of minimum benefits under this Plan and any defined contribution plan. The minimum benefit shall be offset by the Actuarial Equivalent of any amount payable to the participant from a defined contribution plan of the Employer.

(e) Any minimum accrued benefit required (to the extent required to be nonforfeitable under Section 416(b)) may not be forfeited under Code Sections 41l(a)(3)(B) or 41l(a)(3)(D).

(f) For purposes of satisfying the minimum benefit requirements of Section 416(c)(l) of the Code and the Plan, in determining years of service with the Employer, any service with the Employer shall be disregarded to the extent that such 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.

11.4 **VESTING.** The minimum vesting schedule set forth in this Section 11.4 shall apply in any Plan Year in which the Plan is a Top-Heavy Plan, and apply to all benefits within the meaning of

Section 411(a)(7) of the Code except those attributable to Employee contributions, if any, including benefits accrued before the effective date of Section 416 and benefits accrued before the Plan became a Top-Heavy Plan. Further, no reduction in vested benefits may occur in the event the Plan's status as a Top-Heavy Plan changes for any Plan Year and the vesting schedule is amended. In addition, if a Plan's status changes from a Top-Heavy Plan to that of a non-top- heavy plan, a Participant with three (3) or more years of Credited Service shall continue to have his vested rights determined under the schedule which he selects, in the event the vesting schedule is subsequently amended. For vesting to be determined under this schedule, an Employee must be credited with at least one (1) Hour of Service in any Plan Year in which the Plan is a Top-Heavy Plan. Payment of a Participant's vested Accrued Benefit under this Section shall be made in accordance with the provisions of Article Five.

Years of Credited Service	**Vested Percentage**
Less than 3 years	*0%*
3 years and thereafter	*100%*

ARTICLE TWELVE--MISCELLANEOUS PROVISIONS

12.1 **PLAN DOES NOT AFFECT EMPLOYMENT.** Neither the creation of this Plan nor any amendment of it nor the creation of any fund or amount nor the payment of benefits hereunder shall be construed as giving any legal or equitable right to any Employee or Participant against the Employer, its officers or Employees, or against the Trustee, and all liabilities under this Plan shall be satisfied, if at all, only out of the Trust Fund held by the Trustee. Participation in the Plan shall not give any Participant any right to be retained in the employ of the Employer, and the Employer hereby expressly retains the right to hire and discharge any Employee at any time with or without cause, as if the Plan had not been adopted, and any such discharged Participant shall have only such rights or interests in the Trust Fund as may be specified herein.

12.2 **SUCCESSOR TO THE EMPLOYER.** In the event of the merger, consolidation, reorganization or sale of assets of the Employer, under circumstances in which a successor person, firm or corporation shall carry on all or a substantial part of the business of the Employer, and such successor shall employ a substantial number of Employees of the Employer and shall elect to carry on the provisions of the Plan, such successor shall be substituted for the Employer under the terms and provisions of the Plan upon the filing in writing with the Trustee of its election to do so.

12.3 **MERGER OF PLANS.** In the case of any merger or consolidation of this Plan with, or transfer of the assets or liabilities of the Plan to, any other plan, the terms of such merger, consolidation or transfer shall be such that each Participant would receive (in the event of termination of this Plan or its successor immediately thereafter) a benefit which is not less than he would have received in the event of termination of this Plan immediately before such merger, consolidation or transfer.

12.4 **REPAYMENTS TO THE EMPLOYER.** Notwithstanding any provisions of this Plan to the contrary:

(a) Any Plan assets attributable to any contribution made to this Plan by the Employer because of a mistake of fact shall be returned to the Employer within one (I) year after the date of contribution.

(b) All Employer contributions hereunder are expressly contributed based upon such contributions' deductibility under Code Section 404. Any Plan assets attributable to any contributions made to this Plan by the Employer shall be refunded to the Employer, to the extent the income tax deduction for such contribution is disallowed. Such amount shall be refunded within one (1) taxable year after the date of such disallowance or within one
(1) year of the resolution of any judicial or administrative process with respect to the disallowance.

12.5 **BENEFITS NOT ASSIGNABLE.** Except as provided in Section 414(p) of the Code with respect to "qualified domestic relations orders," or as provided in Section 40l(a)(l3)(C) of the Code with respect to certain judgments and settlements, the right of any Participant or his Beneficiary to any benefit or payment hereunder shall not be subject to voluntary or involuntary alienation or assignment.

12.6 **DISTRIBUTION TO LEGALLY INCAPACITATED.** In the event any benefit is payable to a minor or to a person deemed to be incompetent or otherwise under legal disability, or who is by sole reason of advanced age, illness, or other physical or mental incapacity, incapable of handling the disposition of his property, the Administrator, in its sole discretion, may direct the Trustee to apply all or any portion of such benefits, directly to the care, comfort, maintenance, support, education or use of such person or to pay or distribute all or any portion of such benefit to (a) the spouse of such person, (b) the parent of such person, (c) the guardian, committee or other legal representative, wherever appointed, of such person, (d) the person with whom such person shall reside, (e) any other person having the care and control of such person, or (f) such person. The receipt of any such payment or distribution shall be a complete discharge of liability for Plan obligations.

12.7 **MISSING PERSONS.** If the Administrator is unable to locate a proper payee within one year after a benefit becomes payable, the Administrator may treat the benefit as a forfeiture; however, if a claim for benefits is subsequently presented by a person entitled to a payment, the forfeited amount shall be recredited upon verification of the claim, except for those amounts that have been paid pursuant to an escheat or other applicable law.

12.8 **EXPENSES.** To the extent permissible under applicable law, all reasonable expenses of the Plan and Trust Fund shall be paid by, and constitute a charge upon, the Trust Fund, except to the extent that such expenses may have been paid by an Employer in its sole and absolute discretion. Such expenses shall include any expenses incident to the functioning of the Plan, including, without limitation, attorneys' fees and the compensation of actuaries and other agents, accounting and clerical charges, expenses, if any, of being bonded as required by ERISA, the premiums of plan termination insurance purchased from the Pension Benefit Guaranty Corporation, and any other costs of administering the Plan.

12.9 **GOVERNING DOCUMENTS.** A Participant's rights shall be determined under the terms of the Plan as in effect at his date of separation from service.

12.10 **GOVERNING LAW.** The provisions of this Plan shall be construed under the laws of the state of New York, except to the extent such laws are pre-empted by Federal law.

12.11 **CONSTRUCTION.** Wherever appropriate, the use of the masculine gender shall be extended to include the feminine or neuter or vice versa; and the singular form of words shall be extended to include the plural; and the plural shall be restricted to mean the singular.

12.12 **HEADINGS.** The Article headings and Section numbers are included solely for ease of reference. If there is any conflict between such headings or numbers and the text of the Plan, the text shall control.

12.13 **COUNTERPARTS.** This Plan may be executed in any number of counterparts, each of which shall be deemed an original; said counterparts shall constitute but one and the same instrument, which may be sufficiently evidenced by any one counterpart.

IN WITNESS WHEREOF,
the Employer has caused this Plan to be executed on the ____________27_____________________ day of ________August________________, 2020.

MINERALS TECHNOLOGIES INC.

By:_____/s/ Thomas J. Meek___________________

Print Name:_______Thomas J. Meek_____________

On behalf of the Retirement Committee

SCHEDULE A

Early Retirement Table

The following table sets forth the percentages which will apply at the ages indicated in the computation of early retirement benefits pursuant to Section 4.4(b)(2)(A):

Age	**Percentage**
65	100
64	96
63	92
62	88
61	84
60	80
59	76
58	72
57	68
56	64
55	60

SCHEDULE B

Alternate Early Retirement Table

The following table sets forth the percentages which will apply at the ages indicated in the computation of early retirement benefits pursuant to Section 4.4(b)(2)(B):

Age	Minimum Years of Service	Percentage
64	26	100
63	27	100
62	28	100
61	29	100
60	30	100
59	31	96
58	32	92
57	33	88
56	34	84
55	35	80

SCHEDULE C

Vested Benefit Table

The following table sets forth the percentages which will apply at the ages indicated in the computation of vested benefits pursuant to Section 4.4(b)(2)(C):

Age That Annuity Payments Commence	Percentage of Vested Annuity
65+	100
64	94
63	88
62	82
61	76
60	70
59	64
58	58
57	52
56	46
55	40

SCHEDULE D

A Participant's Credited Service pursuant to Section 2.1 shall include service with the following employers as provided herein.

(1) Service With Zedmark Refractories Corporation and/or Zedmark Inc. Credited Service, for purposes of vesting pursuant to Section 4.4(a), shall include each full year of service for the period during which a Participant was employed by Zedmark Refractories Corporation and/or Zedmark, Inc. prior to October 3, 1989, except if such Participant was covered at such time by a collective bargaining agreement that did not provide for coverage of such Participant under the Pfizer Inc. Retirement Annuity Plan (the "Pfizer Plan"). Credited Service for purposes of benefit accrual under the Career Earnings Formula shall include each full year of service for the period during which a Participant was employed by Zedmark Refractories Corporation and/or Zedmark, Inc. prior to October 3, 1989, provided such number of full years of service may not exceed the number of full years of service the Participant is employed by the Company after October 3, 1989; and provided, further, such Participant was not covered, on October 3, 1989, by a collective bargaining agreement that did not provide for coverage of such Participant under the Pfizer Plan.

(2) Service With Nalco Chemical Company. Credited Service, for purposes of vesting under Section 4.4 and eligibility for early retirement under Section 4.4(b)(2)(A) and (B), shall include each full year of service for the period during which a Participant was employed by Nalco Chemical Company prior to June 1, 1988, if such Participant was a transferred employee, as such term is defined in the Purchase Agreement dated June 1, 1988, between Quigley Company, Inc. and Pfizer Inc., as purchasers and Nalco Chemical Company, as seller.

(3) Service With Martin Marietta Magnesia Specialties, Inc. With respect to Participants who were employees of Martin Marietta Magnesia Specialties, Inc. on April 30, 2001, who became Employees on May 1, 2001, Credited Service, for purposes of vesting under Section 4.4 and eligibility for early retirement under Section 4.4(b)(2), shall include each full year of service for the period during which a Participant was employed by Martin Marietta Magnesia Specialties, Inc. prior to May 1, 2001; provided such Participant was not covered, on April 30, 2001, by the terms of a collective bargaining agreement of which Martin Marietta Magnesia Specialties, Inc. was a party.

AMENDMENT TO THE MINERALS TECHNOLOGIES INC. SAVINGS AND INVESTMENT PLAN

WHEREAS, Minerals Technologies Inc. (the "Employer") heretofore adopted the Minerals Technologies Inc. Savings and Investment Plan, as amended and restated effective as of January 1, 2013 (the "Plan"); and

WHEREAS, the Employer reserved the right to amend the Plan; and

WHEREAS, the Employer desires to amend the Plan to modify the eligibility requirements and Employer matching contribution, and add a loan provision for union employees of the Dover, Ohio plant;

NOW, THEREFORE, the Plan is hereby amended, effective as of August 1, 2020, unless otherwise stated herein, as follows:

1. Section 3.1 of the Plan shall be amended by replacing the fourth paragraph in its entirety as follows:

   "Notwithstanding the foregoing and commencing as soon as administratively feasible after September 18, 2012, any Employee who is a member of who is a member of the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union Local 521, at Minteq International, Inc., Dover Ohio plant shall be eligible to participate in the Plan subject to the eligibility requirements of this Section 3.1. Any such Employee hired on or after August 1, 2020 shall be eligible as soon as administratively feasible following sixty (60) "days of employment" with the Employer. For this purpose, an Employee shall be credited with one (1) "day of employment" for each day in which he is credited with a least one (1) Hour of Service under Section 1.14. In the event an Employee fails to complete sixty (60) days of employment during the twelve (12)-month period commencing on his Employment Date (or reemployment date), but is employed by the Employer on the twelve (12)-month anniversary of that date, such Employee shall be deemed to have satisfied the service requirement for purposes of participating under the Plan."

2. Section 4.3 of the Plan shall be amended by replacing subsection (d) in its entirety as follows:

   "(d) *Dover Employer Matching Contributions.* For each payroll period, the Employer may contribute to the Plan, on behalf of each Participant who is a member of the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union Local 521, at Minteq International, Inc., Dover Ohio plant a discretionary matching contribution equal to one hundred percent (100%) of the first three percent (3%) of the Participant's Compensation contributed as elective deferrals (within the meaning of Section 4.1) and/or Employee after-tax contributions (within the meaning of Section 4.2), plus fifty percent (50%) of the next two percent (2%) of the Participant's Compensation contributed as elective deferrals (within the meaning of Section 4.1) and/or Employee after-tax contributions (within the meaning of Section 4.2) for the period during which elective deferrals and/or Employee after-tax contributions are made by the Participant. The Board of Directors of Minerals Technologies Inc. may also determine to increase, suspend or reduce its contributions under this Section for any Plan Year or any portion thereof, provided any such suspension or reduction does not violate Section 411(d)(6) of the Code. Allocations under this Section shall be subject to the special rules of Section 13.3 in any Plan Year in which the Plan is a Top-Heavy Plan (as defined in Section 13.2(b))."

3. Section 8.1(a) of the Plan is hereby amended by deleting the first paragraph in its entirety and replacing it with the following:

   "(a) *Permissible Amount and Procedures.* Upon the application of an active Participant, the Administrator may, in accordance with a uniform and nondiscriminatory policy, direct the Trustee to grant a loan to the Participant, which loan shall be secured by the Participant's vested Account balance. The Participant's signature shall be required on a promissory note. The rate of interest on any such loan shall be equal to the "Prime Rate" (as reported in *The Wall Street Journal* on the date the loan is initiated) plus one percent 1%. Participant loans shall be treated as segregated investments, and interest repayments shall be credited only to the Participant's Account. Provided, however, that only Participants who are Employees or "parties in interest" (as defined in Section 3(14) of the Employee Retirement Income Security Act of 1974) are permitted to inititate loans. In addition, a Participant may only have one (1) outstanding loan at any time, including any defaulted loans."

4. Except as hereinabove amended, the provisions of the Plan shall continue in full force and effect.

IN WITNESS WHEREOF, the Employer, by its duly authorized officer, has caused this Amendment to be executed on ____December 21, 2020___________________________.

MINERALS TECHNOLOGIES INC.
By: Thomas J. Meek

EXHIBIT 21.1

SUBSIDIARIES OF THE COMPANY

Name of the Company	Jurisdiction of Organization
ADAE, Cetco Sp. Z o.o., s.k.a. (Short Name: ADAE SKA)	Poland
Amcol Australia Pty. Ltd.	Australia
AMCOL CETCO do Brasil Serviços e Produtos de Construção Ltda.	Brazil
AMCOL Dongming Industrial Minerals Company Limited	China
AMCOL Health & Beauty Solutions, Incorporated	Delaware
AMCOL (Holdings) Ltd.	UK
Amcol International B.V.	Netherlands
AMCOL International Corporation	Delaware
AMCOL International Holdings Corporation	Delaware
Amcol International (Thailand) Limited	Thailand
AMCOL Korea Limited	S. Korea
Amcol Mauritius	Mauritius
Amcol Minchem Jianping Co., Ltd	China
Amcol Mineral Madencilik Sanayi ve Ticaret A.S. (Turkey)	Turkey
Amcol Minerals EU Limited	UK
Amcol Minerals Europe Limited	UK
Amcol Minerals and Materials (India) Private Limited	India
AMCOL (Tianjin) Industrial Minerals Company Limited	China
AMCOL Tianyu Industrial Minerals Co. Ltd.	China
AMCOL de México, S.A., de C.V.	Mexico
American Colloid Company	Delaware
Ameri-Co Carriers, Inc.	Nebraska
Ameri-Co Logistics, Inc.	Nebraska
Animal Care Trading B.V.	Netherlands
APP China Specialty Minerals Pte Ltd.	Singapore
ASMAS Agir Sanayi Malzemeleri Imal ve Tic. A.S (has branch office in Bahrain).	Turkey
Barretts Minerals Inc.	Delaware
Batlhako Mining Ltd.	South Africa
Bonmerci Investments 103 (Pty) Ltd.	South Africa
CCS, Cetco Sp. Z o.o., s.k.a.	Poland
CETCO do Brasil Serviços E Produtos Minerais E De Meio-Ambiente Ltda.	Brazil
CETCO Energy Services Company LLC	Delaware
CETCO Energy Services de México, S.A. de C.V.	Mexico
CETCO Energy Services Limited	UK
CETCO Energy Services (Malaysia) Sdn. Bhd.	Malaysia
CETCO (Europe) Ltd	UK
CETCO Germany GmbH	Germany
CETCO Iberia S.L.	Spain
CETCO Iberia Construcciones y Servicios S.L.	Spain
CETCO Lining Technologies India Private Limited	India
CETCO Oilfield Services Asia Ltd.	Malaysia
CETCO Oilfield Services Company Limited	Canada
CETCO Oilfield Services Company Nigeria Limited	Nigeria
CETCO Oilfield Services Pty. Ltd.	Australia
CETCO Poland, Cetco Sp. Zo.o. S.K.A. (aka CETCO Poland)	Poland
CETCO Sp. Zo.o.	Poland
CETCO Technologies (Suzhou) Co., Ltd. (China)	China
Colloid Environmental Technologies Company LLC (Has a branch in Canada)	Delaware

Name of the Company	Jurisdiction of Organization
Comercializadora y Exportadora CETCO Latino América Limitada (aka CVE CETCO Latino America)	Chile
COS Employment Services de México, S.A. de C.V.	Mexico
Double A Specialty Minerals Co., Ltd.	Thailand
Gold Lun Chemicals (Zhenjiang) Co., Ltd. .	China
Gold Sheng Chemicals (Zhenjiang) Co., Ltd.	China
Gold Zuan Chemicals (Suzhou) Co., Ltd.	China
Green Roof Insurance Co LLC	Vermont
Hi-Tech Specialty Minerals Company Limited	Thailand
Ingeniería y Construcción CETCO ICC Limitada	Chile
Minerals Technologies do Brasil Comercio é Industria de Minerais Ltda.	Brazil
Minerals Technologies Europe S.A. (has branch office in France)	Belgium
Minerals Technologies Holding China Co., Ltd.	China
Minerals Technologies Holdings Inc.	Delaware
Minerals Technologies Holdings Ltd.	United Kingdom
Minerals Technologies India Private Limited	India
Minerals Technologies South Africa (Pty) Ltd.	South Africa
Mintech Canada Inc.	Canada
Mintech Japan K.K.	Japan
Minteq Australia Pty Ltd.	Australia
Minteq B.V.	The Netherlands
Minteq Europe Limited.	Ireland
Minteq International GmbH (has branch office in Schongau)	Germany
Minteq International Inc.	Delaware
Minteq International (Suzhou) Co., Ltd.	China
Minteq Italiana S.p.A.	Italy
Minteq Magnesite Limited (has a branch office in Spain)	Ireland
Minteq Shapes and Services Inc.	Delaware
Minteq UK Limited.	United Kingdom
Montana Minerals Development Company	Montana
MTI Bermuda L.P.	Bermuda
MTI Holding Singapore Pte. Ltd.	Singapore
MTI Holdco I LLC	Delaware
MTI Netherlands B.V.	Netherlands
MTI Technologies UK Limited	United Kingdom
MTI Ventures B.V.	Netherlands
MTX Singapore Holdings Pte. Ltd.	Singapore
Nanocor LLC	Delaware
PT. CETCO Oilfield Services Indonesia	Indonesia
PT Sinar Mas Specialty Minerals	Indonesia
Rayagada Minerals & Chemicals Private Limited	India
Shouguang Minerals Environmental Technology Co., Ltd	China
Sivomatic B.V.	Netherlands
Sivomatic GmbH	Austria
Sivomatic GmbH	Germany
Sivomatic Holding, B.V.	Netherlands
Sivomatic Immovables B.V.	Netherlands
Sivomatic Italia	Italy
Sivomatic Madencilik A.S.	Turkey
Sivomatic Mining B.V.	Netherlands
SMI NewQuest India Private Limited	India
SMI Poland Sp. z o.o.	Poland
Specialty Minerals Bangladesh Limited	Bangladesh
Specialty Minerals (Changshu) Co., Ltd.	China
Specialty Minerals do Brasil Participacoes Ltda.	Brazil
Specialty Minerals FMT K.K.	Japan

Name of the Company	Jurisdiction of Organization
Specialty Minerals France S.A.S. .	France
Specialty Minerals Inc.	Delaware
Specialty Minerals India Holding Inc.	Delaware
Specialty Minerals India Private Limited	India
Specialty Minerals International Inc.	Delaware
Specialty Minerals Malaysia Sdn. Bhd.	Malaysia
Specialty Minerals (Michigan) Inc.	Michigan
Specialty Minerals Nordic Oy Ab	Finland
Specialty Minerals (Portugal) Especialidades Minerais, S.A.	Portugal
Specialty Minerals-Qishun (Nanning) Co., Ltd.	China
Specialty Minerals Slovakia, spol. sr.o.	Slovakia
Specialty Minerals South Africa (Pty) Limited	South Africa
Specialty Minerals (Thailand) Limited	Thailand
Specialty Minerals UK Limited	United Kingdom
Specialty Minerals (Wuzhi) Co., Ltd.	China
Specialty Minerals (Yanzhou) Co., Ltd.	China
Volcay International LLC	Delaware
Volclay South Africa (Proprietary) Limited	South Africa
Volclay Trading Co.	South Africa

EXHIBIT 23.1

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Minerals Technologies Inc.:

We consent to the incorporation by reference in the registration statements (Nos. 333-160002, 33-59080, 333-62739, 333-138245, 333-206244 and 333-249761) on Form S-8 of Minerals Technologies Inc. of our reports dated February 19, 2021, with respect to the consolidated balance sheets of Minerals Technologies, Inc. as of December 31, 2020 and 2019, and the related consolidated statements of income, comprehensive income, changes in shareholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2020, and the related notes and financial statement schedule (collectively, the "consolidated financial statements"), and the effectiveness of internal control over financial reporting as of December 31, 2020, which reports appear in the December 31, 2020 annual report on Form 10-K of Minerals Technologies Inc.

/s/ KPMG LLP

New York, New York
February 19, 2021

Exhibit 24

POWER OF ATTORNEY FOR FILINGS UNDER THE SECURITIES ACT OF 1933, AS AMENDED AND THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

Know all by these presents, that the undersigned hereby constitutes and appoints the Secretary and any Assistant Secretary of Minerals Technologies Inc. (the "Company"), acting singly, with full power of substitution, as the undersigned’s true and lawful attorneys-in-fact and agents to:

(1) execute for and on behalf of the undersigned, in the undersigned’s capacity as an officer and/or director of the Company, all documents, certificates, instruments, statements, filings and agreements (“documents”) to be filed with or delivered in accordance with the Securities Act of 1933, as amended (the “Securities Act”), and the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and the rules and regulations thereunder;

(2) do and perform any and all acts for and on behalf of the undersigned that may be necessary or desirable to complete and execute and timely file any such documents with the United States Securities and Exchange Commission (the “SEC”) and any stock exchange or similar authority; and

(3) take any other action of any type whatsoever that, in the opinion of such attorneys-in-fact, may be necessary or desirable in connection with the foregoing authority, it being understood that the documents executed by such attorneys-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorneys-in-fact may approve.

The undersigned hereby grants to such attorneys-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary, or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such attorneys-in-fact substitute or substitutes, have lawfully done or cause to be done or shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted. The undersigned acknowledges that the foregoing attorneys-in-fact, in serving in such capacity at the request of the undersigned, are not assuming any of the undersigned’s responsibilities to comply with the Securities Act and the Exchange Act.

All pre-existing Powers of Attorney granted to the persons designated above are hereby revoked. This Power of Attorney shall remain in full force and effect until the undersigned is no longer required to file documents under the Securities Act and the Exchange Act with respect to the undersigned's holdings of and transactions in securities issued by the Company, unless earlier revoked by the undersigned in a signed writing delivered to the foregoing attorneys-in-fact. This Power of Attorney may be filed with the SEC as a confirming statement of the authority granted herein.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of this ___ day of _________, ____.

/s/ Joseph C. Breunig Joseph C. Breunig	Dated: November 12, 2014
/s/ John J. Carmola John J. Carmola	Dated: May 21, 2013
/s/ Robert L. Clark Robert L. Clark	Dated: November 9, 2009
/s/ Alison A. Deans Alison A. Deans	Dated: February 20, 2019
/s/ Duane R. Dunham Duane R. Dunham	Dated: June 15, 2009
/s/ Franklin Feder Franklin Feder	Dated: October 1, 2017
/s/ Carolyn K. Pittman Carolyn K. Pittman	Dated: August 8, 2017
/s/ Marc E. Robinson Marc E. Robinson	Dated: December 1, 2011
/s/ Donald C. Winter Donald C. Winter	Dated: February 1, 2014

EXHIBIT 31.1

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, Douglas T. Dietrich, certify that:

1. I have reviewed this Annual Report on Form 10-K of Minerals Technologies Inc.;

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

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

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

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

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

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

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

5. The registrant's other certifying officer(s) 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:

   (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 19, 2021

/s/ Douglas T. Dietrich
Douglas T. Dietrich
Chief Executive Officer

EXHIBIT 31.2

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, Matthew E. Garth, certify that:

1. I have reviewed this Annual Report on Form 10-K of Minerals Technologies Inc.;

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

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

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

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

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

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and (the registrant’s fourth fiscal quarter in the case of an annual report)

   (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(s) 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:

   (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 19, 2021

/s/ Matthew E. Garth
Matthew E. Garth
Senior Vice President - Finance and Treasury
Chief Financial Officer

EXHIBIT 32

SECTION 1350 CERTIFICATION

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of Section 1350 of Chapter 63 of Title 18, United States Code), each of the undersigned officers of Minerals Technologies Inc., a Delaware corporation (the "Company"), does hereby certify that:

The Annual Report on Form 10-K for the year ended December 31, 2020 (the "Form 10-K") of the Company fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and information contained in the Form 10-K fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: February 19, 2021

/s/ Douglas T. Dietrich
Douglas T. Dietrich
Chief Executive Officer

Dated: February 19, 2021

/s/ Matthew E. Garth
Matthew E. Garth
Senior Vice President-Finance and Treasury
Chief Financial Officer

The foregoing certification is being furnished solely pursuant to Exchange Act Rule 13a-14(b); is not deemed to be "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that section; and is not deemed to be incorporated by reference into any filing under the Securities Act of 1933 or the Exchange Act of 1934.

Section 1503 of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K contain certain reporting requirements regarding coal or other mine safety. The Company, through its subsidiaries Specialty Minerals Inc., Barretts Minerals Inc., and American Colloid Company, operates fourteen mines in the United States. The operation of our mines is subject to regulation by the Federal Mine Safety and Health Administration ("MSHA") under the Federal Mine Safety and Health Act of 1977 (the "Mine Act"). MSHA inspects our mines on a regular basis and issues various citations and orders when it believes a violation has occurred under the Mine Act.

The following table sets forth the required information with respect to each mine for which we are the operator for the period January 1, 2020 to December 31, 2020:

Mine	Section 104(a) S&S	Section 104(b)	Section 104(d)	Section 110(b)(2)	Section 107(a)	Proposed Assessments	Fatalities
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Lucerne Valley, CA 04-00219	7	0	2	0	0	$ 42,273	0
Canaan, CT 06-00019	6	0	0	0	0	$ 6,382	0
Adams, MA 19-00035	11	0	0	0	1	$ 55,582	0
Barretts Mill, Dillon, MT 24-00157	1	0	0	0	0	$ 1,500	0
Regal Mine, Dillon, MT 24-01994	0	0	0	0	0	$ 0	0
Treasure Mine, Dillon, MT 24-00160	0	0	0	0	0	$ 0	0
Belle/Colony Mine, WY 48-00888	0	0	0	0	0	$ 1,209	0
Belle Fourche Mill, SD 39-00049	0	0	0	0	0	$ 246	0
Colony East, WY 48-00594	3	0	0	0	0	$ 4,632	0
Colony West, WY 48-00245	0	0	0	0	0	$ 1,775	0
Gascoyne, ND 32-00459	1	0	0	0	0	$ 1,109	0
Lovell, WY 48-00057	2	0	0	0	0	$ 9,777	0
Sandy Ridge, AL 01-00093	0	0	0	0	0	$ 246	0
Yellowtail, WY 48-00607	0	0	0	0	0	$ 246	0

(A) The total number of violations of mandatory health or safety standards that could significantly and substantially contribute to the cause and effect of a mine safety or health hazard under section 104 of the Mine Act for which we received a citation from MSHA.

(B) The total number of orders issued under section 104(b) of the Mine Act.

(C) The total number of citations and orders for unwarrantable failure of the Company to comply with mandatory health or safety standards under section 104(d) of the Mine Act.

(D) The total number of flagrant violations under section 110(b)(2) of the Mine Act.

(E) The total number of imminent danger orders issued under section 107(a) of the Mine Act.

(F) The total dollar value of proposed assessments from MSHA under the Mine Act.

(G) The total number of mining-related fatalities, other than fatalities determined by MSHA to be unrelated to mining activity.

During the period January 1, 2020 to December 31, 2020, we did not receive any written notice from MSHA, with respect to any mine for which we are the operator, of (A) a pattern of violations of mandatory health or safety standards that are of such nature as could have significantly and substantially contributed to the cause and effect of mine health and safety hazards under section 104(e) of the Mine Act or (B) the potential to have such a pattern.

The following table sets forth the required information with respect to legal actions before the Federal Mine Safety and Health Review Commission, reported on a per docket basis, involving each mine for which we are the operator for the period January 1, 2020 to December 31, 2020:

Mine	Legal Actions Pending As Of Last Day Of Period	Legal Actions Initiated During Period	Legal Actions Resolved During Period
Lucerne Valley, CA	0	0	0

Canaan, CT	0	0	0
Adams, MA	0	4	4
Barretts Mill, Dillon, MT	0	0	0
Regal Mine, Dillon, MT	0	0	0
Treasure Mine, Dillon, MT	0	0	0
Belle/Colony Mine, WY	0	0	0
Belle Fourche Mill, SD	0	0	0
Colony East, WY	0	2	2
Colony West, WY	0	0	0
Gascoyne, ND	0	0	0
Lovell, WY	0	1	2
Sandy Ridge, AL	0	0	0
Yellowtail, WY	0	0	0