NEWMARKET CORP
Form 10-K
February 19, 2019
Table of Contents

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

FORM 10-K
x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
or
.. 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 1-32190

NEWMARKET CORPORATION
Incorporated pursuant to the Laws of the Commonwealth of Virginia
Internal Revenue Service Employer Identification No. 20-0812170
330 South Fourth Street
Richmond, Virginia 23219-4350
804-788-5000
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
COMMON STOCK, without par value	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 x No o
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes o No x
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o
Indicate by check mark whether the registrant has submitted electronically 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 x No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 x Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company)

Smaller reporting company	o
Emerging growth company	o

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

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

Aggregate market value of voting stock held by non-affiliates of the registrant as of June 30, 2018 (the last business day of the registrant's most recently completed second fiscal quarter): $3,346,827,337*

Number of shares of Common Stock outstanding as of January 31, 2019: 11,182,082

DOCUMENTS INCORPORATED BY REFERENCE

Portions of NewMarket Corporation's definitive Proxy Statement for its 2019 Annual Meeting of Shareholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A under the Securities Exchange Act of 1934 are incorporated by reference into Part III of this Annual Report on Form 10-K.

* In determining this figure, an aggregate of 3,191,828 shares of Common Stock as beneficially owned by Bruce C. Gottwald and members of his immediate family have been excluded and treated as shares held by affiliates. See Item 12. The aggregate market value has been computed on the basis of the closing price on the New York Stock Exchange on June 30, 2018.

Table of Contents

Form 10-K
Table of Contents

PART I

Item 1.	Business	3
Item 1A.	Risk Factors	11
Item 1B.	Unresolved Staff Comments	18
Item 2.	Properties	18
Item 3.	Legal Proceedings	19
Item 4.	Mine Safety Disclosures	19

PART II

Item 5.	Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	20
Item 6.	Selected Financial Data	22
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	24
Item 7A.	Quantitative and Qualitative Disclosures about Market Risk	37
Item 8.	Financial Statements and Supplementary Data	38
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	79
Item 9A.	Controls and Procedures	79
Item 9B.	Other Information	80

PART III

Item 10.	Directors, Executive Officers and Corporate Governance	81
Item 11.	Executive Compensation	81
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	81
Item 13.	Certain Relationships and Related Transactions, and Director Independence	82
Item 14.	Principal Accounting Fees and Services	82

PART IV

Item 15.	Exhibits, Financial Statement Schedules	83
Item 16.	Form 10-K Summary	85
Signatures		86

Table of Contents

PART I

ITEM 1. BUSINESS

NewMarket Corporation (NewMarket) (NYSE: NEU) is a holding company and is the parent company of Afton Chemical Corporation (Afton), Ethyl Corporation (Ethyl), NewMarket Services Corporation (NewMarket Services), and NewMarket Development Corporation (NewMarket Development).

Each of our subsidiaries manages its own assets and liabilities. Afton manufactures and sells petroleum additives, while Ethyl represents the sale of tetraethyl lead (antiknock compounds) in North America, as well as certain contracted manufacturing and services. NewMarket Development manages the property that we own in Virginia. NewMarket Services provides various administrative services to NewMarket, Afton, Ethyl, and NewMarket Development. NewMarket Services departmental expenses and other expenses are billed to each subsidiary pursuant to services agreements between the companies.

References in this Annual Report on Form 10-K to “we,” “us,” “our,” and “NewMarket” are to NewMarket Corporation and its consolidated subsidiaries, unless the context indicates otherwise.

As a specialty chemicals company, Afton develops and manufactures highly formulated lubricant and fuel additive packages and markets and sells these products worldwide. Afton is one of the largest lubricant and fuel additives companies in the world. Lubricant and fuel additives are necessary products for efficient and reliable operation of vehicles and machinery. From custom-formulated additive packages to market-general additives, we believe Afton provides customers with products and solutions that make engines run smoother, machines last longer, and fuels burn cleaner.

Through an open, flexible, and collaborative style, Afton works closely with its customers to understand their business and help them meet their goals. This style has allowed Afton to develop long-term relationships with its customers in every major region of the world, which Afton serves through ten manufacturing facilities across the globe.

We have operations in the United States, Europe, Asia Pacific, India, Latin America, Canada, and the Middle East. The economies are generally stable in the countries where we do most of our business, although many of those countries have experienced economic downturns in the past. In countries with more political or economic uncertainty, we generally minimize our risk of loss by utilizing U.S. Dollar-denominated transactions, letters of credit, and prepaid transactions. Further information on our operations in the various geographic areas is in Note 21 of the Notes to Consolidated Financial Statements.

With 514 employees in research and development, Afton is dedicated to developing additive formulations that are tailored to our customers’ and the end-users’ specific needs. Afton’s portfolio of technologically-advanced, value-added products allows it to provide a full range of products, services, and solutions to its customers.

Ethyl provides contracted manufacturing and services to Afton and to third parties, and is a marketer of antiknock compounds in North America.

NewMarket Development manages the property that we own in Richmond, Virginia consisting of approximately 57 acres. Our corporate offices are included in this acreage, as well as a research and testing facility, and several acres dedicated to other uses. We are currently exploring various development opportunities for portions of the property as the demand warrants. This effort is ongoing in nature, as we have no specific timeline for any future developments.

We were incorporated in the Commonwealth of Virginia in 2004. Our principal executive offices are located at 330 South Fourth Street, Richmond, Virginia, and our telephone number is (804) 788-5000. We employed 2,089 people at the end of 2018.

Table of Contents

Business Segments

Our business is composed of one segment, petroleum additives, which is primarily represented by Afton. The antiknock compounds business of Ethyl is reflected in the “All other” category. Each of these is discussed below.

Petroleum Additives—Petroleum additives are used in lubricating oils and fuels to enhance their performance in machinery, vehicles, and other equipment. We manufacture chemical components that are selected to perform one or more specific functions and combine those chemicals with other chemicals or components to form additive packages for use in specified end-user applications. The petroleum additives market is a global marketplace, with customers ranging from large, integrated oil companies to national, regional, and independent companies.

We believe our success in the petroleum additives market is largely due to our ability to deliver value to our customers through our products and our open, flexible, and collaborative working style. We accomplish this by understanding what our customers value and by applying our technical capabilities, formulation expertise, broadly differentiated product solutions, and global supply capabilities to satisfy the customers' needs. We invest significantly in research and development in order to meet our customers’ needs and to adapt to the rapidly changing environment for new and improved products and services.

We view the petroleum additives marketplace as being comprised of two broad product applications: lubricant additives and fuel additives. Lubricant additives are highly formulated chemical solutions that, when blended with base fluids, improve the efficiency, durability, performance, and functionality of mineral oils, synthetic oils, and biodegradable fluids, thereby enhancing the performance of machinery and engines. Fuel additives are chemical components that help oil refiners meet fuel specifications or formulated packages that improve the performance of gasoline, diesel, biofuels, and other fuels, resulting in lower operating costs, improved vehicle performance, and reduced emissions.

Lubricant Additives

Lubricant additives are essential ingredients for making lubricating oils. Lubricant additives are used in a wide variety of vehicle and industrial applications, including engine oils, transmission fluids, off-road powertrain and hydraulic systems, gear oils, hydraulic oils, turbine oils, metalworking fluids and virtually any other application where metal-to-metal moving parts are utilized. Lubricant additives are organic and synthetic chemical components that enhance wear protection, prevent deposits, and protect against the hostile operating environment of an engine, transmission, axle, hydraulic pump, or industrial machine.

Lubricants are widely used in operating machinery from transportation vehicles to heavy industrial equipment. Lubricants provide a layer of protection between moving mechanical parts. Without this layer of protection, the normal functioning of machinery would not occur. Effective lubricants reduce downtime and increase efficiency. Specifically, lubricants serve the following main functions:

- friction reduction—Friction is reduced by maintaining a thin film of lubricant between moving surfaces, preventing them from coming into direct contact with one another and reducing wear on moving machinery, thereby providing longer life and operational efficiency.
- heat removal—Lubricants act as coolants by removing heat resulting either from friction or through contact with other, higher temperature materials.
- containment of contaminants—Lubricants function by carrying contaminants away from the machinery and neutralizing the harmful impact of the by-products created by combustion.

The functionality of lubricants is created through an exact balance between a base fluid and performance enhancing additives. This balance is the goal of effective formulations achieved by experienced research and development professionals. We offer a full line of lubricant additive packages, each of which is composed of component chemicals specially selected to perform desired functions. We manufacture most of the chemical components and blend these components to create formulated additives packages designed to meet industry and customer specifications. Lubricant additive components are generally classified based upon their intended functionality, including:

- detergents, which clean moving parts of engines and machines, suspend oil contaminants and combustion by-products, and absorb acidic combustion products;

4

Table of Contents

- dispersants, which serve to inhibit the formation of sludge and particulates;
- extreme pressure/antiwear agents, which reduce wear on moving engine and machinery parts;
- viscosity index modifiers, which improve the viscosity and temperature characteristics of lubricants and help the lubricant flow evenly to all parts of an engine or machine; and
- antioxidants, which prevent oil from degrading over time.

We are one of the leading global suppliers of specially formulated lubricant additives that combine some or all of the components described above to develop our products. Our products are highly formulated, complex chemical compositions derived from extensive research and testing to ensure all additive components work together to provide the intended results. Our products are engineered to meet specifications prescribed by either the industry or a specific customer. Purchasers of lubricant additives tend to be integrated oil companies or independent compounders/blenders. We make no sales directly to end-users or to original equipment manufacturers (OEMs).

We view our participation in the lubricant marketplace in three primary areas: engine oil additives, driveline additives, and industrial additives. Our view is not necessarily the same way others view the market.

Engine Oil Additives—The largest submarket within the lubricant additives marketplace is engine oil additives which consists of additives designed for passenger cars, motorcycles, on and off-road heavy duty commercial equipment, locomotives, and large engines in ocean-going vessels. We estimate engine oil additives represent approximately 70% of the overall lubricant additives market volume.

The engine oil market’s primary customers include consumers, fleet owners, mining and construction companies, farmers, railroads, shipping companies, service dealers, and OEMs. The primary functions of engine oil additives are to reduce friction, prevent wear, control formation of sludge and oxidation, and prevent rust. Engine oil additives are typically sold to lubricant manufacturers who combine them with a base oil fluid to meet internal, industry, and OEM specifications.

Key drivers of engine oil additives demand are the number of vehicles on the road, total vehicle miles driven, fuel economy, the average age of vehicles on the road, drain intervals, engine and crankcase size, changes in engine design, and temperature and specification changes driven by the OEMs. The extension of drain intervals has generally offset increased demand due to higher vehicle population, new hardware, and more miles driven. Other key drivers include industrial production rates, agricultural output, mining and construction output, environmental regulations, and infrastructure investments of commercial companies. Afton offers products that enhance the performance of mineral, part-synthetic, and fully-synthetic engine oils.

Driveline Additives—The driveline additives submarket is comprised of additives designed for products such as transmission fluids, axle fluids, and off-road powertrain fluids. This submarket shares in the 30% of the market not covered by engine oil additives. Transmission fluids primarily serve as the power transmission and heat transfer medium in the area of the transmission where the torque of the drive shaft is transferred to the gears of the vehicle. Axle fluids lubricate gears and bearings in axles, and powertrain fluids are used in off-highway powertrain and hydraulic systems. Other products in this area include power steering fluids, shock absorber fluids, gear oils, and lubricants for heavy machinery. These products must conform to highly prescribed specifications developed by vehicle OEMs for specific models or designs. These additives are generally sold to oil companies for ultimate sale to vehicle OEMs for new vehicles (factory-fill), service dealers for aftermarket servicing (service-fill), retailers, and distributors.

Key drivers of the driveline additives marketplace are the number of vehicles manufactured, total number of vehicles in operation, drain intervals for transmission fluids and axle fluids, changes in engine and transmission design and temperatures, and specification changes driven by the OEMs.

Industrial Additives—The industrial additives submarket is comprised of additives designed for products for industrial applications such as hydraulic fluids, grease, industrial gear fluids, industrial specialty applications, such as turbine oils, and metalworking fluids. This submarket also shares in the 30% of the market not covered by engine oil additives. These products must conform to industry specifications, OEM requirements, and/or application and operating environment demands. Industrial additives are generally sold to oil companies, service dealers for after-market servicing, and distributors.

5

Table of Contents

Key drivers of the industrial additives marketplace are gross domestic product levels and industrial production.

Fuel Additives

Fuel additives are chemical compounds that are used to improve both the oil refining process and the performance of gasoline, diesel, biofuels, and other fuels. Benefits of fuel additives in the oil refining process include reduced use of crude oil, lower processing costs, and improved fuel storage properties. Fuel performance additives enhance fuel economy, improve ignition and combustion efficiency, reduce emission particulates, maintain engine cleanliness, and protect against deposits in fuel injectors, intake valves, and the combustion chamber. Our fuel additives are extensively tested and designed to meet stringent industry, government, OEM, and individual customer requirements.

Many different types of additives are used in fuels. Their use is generally determined by customer, industry, OEM, and government specifications, and often differs from country to country. The types of fuel additives we offer include:

- gasoline performance additives, which clean and maintain key elements of the fuel delivery systems, including fuel injectors and intake valves, in gasoline engines;
- diesel fuel performance additives, which perform similar cleaning functions in diesel engines;
- cetane improvers, which increase the cetane number (ignition quality) in diesel fuel by reducing the delay between injection and ignition;
- stabilizers, which reduce or eliminate oxidation in fuel;
- corrosion inhibitors, which minimize the corrosive effects of combustion by-products and prevent rust;
- lubricity additives, which restore lubricating properties lost in the refining process;
- cold flow improvers, which improve the pumping and flow of distillate and diesel fuels in cold temperatures; and
- octane enhancers, which increase octane ratings and decrease emissions.

We offer a broad line of fuel additives worldwide and sell our products to major fuel marketers and refiners, as well as independent terminals and other fuel blenders.

Key drivers in the fuel additive marketplace include total vehicle miles driven, fuel economy, the introduction of new engine designs, regulations on emissions (both gasoline and diesel), quality of the crude oil slate and performance standards, and marketing programs of major oil companies.

Competition

We believe we are one of the four largest manufacturers and suppliers in the petroleum additives marketplace.

In the lubricant additives submarket of petroleum additives, our major competitors are The Lubrizol Corporation (a wholly-owned subsidiary of Berkshire Hathaway Inc.), Infineum (a joint venture between ExxonMobil Chemical and Royal Dutch Shell plc), and Chevron Oronite Company LLC. There are several other suppliers in the worldwide market who are competitors in their particular product areas.

The fuel additives submarket is characterized by more competitors. While we participate in many facets of the fuel additives market, our competitors tend to be more narrowly focused. In the gasoline detergent market, we compete mainly against BASF, Chevron Oronite Company LLC, and The Lubrizol Corporation. In the diesel and refinery markets, we compete mainly against The Lubrizol Corporation, Infineum, BASF, Clariant Ltd., and Innospec Inc. We also compete against other regional competitors in the fuel additives marketplace.

The competition among the participants in these industries is characterized by the need to provide customers with cost effective, technologically-capable products that meet or exceed industry specifications. The need to continually increase technology performance and lower cost through formulation technology and cost improvement programs is vital for success in this environment.

Table of Contents

All Other—The “All other” category includes the operations of the antiknock compounds business (primarily sales of antiknock compounds in North America), as well as certain contracted manufacturing and services performed by Ethyl. The Ethyl facility is located in Houston, Texas and is substantially dedicated to terminal operations related to antiknock compounds and other fuel additives. The financial results of the petroleum additives activities by Ethyl are reflected in the petroleum additives segment results. The “All other” category financial results include a service fee charged by Ethyl for its production services to Afton.

Raw Materials and Product Supply

We use a variety of raw materials and chemicals in our manufacturing and blending processes and believe the sources of these are adequate for our current operations. The primary raw materials for Afton are base oil, polyisobutylene, antioxidants, alcohols, solvents, sulfonates, friction modifiers, olefins, and copolymers.

As the performance requirements of our products become more complex, we often work with highly specialized suppliers. In some cases, we source from a single supplier. In cases where we decide to source from a single supplier, we manage our risk by maintaining safety stock of the raw material or qualifying alternate suppliers. The backup position could take additional time to implement, but we are confident we can ensure continued supply for our customers. We continue to monitor the raw material supply situation and continually adjust our procurement strategies as conditions require.

Research, Development, and Testing

Research, development, and testing (R&D) provides Afton with new performance-based solutions for our customers in the petroleum additives market. We develop products through a combination of chemical synthesis, formulation development, engineering design, and performance testing. In addition to developing new products, R&D provides our customers and OEMs with data to substantiate product differentiation and technical support to assure total customer satisfaction.

We are committed to providing the most advanced products, comprehensive testing programs, and superior technical solutions tailored to the needs of our customers and OEMs worldwide. Afton continues to successfully implement techniques to drive efficiency in technology discovery and development, while expanding our internal testing, research, and customer support capabilities around the world in support of our goals of providing market-driven technical leadership and performance-based differentiation. In 2018, we commenced construction to expand our laboratories in Tsukuba, Japan, which will enhance our technical infrastructure and testing capability in the region. Afton continues to develop new products and technology to meet evolving OEM requirements (including specific demands of hybrid and electric vehicles), industry specifications and environmental regulations, and to keep our customers well-positioned for the future. A significant portion of our R&D investment is dedicated to the development of products that are differentiated by their ability to deliver improved fuel efficiency in addition to robust performance in a wide range of new vehicle and industrial equipment designs. Afton’s state-of-the art testing capabilities enable customized research in all areas of performance needed by both OEMs and tier one suppliers. Our leading-edge capabilities and fundamental understanding in the areas of combustion, friction control, energy efficiency, and wear prevention are used to set the stage for next-generation products in all areas.

In 2018, we successfully launched new technologies across all of our lubricant additive and fuel additive product areas. We developed new engine oil products for passenger cars and commercial trucks in support of our customers in all the major regions of the world in which we operate. Research in the engine oil area remains high as we continue to prepare for the new engine oil specification in North America for passenger car motor oil, ILSAC GF-6. This new specification is expected to go into effect in 2020.

We continued to develop new products in multiple application areas in the industrial additive sector, including hydraulic, industrial gear, turbine, slideway, and grease additives. Research is focused on the development of technologies that will provide differentiation to our customers in multiple performance areas including equipment life, reliability, and energy efficiency.

Table of Contents

Research continued in our transmission fluid, axle oil, and tractor fluid product lines. This included the development of new OEM-specific additives used in factory fill fluids installed during automotive component and vehicle assembly in the United States, Germany, Japan, India, and China. In addition, we developed new products for the service-fill sector to provide our customers with the latest additive technology available including some first to market capability enabling our customers to differentiate their offering to the retail market.

We continue to provide leading technology in the fuel additives area. In 2018, we developed and launched new products in all product lines including gasoline performance additives and diesel performance additives, as well as additives used in the distribution of fuels. Research is focused on the development of new technologies that perform well in new, modern engine designs and changing fuel properties, as well as addressing the growing need for increased fuel economy and emissions reduction. In addition, we continue to maintain close interactions with regulatory, industry, and OEM leaders to guide our development of future fuel additive technologies based on well-defined market needs.

Intellectual Property

Our intellectual property, including our patents, licenses, and trademarks, is an important component of our business. We actively protect our inventions, new technologies, and product developments by filing patent applications and maintaining trade secrets. We currently own approximately 1,400 issued or pending United States and foreign patents. In addition, we have acquired the rights under patents and inventions of others through licenses or otherwise. We take care to respect the intellectual property rights of others and we believe our products do not infringe upon those rights. We vigorously participate in patent opposition proceedings around the world, where necessary, to secure a technology base free of infringement. We believe our patent position is strong, aggressively managed, and sufficient for the conduct of our business.

We also have several hundred trademark registrations throughout the world for our marks, including NewMarket®, Afton Chemical®, Ethyl®, mmt®, HiTEC®, GREENBURN®, Passion for Solutions®, CleanStart®, Microbotz®, DriveMore® and Axcel®.

Commitment to Environmental and Safety Excellence

Our commitment to the environment and safety excellence applies to every employee, contractor, and visitor every day, at every site. Safety and environmental responsibility are a way of life at NewMarket - enhancing operations, the way we work, and the relationships we maintain with our employees, customers, supply chain partners, and the communities in which we operate. Our objective is to establish a culture where our employees understand that good environmental and safety performance is good business and understand that environmental compliance and safety are their personal responsibilities. Every employee at NewMarket is responsible for ensuring that our high standards in the area of health, safety (including process safety), environmental protection, and security are upheld at all times.

Our Global Responsible Care Policy Statement includes a commitment to conduct operations in a manner that protects our employees, communities, and the environment, to comply with all applicable laws and regulations, and to reduce our environmental impacts. Additionally, in pursuit of our vision of zero incidents, we work with our employees and other key stakeholders to establish appropriate goals, objectives and targets.

Both Afton and Ethyl have implemented Responsible Care® Management Systems (RC14001®) at U.S. facilities. Our Responsible Care® management systems are certified by an independent third-party auditing process. Additionally, Afton’s Feluy, Belgium; Suzhou, China; Hyderabad, India; Tsukuba, Japan; Rio de Janeiro, Brazil; Bracknell, England; and Singapore facilities are all certified to the environmental standard ISO 14001. Suzhou is also certified to OHSAS 18001, a global occupational health and safety standard. Afton’s Sauget, Illinois plant continues to be an OSHA VPP (Voluntary Protection Program) “Star” worksite.

Table of Contents

In 2018, we continued to enhance our “Actively Caring” safety program, where people look out for the safety and welfare of others with courage and compassion, enabling the achievement of an injury-free environment. Our worldwide injury/illness recordable rate (which is the number of injuries per 200,000 hours worked) in 2018 was 1.05. Our performance was impacted by the integration of our acquisition in San Juan del Rio, Mexico, as well as an overall increase in injuries at our other sites. Minor injuries across the sites highlights the importance of our safety-first culture and have renewed our focus. We introduced new metrics and emphasized reporting of "good catches" and "near misses" to help reduce risk and drive improved performance. We are committed to achieving our aspiration of zero injuries and incidents. To that end, several of our sites did achieve the "Vision of Zero" with no injuries in 2018.
As members of the American Chemistry Council (ACC), Afton and Ethyl provide data on twelve metrics used to track environmental impact, safety, energy use, community outreach and emergency preparedness, greenhouse gas intensity, and product stewardship performance of the ACC member companies. These can be viewed at http://responsiblecare.americanchemistry.com/Performance-Results. The information on this website is not, and shall not be deemed to be, a part of this Annual Report on Form 10-K or incorporated by reference in this Annual Report on Form 10-K or any other filings we make with the Securities and Exchange Commission (SEC).

Environmental

We believe that we comply, in all material respects, with laws, regulations, statutes, and ordinances protecting the environment, including those related to the management and stewardship of chemicals. We have policies and procedures in place establishing regular reviews of our compliance and stewardship, as well as monitoring any significant existing, potential or threatened environmental issues that could materially affect the company.

Our total accruals for environmental remediation, dismantling, and decontamination were approximately $12 million at December 31, 2018 and $14 million December 31, 2017.

As new technology becomes available, it may be possible to reduce accrued amounts. While we believe that we are currently fully accrued for known environmental issues, it is possible that unexpected future costs could have a significant financial impact on our financial position, results of operations, and cash flows.

We spent approximately $30 million in 2018, $26 million in 2017, and $24 million in 2016 for ongoing environmental operating and clean-up costs, excluding depreciation of previously capitalized expenditures. These environmental operating and clean-up expenses are primarily included in cost of goods sold.

For capital expenditures on pollution prevention and safety projects, we spent $10 million in 2018, $10 million in 2017, and $14 million in 2016. We expect expenditures in 2019 to be at a level similar to the previous three years.

The costs of complying with governmental pollution prevention and safety regulations are subject to:

- potential changes in applicable statutes and regulations (or their enforcement and interpretation);
- uncertainty as to the success of anticipated solutions to pollution problems;
- uncertainty as to whether additional expense may prove necessary; and
- potential for emerging technology to affect remediation methods and reduce associated costs.

We are subject to liabilities associated with the investigation and cleanup of hazardous substances, as well as personal injury, property damage, or natural resource damages arising from the release of, or exposure to, such hazardous substances. Further, we may have environmental liabilities imposed in many situations without regard to violations of laws or regulations. These liabilities may also be imposed jointly and severally (so that a responsible party may be held liable for more than its share of the losses involved, or even the entire loss) and may be imposed on many different entities with a relationship to the hazardous substances at issue, including, for example, entities that formerly owned or operated the property and entities that arranged for the disposal of the hazardous substances at an affected property. We are subject to many environmental laws, including the federal Comprehensive Environmental Response, Compensation and Liability Act, commonly known as CERCLA or Superfund, in the United States, and similar foreign and state laws.

Table of Contents

Under CERCLA, we are currently considered a potentially responsible party (PRP), at a few sites, ranging from smaller than a de minimis PRP to involvement considered more of a minor PRP. At some of these sites, the remediation methodology, as well as the proportionate shares of each PRP, has been well established. Other sites are not as mature, which makes it more difficult to reasonably estimate our share of the future clean-up or remediation costs.

In 2000, the Environmental Protection Agency (EPA) named us as a PRP under Superfund law for the clean-up of soil and groundwater contamination at the five grouped disposal sites known as "Sauget Area 2 Sites" in Sauget, Illinois. Without admitting any fact, responsibility, fault, or liability in connection with this site, in November 2018, we resolved our purported liabilities with the government and those PRP's performing the remedial activities addressed in the EPA's December 2013 Record of Decision. See Note 17 for further information.

Availability of Reports Filed with the Securities and Exchange Commission and Corporate Governance Documents

Our internet website address is www.newmarket.com. We make available, free of charge through our website, our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (Exchange Act), as soon as reasonably practicable after such documents are electronically filed with, or furnished to, the SEC. In addition, our Corporate Governance Guidelines, Code of Conduct, and the charters of our Audit, Compensation, and Nominating and Corporate Governance Committees are available on our website and are available in print, without charge, to any shareholder upon request by contacting our Corporate Secretary at NewMarket Corporation, 330 South Fourth Street, Richmond, Virginia 23219. The information on our website is not, and shall not be deemed to be, a part of this Annual Report on Form 10-K or incorporated by reference in this Annual Report on Form 10-K or any other filings we make with the SEC. We file our annual, quarterly and current reports, proxy statements, and other information with the SEC. Our SEC filings are available to the public on the SEC's website at https://www.sec.gov.

Executive Officers of the Registrant

The names and ages of all executive officers as of February 19, 2019 follow.

Name	Age	Positions
Thomas E. Gottwald	58	Chairman of the Board, President, and Chief Executive Officer (Principal Executive Officer)
Brian D. Paliotti	42	Chief Financial Officer and Vice President (Principal Financial Officer)
Bruce R. Hazelgrove, III	58	Executive Vice President and Chief Administrative Officer
William J. Skrobacz	59	Controller (Principal Accounting Officer)
Cameron D. Warner, Jr.	60	Treasurer
M. Rudolph West	65	Vice President, General Counsel, and Secretary
Regina A. Harm	54	President, Afton Chemical Corporation

Our officers, at the discretion of the Board of Directors, hold office until the meeting of the Board of Directors following the next annual shareholders' meeting. Mr. Gottwald, Mr. Hazelgrove, Mr. Skrobacz, and Mr. Warner have served in their capacity for at least the last five years. Mr. Paliotti, Mr. West, and Mrs. Harm have served in their capacities for less than five years.

Mr. Paliotti has been employed by NewMarket or Afton since 2008. Prior to being named Chief Financial Officer and Vice President effective January 1, 2015, Mr. Paliotti was Vice President, Finance, of NewMarket Services since 2013. Mr. West was named Vice President, General Counsel, and Secretary effective January 1, 2016. Prior to that date, Mr. West served as Assistant General Counsel and Secretary for more than five years. Mrs. Harm has been employed by Afton since 2007. Prior to being named President of Afton Chemical Corporation in May 2018, Mrs. Harm was Senior Vice President and Chief Operating Officer of Afton since October 2015, Vice President, Supply since July 2015, and Vice President, Performance Additives since November 2013.

10

Table of Contents

ITEM 1A. RISK FACTORS

Our business is subject to many factors that could have a material adverse effect on our future performance, results of operations, financial condition, or cash flows and could cause our actual results to differ materially from those expressed or implied by forward-looking statements made in this Annual Report on Form 10-K. Those risk factors are outlined below.

- Lack of availability of raw materials, including sourcing from some single suppliers, could negatively impact our ability to meet customer demand.

The chemical industry can experience limited supply of certain materials. In addition, in some cases, we choose to source from a single supplier. Any significant disruption in supply, for any reason, could adversely affect our ability to obtain raw materials, which in turn could adversely affect our ability to ensure continued supply for our customers and to meet customer demand.

- A disruption in the availability or capacity of distribution systems could negatively impact our ability to meet our customers' needs and affect our competitive position.

We rely on a variety of modes of transportation to deliver products to our customers, including rail cars, cargo ships, and trucks. We depend upon the availability of a distribution infrastructure to deliver our products in a safe and timely manner. Any disruptions in this infrastructure network, whether caused by human error, accidents, deliberate acts of violence, limitations on capacity, repairs and improvements to infrastructure components, earthquakes, storms, or other natural disasters, could adversely affect our ability to meet customer demand.

- A significant disruption or disaster at one of our production facilities, including those facilities which are sole producers of certain of our products, could result in our inability to meet production requirements and projected customer demand. This could potentially result in us incurring significant liabilities.

We are dependent upon the continued safe operation of our production facilities. Several of the products we sell are produced only in one location. A prolonged disruption or disaster at one of our facilities could result in our inability to meet production requirements.

Our production facilities are subject to various hazards associated with the manufacturing, handling, storage, and transportation of chemical materials and products, including some that are reactive, explosive, and flammable. Such hazards could include leaks, ruptures, chemical spills, explosions, or fires which result in the discharge or release of toxic or hazardous substances or gases; mechanical failures; unscheduled downtime; and environmental hazards. These sites may also experience significant disruptions in operations due to inclement weather, natural disasters, flooding, and levee breaches. Many of these hazards could cause a disruption in the production of our products and may diminish our ability to meet output goals. We cannot assure that our facilities will not experience these types of hazards and disruptions in the future or that these incidents will not result in production delays and affect our ability to meet production requirements. Any such disruptions or disasters at our facilities could result in us losing revenue or not being able to maintain our relationships with our customers.

Additionally, some of the hazards mentioned above could result in significant liabilities related to personal injury and loss of life; severe damage to, or destruction of, property and equipment; and environmental contamination.

Table of Contents

- Our research and development efforts are costly and may not succeed, which could impair our ability to meet our customers' needs, affect our competitive position, and result in a loss of market share.

The petroleum additives industry is subject to periodic technological change, changes in performance standards, and ongoing product improvements. Further, technological changes in some or all of our customers' products or processes may make our products obsolete. As a result, the life cycle of our products is often hard to predict. In order to maintain our profits and remain competitive, we must effectively respond to technological changes in our industry and successfully develop, manufacture, and market new or improved products in a cost-effective and timely manner. As a result, we must commit substantial resources each year to research and development to maintain and enhance our technological capabilities and meet our customers' changing needs. Ongoing investments in research and development for future products could result in higher costs without a proportional increase in profits. Additionally, for any new product program, there is a risk of technical or market failure in which case we may not be able to develop the new commercial products needed to maintain and enhance our competitive position, or we may need to commit additional resources to new product development programs. Moreover, new products may have lower margins than the products they replace.

- Our failure to protect our intellectual property rights could harm our competitive position and could adversely affect our future performance and growth.

Protection of our proprietary processes, methods, compounds, and other technologies is important to our business. We depend upon our ability to develop and protect our intellectual property rights to distinguish our products from those of our competitors. Failure to protect our existing intellectual property rights may result in the loss of valuable technologies or having to pay other companies for infringing on their intellectual property rights. The inability to continue using certain of our trademarks or service marks could result in the loss of brand recognition, and could require us to devote additional resources to advertise, rebrand our products, and market our brands. See Item 1, "Business-Intellectual Property."

We rely on a combination of patent, trade secret, trademark, and copyright laws, as well as judicial enforcement, to protect our intellectual property and technologies. We cannot assure that the measures taken by us to protect these assets and rights will provide meaningful protection or that adequate remedies will be available in the event of an unauthorized use or disclosure of our trade secrets or manufacturing expertise. We cannot assure that any of our intellectual property rights will not be challenged, invalidated, circumvented, or rendered unenforceable. Furthermore, we cannot assure that any pending patent application filed by us will result in an issued patent, or if patents are issued to us, that those patents will provide meaningful protection against competitors or against competitive technologies. We could face patent infringement claims from our competitors or others alleging that our processes or products infringe on their proprietary technologies. If we were found to be infringing on the proprietary technology of others, we may be liable for damages, and we may be required to change our processes, redesign our products partially or completely, pay to use the technology of others, or stop using certain technologies or producing the infringing product entirely. Even if we ultimately prevail in an infringement suit, the existence of the suit could prompt customers to switch to products that are not the subject of infringement suits. We may not prevail in any intellectual property litigation and such litigation may result in significant legal costs or otherwise impede our ability to produce and distribute key products.

We also rely on unpatented proprietary manufacturing expertise, continuing technological innovation and other trade secrets to develop and maintain our competitive position. While we generally enter into confidentiality agreements with our employees and third parties to protect our intellectual property, we cannot assure that our confidentiality agreements will not be breached, that they will provide meaningful protection for our trade secrets and proprietary manufacturing expertise, or that adequate remedies will be available in the event of an unauthorized use or disclosure of our trade secrets or manufacturing expertise.

In addition, our trade secrets and know-how may be improperly obtained by other means, such as a breach of our information technology security systems or direct theft. Any unauthorized disclosure of our material know-how or trade secrets could adversely affect our business and results of operations.

12

Table of Contents

- Sudden or sharp changes in the prices of and/or demand for raw materials may adversely affect our profit margins.

We utilize a variety of raw materials in the manufacture of our products, including base oil, polyisobutylene, antioxidants, alcohols, solvents, sulfonates, friction modifiers, olefins, and copolymers. We may also enter into contracts which commit us to purchase some of our more critical raw materials based on anticipated demand. Our profitability is sensitive to changes in the quantities of raw materials we may need and the costs of those materials which may be caused by changes in supply, demand or other market conditions, over which we have little or no control. Political and economic conditions globally have caused, and may continue to cause, our demand for and the cost of our raw materials to fluctuate. War, armed hostilities, terrorist acts, civil unrest, or other incidents may also cause a sudden or sharp change in our demand for and the cost of our raw materials. We cannot assure that we will be able to pass on to our customers any future increases in raw material costs in the form of price increases for our products. If our demand for raw materials were to decline such that we would not have need for the quantities required to be purchased under commitment agreements, we could incur additional charges that would affect our profitability.

- Competitive pressures could adversely affect our margins and profitability.

We face significant competition in all of the product lines and markets in which we compete. We expect that our competitors will develop and introduce new and enhanced products, which could cause a decline in the market acceptance of certain products we manufacture. In addition, as a result of price competition, we may be compelled to reduce the prices for some of our products, which could adversely affect our margins and profitability. Some of our competitors may also have greater financial, technological, and other resources than we have and may be able to maintain greater operating and financial flexibility than we are able to maintain. As a result, these competitors may be able to better withstand changes in conditions within our industry, changes in the prices for raw materials, and changes in general economic conditions.

- We rely on a small number of significant customers concentrated in the lubricant and fuel industries. The loss of sales to any of these customers could significantly reduce our revenues and negatively affect our profitability.

Our principal customers are multinational oil companies primarily in the lubricant and fuel industries. These industries are characterized by the concentration of a few large participants. This concentration of customers affects our overall risk profile, since our customers will be similarly affected by changes in economic, geopolitical, and industry conditions. Many factors affect the level of our customers' spending on our products, including, among others, general business conditions, changes in technology, interest rates, gasoline prices, and consumer confidence in future economic conditions. A sudden or protracted downturn in these industries could adversely affect the buying power of, and purchases by, our customers. The loss of a significant customer or a material reduction in purchases by a significant customer could reduce our revenues and negatively affect our profitability.

- Our business could be adversely affected by current and future governmental regulation.

We are subject to regulation by local, state, federal, and foreign governmental authorities. In some circumstances, before we may sell certain products, these authorities must approve these products, our manufacturing processes, and our facilities. We are also subject to ongoing reviews of our products, manufacturing processes, and facilities by governmental authorities. Any delay in obtaining, or any failure to obtain or maintain, these approvals would adversely affect our ability to introduce new products and to generate sales from those products.

New laws and regulations, including climate change regulations, may be introduced in the future that could result in additional compliance costs, seizures, confiscation, recall, or monetary fines, any of which could prevent or inhibit the development, distribution, and sale of our products. If we fail to comply with applicable laws and regulations, we may be subject to civil remedies, including fines, injunctions, and recalls or seizures.

Table of Contents

We are subject to the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act, and similar anti-bribery laws in other jurisdictions which generally prohibit companies and their intermediaries from making improper payments to foreign officials for the purpose of obtaining or retaining business. We are also subject to export and import laws and regulations which restrict trading with embargoed or sanctioned countries and certain individuals. Although we have policies and procedures designed to facilitate compliance with these laws and regulations, our employees, contractors and agents may take actions in violation of our policies. Any such violation, even if prohibited by our policies, could adversely affect our business and/or our reputation.

- In order to be successful, we must attract and retain a highly qualified workforce, including key employees in leadership positions.

The success of our business is highly dependent on our ability to attract and retain highly qualified personnel to support our research and development efforts and our agility in effectively responding to technological changes in our industry. To the extent that the demand for skilled personnel exceeds supply, we could experience higher labor, recruiting, or training costs in order to attract and retain such a work force. We compete with other companies, both within and outside of our industry, for qualified technical and scientific personnel such as chemical and industrial engineers. To the extent that we lose experienced personnel through wage competition, normal attrition (including retirement), or other means, we must be able to attract qualified candidates to fill those positions and successfully manage the transfer of critical knowledge from those individuals leaving our company. Our inability to maintain a highly qualified technical workforce could adversely affect our competitive position and result in a loss of market share.

We also must manage leadership development and succession planning throughout our business. To the extent that we are unable to attract, develop, and retain leadership talent successfully, we could experience business disruptions that adversely affect our ability to grow our business.

- The occurrence or threat of extraordinary events, including domestic and international terrorist attacks, may disrupt our operations, decrease demand for our products, and increase our expenses.

Chemical-related assets may be at greater risk of future terrorist attacks than other possible targets in the United States and throughout the world. Federal legislation has imposed significant site security requirements, specifically on chemical manufacturing facilities. Federal regulations have also been enacted to increase the security of the transportation of hazardous chemicals in the United States. The enactment of further federal regulations to increase the security of the transportation of hazardous chemicals in the United States could result in additional costs.

The occurrence of extraordinary events, including future terrorist attacks and the outbreak or escalation of hostilities, cannot be predicted, but their occurrence can be expected to negatively affect the economy in general, and specifically the markets for our products. The damage from a direct attack on our assets or assets used by us could include loss of life, property damage, and production downtime. In addition, available insurance coverage may not be sufficient to cover all of the damage incurred or, if available, may be prohibitively expensive.

Table of Contents

- We face risks related to our foreign operations that may negatively affect our business.

In 2018, sales to customers outside of the United States accounted for over 65% of consolidated net sales. We do business in all major regions of the world, some of which do not have stable economies or governments. In particular, we sell and market products in countries experiencing political and/or economic instability in the Middle East, Asia Pacific, Latin America, and Europe. Our international operations are subject to international business risks, including unsettled political conditions, expropriation, import and export restrictions, trade policies, increases in royalties, exchange controls, national and regional labor strikes, taxes, government royalties, inflationary or unstable economies, currency exchange rate fluctuations, and changes in laws and policies governing operations of foreign-based companies (such as restrictions on repatriation of earnings or proceeds from liquidated assets of foreign subsidiaries). The occurrence of any one or a combination of these factors may increase our costs or have other adverse effects on our business.

More specifically, the United Kingdom's June 2016 referendum decision to withdraw from the European Union (EU), commonly known as Brexit, has resulted in uncertainty for our European operations regarding the extent to which our operations and financial performance will be affected immediately and in the longer term. Our key manufacturing facilities in the current EU are not in the United Kingdom. Therefore, goods movements will continue to be predominantly within the EU post-Brexit which means that existing key trade agreements will continue to apply. However, because the UK has not finalized a transition plan, there continues to be significant uncertainty related to Brexit and its impact, with a number of regulatory and logistical challenges remaining. We will continue to monitor and evaluate changes in legislation and trading practices in order to mitigate any potential risks to our operations associated with the changing commercial landscape.

- A substantial amount of indebtedness could adversely impact our business and limit our operational and financial flexibility.

We have incurred, and may in the future incur, significant amounts of indebtedness to support our operations. Our indebtedness could, among other things, require us to dedicate a substantial portion of our cash flow to repaying our indebtedness, thus reducing the amount of funds available for other general corporate purposes; limit our ability to borrow additional funds necessary for working capital, capital expenditures or other general corporate purposes; and limit our flexibility in planning for, or reacting to, changes in our business.

Our ability to make payments on or refinance our indebtedness will depend on our ability to generate cash from operations in the future. This, to a certain extent, is subject to general economic, financial, competitive, legislative, regulatory, and other factors that are beyond our control.

We cannot guarantee that our business will generate sufficient cash flow from operations or that future borrowings will be available to us under our credit facilities in an amount sufficient to enable us to repay our debt, service our indebtedness, or to fund other liquidity needs. Furthermore, substantially all of our business is conducted through our subsidiaries, and we cannot guarantee that our subsidiaries will be able to distribute funds to us for these purposes.

We may need to refinance all or a portion of our indebtedness on or before maturity. We cannot guarantee that we will be able to refinance any of our indebtedness on commercially reasonable terms or at all.

Additionally, our debt instruments contain restrictive covenants. These covenants may constrain our activities and limit our operational and financial flexibility. The failure to comply with these covenants could result in an event of default.

Table of Contents

- We are exposed to fluctuations in foreign exchange rates, which may adversely affect our results of operations.

We conduct our business in the local currency of many of the countries in which we operate. The financial condition and results of operations of our foreign operating subsidiaries are reported in the relevant local currency and then translated to U.S. Dollars at the applicable currency exchange rate for inclusion in our consolidated financial statements. Changes in exchange rates between these foreign currencies and the U.S. Dollar will affect the recorded amounts of our assets and liabilities, as well as our revenues, costs, and operating margins. The primary foreign currencies in which we have exchange rate fluctuation exposure are the European Union Euro, British Pound Sterling, Japanese Yen, Chinese Renminbi, Indian Rupee, Singapore Dollar, Mexican Peso, Australian Dollar, and Canadian Dollar. Exchange rates between these currencies and the U.S. Dollar have fluctuated significantly in recent years and may do so in the future.

- An information technology system failure may adversely affect our business.

We rely on information technology systems, some of which are managed by third parties, to transact our business. An information technology system failure due to computer viruses, internal or external security breaches, cybersecurity attacks, power interruptions, hardware failures, fire, natural disasters, human error or other causes could disrupt our operations, lead to loss of confidential information or intellectual property, and/or prevent us from being able to process transactions with our customers, operate our manufacturing facilities, and properly report transactions in a timely manner. Cybersecurity threats, in particular, continue to increase in sophistication. We have security processes and disaster recovery plans in place to mitigate these threats. Nonetheless, these may not be sufficient to identify a threat in a timely manner or protect our operations from such a threat, potentially resulting in financial, legal, business, or reputational damage to our company.

A significant, protracted information technology system failure may adversely affect our results of operations, financial condition, or cash flows.

- Legal proceedings and other claims could impose substantial costs on us.

We are involved in numerous administrative and legal proceedings that result from, and are incidental to, the conduct of our business. From time to time, these proceedings involve environmental, product liability, tetraethyl lead, premises asbestos liability, and other matters. See Item 3, “Legal Proceedings.” There is no assurance that our available insurance will cover these claims, that our insurers will not challenge coverage for certain claims, or that final damage awards will not exceed our available insurance coverage.

At any given time, we are involved in claims, litigation, administrative proceedings, and investigations of various types in a number of jurisdictions involving potential environmental liabilities, including clean-up costs associated with waste disposal sites, natural resource damages, property damage, and personal injury. We cannot assure that the resolution of these environmental matters will not have an adverse effect on our results of operations, financial condition, or cash flows.

- Environmental matters could have a substantial negative impact on our business.

As a manufacturer and distributor of chemical products, we are generally subject to extensive local, state, federal, and foreign environmental, safety, and health laws and regulations concerning, among other things, emissions to the air; discharges to land and water; the generation, handling, treatment, and disposal of hazardous waste and other materials; and remediation of contaminated soil, as well as surface and ground water. Our operations entail the risk of violations of those laws and regulations, many of which provide for substantial fines and criminal sanctions for violations. We believe that we comply in all material respects with laws, regulations, statutes, and ordinances protecting the environment, including those related to the discharge of materials. However, we cannot assure that we have been or will be at all times in compliance with all of these requirements.

Table of Contents

In addition, these requirements, and the enforcement or interpretation of these requirements, may become more stringent in the future. Although we cannot predict the ultimate cost of compliance with any such requirements, the costs could be material. Noncompliance could subject us to material liabilities, such as government fines, damages arising from third-party lawsuits, or the suspension and potential cessation of non-compliant operations. We may also be required to make significant site or operational modifications at substantial cost. Future developments could also restrict or eliminate the use of or require us to make modifications to our products.

There may be environmental problems associated with our properties of which we are unaware. The discovery of environmental liabilities attached to our properties could have an adverse effect on our business even if we did not create or cause the problem.

We may also face liability arising from current or future claims alleging personal injury, product liability, or property damage due to exposure to chemicals or other hazardous substances, such as premises asbestos, at or from our facilities. We may also face liability for personal injury, product liability, property damage, natural resource damage, or clean-up costs for the alleged migration of contaminants or hazardous substances from our facilities or for future accidents or spills.

In some cases, we have been identified, and in the future may be identified, as a PRP in connection with state and federal laws regarding environmental clean-up projects. As a PRP, we may be liable for a share of the costs associated with cleaning up hazardous waste sites, such as a landfill to which we may have sent waste.

The ultimate costs and timing of environmental liabilities are difficult to predict. Liability under environmental laws relating to contaminated sites can be imposed retroactively and on a joint and several basis. A liable party could be held responsible for all costs at a site, whether currently or formerly owned or operated, regardless of fault, knowledge, timing of the contamination, cause of the contamination, percentage of contribution to the contamination, or the legality of the original disposal. We could incur significant costs, including clean-up costs, natural resource damages, civil or criminal fines and sanctions, and third-party claims, as a result of past or future violations of, or liabilities under, environmental laws.

- The insurance we maintain may not fully cover all potential exposures.

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, including liabilities for environmental remediation. In the future, we may not be able to obtain coverage at current levels, and our premiums may increase significantly on coverage that we maintain.

- We may be unable to consummate a proposed acquisition transaction due to a lack of regulatory approval or the failure of one or more parties to satisfy conditions to close. In addition, we may not be able to realize the expected benefits from recent or future acquisitions or from investments in our infrastructure, or it may take longer to realize those benefits than originally planned. The inability to achieve our objectives related to these activities could result in unanticipated expenses and losses.

As part of our business growth strategy, we intend to continue pursuing acquisitions and investing in our infrastructure. Our ability to implement these components of our growth strategy will be limited by our ability to identify appropriate acquisition or joint venture candidates; our ability to consummate proposed transactions due to a lack of regulatory approval or the failure of one of the parties to a transaction to satisfy conditions required for closing; and the availability of financial resources, including cash and borrowing capacity. When we acquire new businesses or invest in infrastructure improvements (for example, building new plant facilities), we consider the benefits we expect to realize and time frames over which we will realize those benefits. The expenses incurred in completing these types of activities, the time it takes to integrate the activities into our ongoing business, or our failure to realize the expected benefits from the activities in the planned time frames could result in unanticipated expenses and losses. The process of integrating acquired operations into our existing operations may result in unforeseen operating difficulties and may require significant financial resources that would otherwise be available for the ongoing development or expansion of existing operations.

17

Table of Contents

- We could be required to make additional contributions to our pension plans, which may be underfunded due to any underperformance of equity markets.

Our pension plan asset allocation is predominantly weighted towards equities. Cash contribution requirements to our pension plans are sensitive to changes in our plans' actual return on assets. Reductions in our plans' return on assets due to poor performance of equity markets could cause our pension plans to be underfunded and require us to make additional cash contributions.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our principal operating properties are shown below. Unless indicated, we own the research, development, and testing facilities, as well as the manufacturing and distribution properties, which primarily support the petroleum additives business segment.

Research, Development, and Testing	Richmond, Virginia Bracknell, England Tsukuba, Japan Ashland, Virginia Suzhou, China
Manufacturing and Distribution	Feluy, Belgium (lubricant additives) Houston, Texas (lubricant and fuel additives; also storage and distribution) Hyderabad, India (lubricant additives) Jurong Island, Singapore (lubricant additives; leased land) Orangeburg, South Carolina (fuel additives; manufacturing equipment only) Port Arthur, Texas (lubricant additives) Rio de Janeiro, Brazil (petroleum additives storage and distribution; manufacturing equipment only) San Juan del Rio, Mexico (lubricant additives) Sauget, Illinois (lubricant and fuel additives) Suzhou, China (lubricant additives)

We own our corporate headquarters located in Richmond, Virginia, and generally lease our regional and sales offices located in a number of areas worldwide.

NewMarket Development manages the property we own in Richmond, Virginia consisting of approximately 57 acres. Our corporate offices are included in this acreage, as well as a research and testing facility and several acres dedicated to other uses. We are currently exploring various development opportunities for portions of the property as the demand warrants. This effort is ongoing in nature, and we have no specific timeline for any future developments.

Production Capacity

We believe our plants and supply agreements are sufficient to meet expected sales levels. Operating rates of the plants vary with product mix and normal sales swings. We believe that our facilities are well maintained and in good operating condition.

Table of Contents

ITEM 3. LEGAL PROCEEDINGS

We are involved in legal proceedings that are incidental to our business and may include administrative or judicial actions. Some of these legal proceedings involve governmental authorities and relate to environmental matters. For further information, see Environmental below and Item 1 of this Form 10-K.

While it is not possible to predict or determine with certainty the outcome of any legal proceeding, we believe the outcome of any of these proceedings, or all of them combined, will not result in a material adverse effect on our consolidated results of operations, financial condition, or cash flows.

In late 2013, Afton initiated a voluntary self-audit of its compliance with certain sections of the Toxic Substances Control Act (TSCA) under the United States Environmental Protection Agency (USEPA) audit policy (Audit Policy). Afton concluded its self-audit, sending its notice of this conclusion to the USEPA on August 1, 2018. Any known potential findings and/or violations were disclosed on or before the conclusion of the self-audit. In August 2014, the USEPA staff began its own TSCA inspection of both Afton and Ethyl. To date, however, the USEPA has not notified Afton or Ethyl of any findings, violations, or the conclusion of this inspection. While it is not possible to predict or determine with certainty the outcomes of Afton's self-audit or the USEPA's inspection, we do not believe that any disclosures or findings identified as a result of Afton's self-audit or the USEPA’s TSCA inspection will have a material adverse effect on our consolidated results of operations, financial condition, or cash flows.

In April 2018, the USEPA notified Afton concerning alleged violations of the Clean Air Act regarding the Afton Sauget, Illinois facility’s National Emission Standards for Hazardous Air Pollutants (NESHAP) and the Hazardous Organic NESHAP compliance programs. Without admitting any fact, responsibility, fault, or liability, on December 20, 2018, Afton and the USEPA agreed to a resolution of these purported liabilities, and together with the USEPA administrators, have substantially agreed to all of the material terms of a settlement under a negotiated Administrative Consent Order, including a penalty of $0.3 million. However, Afton and the USEPA are still in negotiations regarding how much of the penalty may be resolved through one or more proposed supplemental environmental projects.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

Table of Contents

PART II

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

Our common stock, with no par value, has traded on the New York Stock Exchange (NYSE) under the symbol "NEU" since June 21, 2004 when we became the parent holding company of Ethyl, Afton, NewMarket Services, NewMarket Development, and their subsidiaries. We had 2,097 shareholders of record at January 31, 2019.

On October 21, 2015, our Board of Directors approved a share repurchase program authorizing management to repurchase up to $500 million of NewMarket's outstanding common stock until December 31, 2018, as market conditions warranted and covenants under our existing agreements permitted. We could conduct the share repurchases in the open market and in privately negotiated transactions. The repurchase program did not require NewMarket to acquire any specific number of shares and could be terminated or suspended at any time. Approximately $187 million remained available under the 2015 authorization at December 31, 2018. This plan expired on December 31, 2018. The following table outlines the purchases during the fourth quarter of 2018 under this authorization.

Issuer Purchases of Equity Securities

Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs
October 1 to October 31	161,785	$379.46	161,785	$209,148,067
November 1 to November 30	0	0.00	0	209,148,067
December 1 to December 31	56,483	389.07	56,483	187,171,963
Total	218,268	$381.94	218,268	$187,171,963

On December 13, 2018, our Board of Directors approved a new share repurchase program authorizing management to repurchase up to $500 million of NewMarket's outstanding common stock effective January 1, 2019 until December 31, 2021, as market conditions warrant and covenants under our existing debt agreements permit. We may conduct the share repurchase in the open market, in privately negotiated transactions, through block trades or pursuant to any trading plan that may be adopted in accordance with Rule 10b5-1 of the Securities Exchange Act of 1934. The repurchase program does not require NewMarket to acquire any specific number of shares and may be terminated or suspended at any time.

Cash dividends declared and paid totaled $7.00 per share for both the year ended December 31, 2018 and December 31, 2017. The declaration and payment of dividends is subject to the discretion of our Board of Directors. Future dividends will depend on various factors, including our financial condition, earnings, cash requirements, legal requirements, restrictions in agreements governing our outstanding indebtedness, and other factors deemed relevant by our Board of Directors.

Table of Contents

The performance graph showing the five-year cumulative total return on our common stock as compared to chemical companies in the S&P 1500 Specialty Chemicals Index and the S&P 500 is shown below. The graph assumes $100 invested on the last day of December 2013, and the reinvestment of all dividends. The graph is based on historical data, and is not intended to be a forecast or indication of future performance of our common stock.

Performance Graph

Comparison of Five-Year Cumulative Total Return

Performance Through December 31, 2018

	December 31,					
	2013	2014	2015	2016	2017	2018
NewMarket Corporation	$100.00	$122.24	$116.94	$132.24	$126.05	$133.01
S&P 1500 Specialty Chemicals Index	100.00	115.73	113.88	127.38	162.64	152.31
S&P 500	100.00	113.69	115.26	129.05	157.22	150.33

The graph and table above are not deemed “filed” with the SEC for purposes of Section 18 of the Exchange Act or otherwise subject to the liabilities of that section, nor are they incorporated by reference into other filings made by us with the SEC.

Table of Contents

ITEM 6. SELECTED FINANCIAL DATA

NewMarket Corporation and Subsidiaries

Five Year Summary

(in thousands, except per-share amounts and percentages)	Years Ended December 31, 2018	2017	2016	2015	2014
Results of operations					
Net sales	$2,289,675	$2,198,404	$2,049,451	$2,140,830	$2,335,405
Costs and expenses (1)	1,997,001	1,875,670	1,694,692	1,786,050	1,973,902
Operating profit (1)	292,674	322,734	354,759	354,780	361,503
Interest and financing expenses, net	26,723	21,856	16,785	14,652	16,567
Other income (expense), net (1) (2)	24,334	14,564	5,234	(1,157)	(5,837)
Income before income tax expense	290,285	315,442	343,208	338,971	339,099
Income tax expense (3)	55,551	124,933	99,767	100,368	105,844
Net income	$234,734	$190,509	$243,441	$238,603	$233,255
Financial position and other data					
Total assets	$1,697,274	$1,712,154	$1,416,436	$1,286,249	$1,227,733
Operations:					
Working capital	$542,119	$516,861	$542,293	$504,712	$529,680
Current ratio	3.00 to 1	2.63 to 1	2.84 to 1	2.91 to 1	3.04 to 1
Depreciation and amortization	$71,759	$55,340	$44,893	$42,265	$41,538
Capital expenditures	$74,638	$148,713	$142,874	$126,499	$59,716
Gross profit as a % of net sales (1)	25.6 %	28.9 %	33.0 %	31.6 %	28.4 %
Research, development, and testing expenses (1)	$140,289	$146,002	$160,788	$159,868	$140,972
Total long-term debt	$770,999	$602,900	$507,275	$490,920	$359,334
Common stock and other shareholders' equity	$489,907	$601,649	$483,251	$387,564	$421,041
Total long-term debt as a % of total capitalization (debt plus equity)	61.1 %	50.1 %	51.2 %	55.9 %	46.0 %
Common stock					
Basic and diluted earnings per share	$20.34	$16.08	$20.54	$19.45	$18.38
Equity per share	$43.80	$51.07	$40.79	$32.44	$33.83
Cash dividends declared per share	$7.00	$7.00	$6.40	$5.80	$4.70

Table of Contents

Notes to the Five Year Summary

(1) Certain prior year amounts have been reclassified to reflect the adoption of Accounting Standards Update No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." There was no impact to net income for any period presented.

(2) Other income (expense), net for each year included the components of net periodic benefit cost (income), except for service costs, amounting to income of $19 million in 2018, $14 million in 2017, $8 million in 2016, $2 million in 2015, and $1 million in 2014. In addition, 2014 through 2016 included a loss on the Goldman Sachs interest rate swap, as well as several other small items. The loss on the interest rate swap was $5 million for 2016, $3 million for 2015, and $7 million for 2014. We terminated the interest rate swap on September 7, 2016. We did not use hedge accounting to record the interest rate swap, and accordingly, any change in the fair value was immediately recognized in earnings.

(3) On December 22, 2017, the United States enacted tax legislation commonly known as the Tax Cuts and Jobs Act, which required a one-time tax in 2017 on the deemed repatriation of previously deferred foreign earnings and reduced the U.S. corporate tax rate from 35% to 21% beginning in 2018. We recorded a net tax expense of $31 million in 2017 as a result.

Table of Contents

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

Forward-Looking Statements

The following discussion, as well as other discussions in this Annual Report on Form 10-K, contains forward-looking statements about future events and expectations within the meaning of the Private Securities Litigation Reform Act of 1995. We have based these forward-looking statements on our current expectations and projections about future results. When we use words in this document such as "anticipates," "intends," "plans," "believes," "estimates," "projects," "exp "should," "could," "may," "will," and similar expressions, we do so to identify forward-looking statements. Examples of forward-looking statements include, but are not limited to, statements we make regarding future prospects of growth in the petroleum additives market, other trends in the petroleum additives market, our ability to maintain or increase our market share, and our future capital expenditure levels.

We believe our forward-looking statements are based on reasonable expectations and assumptions, within the bounds of what we know about our business and operations. However, we offer no assurance that actual results will not differ materially from our expectations due to uncertainties and factors that are difficult to predict and beyond our control. Factors that could cause actual results to differ materially from expectations include, but are not limited to, the availability of raw materials and distribution systems; disruptions at production facilities, including single-sourced facilities; hazards common to chemical businesses; the ability to respond effectively to technological changes in our industry; failure to protect our intellectual property rights; sudden or sharp raw material price increases; competition from other manufacturers; the gain or loss of significant customers; current and future governmental regulations; failure to attract and retain a highly-qualified workforce; the occurrence or threat of extraordinary events, including natural disasters and terrorist attacks; risks related to operating outside of the United States; the impact of substantial indebtedness on our operational and financial flexibility; the impact of fluctuations in foreign exchange rates; an information technology system failure or security breach; resolution of environmental liabilities or legal proceedings; political, economic, and regulatory factors concerning our products; limitation of our insurance coverage; our inability to realize expected benefits from investment in our infrastructure or from recent or future acquisitions, or our inability to successfully integrate recent or future acquisitions into our business; and the underperformance of our pension assets resulting in additional cash contributions to our pension plans. Risk factors are discussed in Item 1A. "Risk Factors."

You should keep in mind that any forward-looking statement made by us in this discussion or elsewhere speaks only as of the date on which we make it. New risks and uncertainties arise from time to time, and it is impossible for us to predict these events or how they may affect us. We have no duty to, and do not intend to, update or revise the forward-looking statements in this discussion after the date hereof, except as may be required by law. In light of these risks and uncertainties, any forward-looking statement made in this discussion or elsewhere, might not occur.

OVERVIEW

When comparing the results of the petroleum additives segment for 2018 with 2017, net sales increased 4.3% primarily due to higher selling prices and a favorable foreign currency impact, partially offset by lower shipment volumes. Petroleum additives operating profit for 2018 was 9.9% lower than 2017 primarily reflecting unfavorable impacts from higher raw material costs and higher conversion costs.

Our operations generate cash that is in excess of the needs of the business. We continue to invest and manage our business for the long-run with the goal of helping our customers succeed in their marketplaces. Our investments continue to be in organizational talent, technology development and processes, and global infrastructure, consisting of technical centers, production capability, and geographic expansion.

During 2018, we repurchased 603,449 shares of our common stock at a total cost of $232 million.

Table of Contents

RESULTS OF OPERATIONS

Certain prior year amounts have been reclassified to reflect the adoption of Accounting Standards Update No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost". There was no impact to net income for any period presented.

Net Sales

Our consolidated net sales for 2018 amounted to $2.3 billion, an increase of $91 million, or 4.2% from 2017. The increase between 2017 and 2016 was $149 million, or 7.3%.

No single customer accounted for 10% or more of our total net sales in 2018, 2017, or 2016.

The following table shows net sales by segment and product line for each of the last three years.

	Years Ended December 31,		
(in millions)	2018	2017	2016
Petroleum additives			
Lubricant additives	$1,871	$1,790	$1,673
Fuel additives	410	397	362
Total	2,281	2,187	2,035
All other	9	11	14
Net sales	$2,290	$2,198	$2,049

Petroleum Additives - The regions in which we operate include North America (the United States and Canada), Latin America (Mexico, Central America, and South America), Asia Pacific, and the Europe/Middle East/Africa/India (EMEAI) region. The percentage of net sales being generated in the regions has remained fairly consistent over the past three years, with some limited fluctuation due to various factors, including the impact of regional economic trends. North America and EMEAI both represent around 35% of our petroleum additives net sales, while Asia Pacific contributes about 25% and Latin America represents the remaining amount. As shown in the table above, lubricant additives net sales and fuel additives net sales compared to total petroleum additives net sales has remained substantially consistent over the past three years. The discussion below provides further detail on net sales in our petroleum additives segment for 2018, 2017, and 2016.

The approximate components of the petroleum additives increases in net sales of $94 million when comparing 2018 to 2017 and $152 million when comparing 2017 to 2016 are shown below in millions.

Net sales for year ended December 31, 2016	$2,035
Lubricant additives shipments	137
Fuel additives shipments	30
Selling prices	(17)
Foreign currency impact, net	2
Net sales for year ended December 31, 2017	2,187
Lubricant additives shipments	(9)
Fuel additives shipments	0
Selling prices	82
Foreign currency impact, net	21
Net sales for year ended December 31, 2018	$2,281

Table of Contents

Petroleum additives net sales for 2018 of $2.3 billion were approximately 4.3% higher than 2017 levels. The increase was across all regions, but predominantly in the Asia Pacific region with a nearly 11% increase. The primary driver in the higher net sales between 2018 and 2017 was improved selling prices, which, along with a favorable foreign currency impact, contributed $103 million. Offsetting the impact from selling prices, petroleum additives shipments accounted for a $9 million reduction in net sales due to a 2.8% decrease in volume of product shipments. Shipments of lubricant additives increased in the Asia Pacific region, but were more than offset by lower lubricant additives shipments in the other regions. Fuel additives shipments decreased in the North America, Asia Pacific, and EMEAI regions, which were partially offset by a small increase in the Latin America region. Foreign currency contributed a favorable impact, mostly from the Euro. The U.S. Dollar weakened against the Euro, Japanese Yen, Pound Sterling, and Chinese Reminbi resulting in a favorable impact to net sales.

Petroleum additives net sales for 2017 of $2.2 billion were approximately 7.5% higher than 2016 levels. The increase was predominantly in the EMEAI region with a nearly 14% increase, as well as in the Asia Pacific region with an almost 10% increase. The Latin America region contributed a smaller increase of almost 7%, while the North America region was substantially unchanged between the two years. The primary driver in the higher net sales between 2017 and 2016 was an 8.2% increase in shipments which was partially offset by lower selling prices. Shipments increased in both lubricant and fuel additives. EMEAI, Asia Pacific and Latin America experienced shipment increases in lubricant additives, while EMEAI was the primary driver in the increase in shipments for fuel additives. The North America region was substantially unchanged between the two years for both lubricant and fuel additives shipments. Foreign currency contributed a small favorable impact, mostly from the Euro. The U.S. Dollar weakened against the Euro, resulting in a favorable impact to net sales. Partially offsetting the impact from the Euro, the U.S. Dollar strengthened against the Japanese Yen and Chinese Renminbi resulting in an unfavorable foreign currency impact.

All Other - The “All other” category includes the operations of the antiknock compounds business, and certain contracted manufacturing and services performed by Ethyl.

Segment Operating Profit

NewMarket evaluates the performance of the petroleum additives business based on segment operating profit. NewMarket Services expenses are charged to each subsidiary pursuant to services agreements between the companies. Depreciation on segment property, plant, and equipment, as well as amortization of segment intangible assets, is included in segment operating profit.

The table below reports segment operating profit for the last three years. A reconciliation of segment operating profit to income before income tax expense is in Note 21.

	Years Ended December 31,		
(in millions)	2018	2017	2016
Petroleum additives	$311	$345	$375
All other	$(3)	$4	$0

Petroleum Additives - Petroleum additives segment operating profit decreased $34 million when comparing 2018 to 2017 and decreased $30 million when comparing 2017 to 2016. Both 2017 and 2016 reflect the retroactive restatement of petroleum additives operating profit due to the adoption of Accounting Standards Update 2017-07. Further information is in Note 23. Both comparative periods included the impact of the same factors that affected gross profit (see discussion below).

The operating profit margin was 13.6% in 2018, 15.8% in 2017, and 18.4% in 2016. Increases in raw material costs over the past two years have continued to put downward pressure on margins. While our efforts have been focused on recovering these increased costs, we continue to experience the lag between when the price increases go into effect and when margins improve. While operating profit margins will fluctuate from quarter to quarter due to multiple factors, we believe the fundamentals of our business and industry are unchanged.

Table of Contents

Petroleum additives gross profit decreased $39 million when comparing 2018 and 2017 and $47 million when comparing 2017 and 2016. Cost of goods sold as a percentage of net sales has increased in 2018 over the prior two years reflecting percentages of 74.5% in 2018, 71.6% in 2017, and 67.1% in 2016.

When comparing 2018 and 2017, the decrease in gross profit resulted predominantly from unfavorable raw material and conversion costs, including unfavorable foreign currency translation, as well as a smaller unfavorable impact from product shipments, which together contributed over 100% of the change. A favorable impact from selling prices partially offset the unfavorable factors.

When comparing 2017 and 2016, the decrease in gross profit resulted predominantly from the unfavorable raw material costs and selling prices (including product mix), as well as unfavorable conversion costs, which together contributed over 100% of the change. These unfavorable factors were partially offset by increases in products shipments as discussed in the Net Sales section above.

The sales price variance for both comparative periods included the impact from foreign currency rates as discussed in the Net Sales section above.

Petroleum additives selling, general, and administrative expenses (SG&A) were $9 million, or 6.1% lower in 2018 than 2017 and essentially flat in 2017 compared to 2016. SG&A as a percentage of net sales was 5.7% in 2018, 6.4% in 2017, and 6.8% in 2016. Our SG&A costs are mainly personnel-related and include salaries, benefits and other costs associated with our workforce. There were no significant changes in the individual components of SG&A costs when comparing the years.

When comparing 2018 with 2017, R&D expenses decreased approximately $6 million, and when comparing 2017 with 2016, R&D decreased approximately $15 million. In both comparison periods, the decrease was primarily in the lubricant additives product lines. As a percentage of net sales, R&D was 6.2% in 2018, 6.7% in 2017, and 7.9% in 2016.

Our R&D investments reflect our efforts to support the development of solutions that meet our customers' needs, meet new and evolving standards, and support our expansion into new product areas. Our approach to R&D investment, as it is with SG&A, is one of purposeful spending on programs to support our current product base and to ensure that we develop products to support our customers' programs in the future. R&D investments include personnel-related costs, as well as internal and external testing of our products. Most R&D is incurred in the United States and in the United Kingdom, with over 70% of total R&D being attributable to the North America and EMEAI regions. Substantially all investments in new product development are incurred in the United States and the United Kingdom. The remaining R&D is attributable to the Asia Pacific and Latin America regions and represents customer technology support services in those regions. All of our R&D is related to the petroleum additives segment.

The following discussion references certain captions on the Consolidated Statements of Income.

Interest and Financing Expenses

Interest and financing expenses were $27 million in 2018, $22 million in 2017, and $17 million in 2016. The increase in interest and financing expense between 2018 and 2017 resulted primarily from higher average debt, which was partially offset from a lower average interest rate. The increase between 2017 and 2016 resulted primarily from higher average interest rates, as well as higher average debt.

Other Income (Expense), Net

Other income (expense), net was income of $24 million in 2018, $15 million in 2017 and $5 million in 2016. Both 2017 and 2016 reflect the retroactive restatement due to the adoption of Accounting Standards Update 2017-07. Further information is in Note 23. The amounts for all periods primarily reflect the components of net periodic benefit cost (income), except for service costs. See Note 18 for further information on total periodic benefit cost (income). The 2016 period also includes the impact from an interest rate swap derivative instrument recorded at fair value through earnings, which we terminated in 2016.

Table of Contents

Income Tax Expense

Income tax expense was $56 million in 2018, $125 million in 2017, and $100 million in 2016. The effective tax rate was 19.1% in 2018, 39.6% in 2017, and 29.1% in 2016. When comparing 2018 and 2017, income tax decreased $59 million due to the lower effective tax rate and $10 million due to lower income before income tax expense. When comparing 2017 and 2016, income tax increased $33 million due to the higher effective tax rate, but decreased $8 million due to lower income before income tax. See Note 19 for further details on income taxes.

The primary reason for the decrease in the effective tax rate for 2018 is the December 22, 2017 enactment of tax legislation commonly known as the Tax Cuts and Jobs Act (Tax Reform Act), which reduced the U.S. federal tax rate from 35% to 21% effective January 1, 2018. In addition, the effective tax rates for 2018 included the benefit from the research and development tax credit, as well as the impact of the decrease in deferred tax liabilities due to the reduction of the U.S. corporate tax rate.

The 2017 tax rate included a one-time tax on the deemed repatriation of previously deferred foreign earnings. We recorded a net tax expense of $31 million as a result of the Tax Reform Act. Included in this expense amount was $32 million related to the deemed repatriation of foreign earnings, which was partially offset by reductions to deferred tax liabilities. The 2017 period also included the benefit of income in foreign jurisdictions with lower tax rates than the United States.

CASH FLOWS DISCUSSION

We generated cash from operating activities of $198 million in 2018, $243 million in 2017, and $353 million in 2016. During 2018, we used the $198 million cash generated from operations, $168 million of borrowings on our revolving credit facility and $11 million cash on hand to repurchase $232 million of our common stock, pay dividends of $80 million on our common stock, and fund capital expenditures of $75 million. Cash flows from operating activities included a decrease of $54 million from higher working capital requirements, as well as cash contributions of $65 million to our pension and postretirement plans.

During 2017, we used the $243 million cash generated from operations, $250 million from the issuance of the 3.78% senior notes, and $108 million cash on hand to fund the acquisition of AMSA for $184 million, repay the outstanding balance of $156 million on our revolving credit facility, and fund $149 million in capital expenditures. We also paid dividends of $83 million and repurchased $26 million of our common stock. Cash flows from operating activities included a decrease of $36 million from higher working capital requirements, $31 million from the impact of the Tax Reform Act, and cash contributions of $26 million for our pension and postretirement plans.

During 2016, we used the $353 million cash generated from operations and $11 million of borrowings on our revolving credit facility to fund $143 million of capital expenditures, fund $76 million in dividend payments, and repurchase $36 million of our common stock. These transactions, along with an unfavorable foreign currency impact of $8 million resulted in an increase of $99 million in cash and cash equivalents. Cash flows from operating activities included an increase of $21 million from lower working capital requirements, as well as cash contributions of $26 million for our pension and postretirement plans.

We expect that cash from operations, together with borrowing available under our credit facilities, will continue to be sufficient for our operating needs and planned capital expenditures for at least the next twelve months.

FINANCIAL POSITION AND LIQUIDITY

Cash

At December 31, 2018, we had cash and cash equivalents of $73 million as compared to $84 million at the end of 2017.

Table of Contents

Our cash and cash equivalents held by our foreign subsidiaries amounted to approximately $71 million at December 31, 2018 and $77 million at December 31, 2017. Periodically, we repatriate cash from our foreign subsidiaries to the United States through intercompany dividends. Under the Tax Reform Act enacted in 2017, previously deferred foreign earnings were subjected to U.S. tax in 2017. The Tax Reform Act also includes a 100% dividends received deduction for most future distributions from our foreign subsidiaries. As a result of these two provisions, we do not anticipate significant tax consequences of future distributions of foreign earnings.

A portion of our foreign cash balances is associated with earnings that we have asserted are indefinitely reinvested. We plan to use these indefinitely reinvested earnings to support growth outside of the United States through funding of operating expenses, research and development expenses, capital expenditures, and other cash needs of our foreign subsidiaries.

Debt

4.10% Senior Notes - At both December 31, 2018 and December 31, 2017, we had $350 million of 4.10% senior notes due 2022 which are senior unsecured obligations. The senior notes are registered under the Securities Act of 1933. We incurred financing costs totaling approximately $5 million related to the 4.10% senior notes, which are being amortized over the term of the agreement.

The 4.10% senior notes rank:

- equal in right of payment with all of our existing and future senior unsecured indebtedness; and
- senior in right of payment to any of our future subordinated indebtedness.

The indenture governing the 4.10% senior notes contains covenants that, among other things, limit our ability and the ability of our subsidiaries to:

- create or permit to exist liens;
- enter into sale-leaseback transactions;
- incur additional guarantees; and
- sell all or substantially all of our assets or consolidate or merge with or into other companies.

We were in compliance with all covenants under the indenture governing the 4.10% senior notes as of December 31, 2018 and December 31, 2017.

3.78% Senior Notes - On January 4, 2017, we issued $250 million in senior unsecured notes in a private placement with The Prudential Insurance Company of America and certain other purchasers. These notes bear interest at 3.78% and mature on January 4, 2029. Interest is payable semiannually. Principal payments of $50 million are payable annually beginning on January 4, 2025. We have the right to make optional prepayments on the notes at any time, subject to certain limitations. The note purchase agreement contains representations, warranties, terms and conditions customary for transactions of this type. These include negative covenants, certain financial covenants, and events of default which are substantially similar to the covenants and events of default in our revolving credit facility.

We were in compliance with all covenants under the 3.78% senior notes as of December 31, 2018 and December 31, 2017.

Revolving Credit Facility – On September 22, 2017, we entered into a Credit Agreement (Credit Agreement) with a term of five years. The Credit Agreement provides for an $850 million, multicurrency revolving credit facility, with a $150 million sublimit for multicurrency borrowings, a $75 million sublimit for letters of credit, and a $20 million sublimit for swingline loans. The Credit Agreement includes an expansion feature which allows us, subject to certain conditions, to request an increase in the aggregate amount of the revolving credit facility or obtain incremental term loans in an amount up to $425 million. In addition, the Credit Agreement includes provisions that allow certain of our foreign subsidiaries to borrow under the agreement. The obligations under the Credit Agreement are unsecured and are fully and unconditionally guaranteed by NewMarket. The revolving credit facility matures on September 22, 2022. We incurred financing costs totaling $2.8 million related to the Credit Agreement, which are being amortized over the term of the agreement.

Table of Contents

At December 31, 2018, the outstanding borrowings under the Credit Agreement amounted to $168 million. There were no outstanding borrowings under the Credit Agreement at December 31, 2017. Outstanding letters of credit amounted to $3 million at both December 31, 2018 and December 31, 2017 resulting in the unused portion of the credit facility amounting to $679 million at December 31, 2018 and $847 million at December 31 2017.

Borrowings made under the revolving credit facility bear interest, at our option, at an annual rate equal to either (1) the Alternate Base Rate (ABR) plus the Applicable Rate (as defined in the Credit Agreement) (solely in the case of loans denominated in U.S. dollars to NewMarket) or (2) the Adjusted LIBO Rate plus the Applicable Rate. ABR is the greater of (i) the rate of interest publicly announced by the Administrative Agent as its prime rate, (ii) the NYFRB Rate (as defined in the Credit Agreement) from time to time plus 0.5%, and (iii) the Adjusted LIBO Rate for a one month interest period plus 1%. The Adjusted LIBO Rate means the rate at which Eurocurrency deposits in the London interbank market for certain periods (as selected by NewMarket) are quoted, as adjusted for statutory reserve requirements for Eurocurrency liabilities and other applicable mandatory costs. The Applicable Rate ranges from 0.0% to 0.625%(depending on our consolidated Leverage Ratio or Credit Ratings) for loans bearing interest based on the ABR. The Applicable Rate ranges from 1.00% to 1.625% (depending on our Leverage Ratio or Credit Ratings) for loans bearing interest based on the Adjusted LIBO Rate. At December 31, 2018, the Applicable Rate was 0.25% for loans bearing interest based on the ABR and 1.25% for loans bearing interest based on the Adjusted LIBO Rate.

The average interest rate for borrowings under our revolving credit facilities was 3.0% during 2018 and 2.5% during 2017.

The Credit Agreement contains financial covenants that require NewMarket to maintain a consolidated Leverage Ratio (as defined in the Credit Agreement) of no more than 3.50 to 1.00 except during an Increased Leverage Period (as defined in the Credit Agreement) at the end of each quarter, and a consolidated Interest Coverage Ratio (as defined in the Credit Agreement) of no less than 3.00 to 1.00, calculated on a rolling four quarter basis, as of the end of each fiscal quarter.

At December 31, 2018, the Leverage Ratio was 2.00 and the Interest Coverage Ratio was 11.89.

We were in compliance with all covenants under the current revolving credit facility at December 31, 2018 and December 31, 2017.

Other Borrowings - One of our subsidiaries in China has access to a short-term line of credit totaling $10 million. There was no activity on this line of credit during 2018. The average interest rate was 4.1% during 2017. One of our subsidiaries in the United Kingdom entered into a 10 million Euro facility in 2018. There was no outstanding balance under this line at December 31, 2018. The average interest rate of this Euro facility during 2018 was 1%. There was no outstanding balance on any subsidiary lines of credit at December 31, 2017.

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We had long-term debt of $771 million at December 31, 2018 and $603 million at December 31, 2017. The increase in debt resulted from borrowings under the outstanding revolving credit facility during 2018.

As a percentage of total capitalization (total long-term debt and shareholders’ equity), our total long-term debt increased from 50.1% at the end of 2017 to 61.1% at the end of 2018. The change in the percentage was primarily the result of the increase in long-term debt, as well as the decrease in shareholders' equity. The change in shareholders’ equity reflects our earnings offset by the impact of the foreign currency translation adjustment, a decrease in the funded position of our defined benefit plans, the impact of stock repurchases and dividend payments. Normally, we repay any outstanding long-term debt with cash from operations or refinancing activities.

Working Capital

Including cash and cash equivalents and the impact of foreign currency on the balance sheet, at December 31, 2018, we had working capital of $542 million, resulting in a current ratio of 3.00 to 1. Our working capital at December 31, 2017 on the same basis was $517 million, resulting in a current ratio of 2.63 to 1.

Table of Contents

Other than the decrease in cash and cash equivalents, the most significant changes in working capital since December 31, 2017 resulted from a decrease in accounts receivable and accrued expenses, which were partially offset by an increase in inventories. The lower accounts receivable balance primarily reflected lower trade receivables due to decreased sales levels substantially in the EMEAI region when comparing the fourth quarter of 2018 with the fourth quarter of 2017, as well as some foreign currency impact. The decrease in trade receivables was partially offset by an increase in income and value added tax receivables since December 31, 2017. The decrease in accrued expenses primarily was due to lower capital project and retainage accruals as compared to December 31 2017. The increase in inventory was in the North America and Asia Pacific regions with some offset in the EMEAI region. The changes in inventory reflected timing of shipments, increases due to maintenance, production start-up at our Singapore facility, and planned safety stock of certain raw materials.

Capital Expenditures

Capital expenditures were $75 million for 2018, $149 million for 2017, and $143 million for 2016. We currently estimate capital expenditures in 2019 will be in the range of $75 million to $85 million as we anticipate spending on several improvements to our manufacturing and R&D infrastructure around the world. We expect to continue to finance capital spending through cash on hand and cash provided from operations, together with borrowing available under our $850 million revolving credit facility.

Environmental Expenses

We spent approximately $30 million in 2018, $26 million in 2017, and $24 million in 2016 for ongoing environmental operating and clean-up costs, excluding depreciation of previously capitalized expenditures. These environmental operating and clean-up expenses are included in cost of goods sold. We expect to continue to fund these costs through cash provided by operations.

Table of Contents

Contractual Obligations

The table below shows our year-end contractual obligations by year due.

(in millions)	Payments Due by Period				
	Total	Less than 1 Year	1 - 3 Years	3 - 5 Years	More than 5 Years
Debt obligations (a)	$768	$ 0	$0	$518	$ 250
Interest payable on long-term debt and capital lease obligations	154	29	59	37	29
Letters of credit (b)	3	0	0	0	3
Capital lease obligations (c)	6	1	1	1	3
Other lease obligations	82	17	26	15	24
Property, plant, and equipment purchase obligations	12	12	0	0	0
Purchase obligations (d)	693	169	294	213	17
Other long-term liabilities (e)	27	11	2	2	12
Reserves for uncertain tax positions	11	1	6	1	3
Total	$1,756	$ 240	$388	$787	$ 341

(a) Amounts represent contractual payments due on the 4.10% senior notes, revolving credit facility, and the Prudential senior unsecured notes as of December 31, 2018. See Note 13 for more information on long-term debt obligations.

(b) We intend to renew letters of credit when necessary as they mature; therefore, the obligations do not have a definitive maturity date.

(c) Amounts represent the debt obligation under the capital leases related to the Singapore manufacturing facility, as well as future minimum lease payments in excess of the capital lease debt obligation.

(d) Purchase obligations include agreements to purchase goods or services that are enforceable and legally binding and that specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum, or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable without penalty. Purchase orders made in the ordinary course of business are excluded from the above table. Any amounts for which we are liable under purchase orders are reflected in our Consolidated Balance Sheets as accounts payable or accrued expenses.

(e) These represent other long-term liability amounts reflected in our Consolidated Balance Sheets that have known payment streams. Amounts include environmental liabilities, contributions associated with pension and postretirement benefit plans, and tax payments related to the deemed repatriation of foreign earnings resulting from the Tax Reform Act. Amounts accrued for potential exposure with respect to litigation, claims, and assessments are not included in the table above.

Pension and Postretirement Benefit Plans

Our U.S. and foreign benefit plans are discussed separately below. The information applies to all of our U.S. benefit plans. Our foreign plans are quite diverse, and the actuarial assumptions used by the various foreign plans are based upon the circumstances of each particular country and retirement plan. The discussion surrounding our foreign retirement benefits focuses only on our pension plan in the United Kingdom (U.K.), which represents the majority of the amounts recorded in our financial statements for foreign pension plans. We use a December 31 measurement date to determine our pension and postretirement expenses and related financial disclosure information. Additional information on our pension and postretirement plans is in Note 18.

Table of Contents

U.S. Pension and Postretirement Benefit Plans—The average remaining service period of active participants for our U.S. plans is 12.8 years, while the average remaining life expectancy of inactive participants is 22.9 years. We utilize the sex distinct RP-2014 tables with separate rates for annuitants and non-annuitants, adjusted to remove MP-2014 improvements, with separate rates for annuitants and non-annuitants, projected generationally with Scale MP-2018 in determining the impact of the U.S. benefit plans on our financial statements.

Investment Return Assumptions and Asset Allocation—We periodically review our assumptions for the long-term expected return on pension plan assets. As part of the review and to develop expected rates of return, we considered an analysis of expected returns based on the U.S. plans' asset allocation as of both January 1, 2019 and January 1, 2018. This analysis reflects our expected long-term rates of return for each significant asset class or economic indicator. As of January 1, 2019, the expected rates were 8.5% for U.S. large cap stocks, 4.5% for fixed income, and 3.4% for inflation. The range of returns developed relies both on forecasts and on broad-market historical benchmarks for expected return, correlation, and volatility for each asset class.

The asset allocation for our U.S. pension plans is predominantly weighted toward equities. Through the ongoing monitoring of our investments and review of market data, we have determined that we should maintain the expected long-term rate of return for our U.S. pension plans at 8.5% at December 31, 2018.

An actuarial loss on the assets occurred during both 2018 and 2016 as the actual investment return for all of our U.S. pension plans was less than the expected return by approximately $56 million in 2018 and $3 million in 2016. An actuarial gain on the assets occurred during 2017 as the actual investment return for all of our U.S. pension plans exceeded the expected return by approximately $39 million in 2017. Investment gains and losses are recognized in earnings on an amortized basis over a period of years, resulting in increased expense of approximately $2 million in 2019. We expect that there will be continued volatility in pension expense as actual investment returns vary from the expected return, but we continue to believe the potential long-term benefits justify the risk premium for equity investments.

At December 31, 2018, our expected long-term rate of return on our postretirement plans was 4.5%. This rate varies from the pension rate of 8.5% primarily because of the difference in investment of assets. The assets of the postretirement plan are held in an insurance contract, which results in a lower assumed rate of investment return.

Pension expense and the life insurance portion of postretirement expense are sensitive to changes in the expected return on assets. For example, decreasing the expected rate of return by 100 basis points to 7.5% for pension assets and 3.5% for postretirement benefit assets (while holding other assumptions constant) would increase the forecasted 2019 expense for our U.S. pension and postretirement plans by approximately $4 million. Similarly, a 100 basis point increase in the expected rate of return to 9.5% for pension assets and 5.5% for postretirement benefit assets (while holding other assumptions constant) would reduce forecasted 2019 pension and postretirement expense by $4 million.

Discount Rate Assumption—We develop the discount rate assumption by determining the single effective discount rate for a unique hypothetical portfolio constructed from investment-grade bonds that, in the aggregate, match the projected cash flows of each of our retirement plans. The discount rate is developed based on the hypothetical portfolio on the last day of December. The discount rate at December 31, 2018 was 4.25% for all plans.

Pension and postretirement benefit expense is also sensitive to changes in the discount rate. For example, decreasing the discount rate by 100 basis points to 3.25% (while holding other assumptions constant) would increase the forecasted 2019 expense for our U.S. pension and postretirement benefit plans by approximately $7 million. A 100 basis point increase in the discount rate to 5.25% would reduce forecasted 2019 pension and postretirement benefit expense by $4 million.

Rate of Projected Compensation Increase—We have maintained our rate of projected compensation increase at December 31, 2018 at 3.5%. The rate assumption was based on an analysis of our projected compensation increases for the foreseeable future.

Liquidity—Cash contribution requirements to the pension plan are sensitive to changes in assumed interest rates and investment gains or losses in the same manner as pension expense. We expect our aggregate cash contributions, before income taxes, to the U.S. pension plans will be approximately $2 million to $4 million in 2019. We expect our contributions to the postretirement benefit plans will be approximately $1 million in 2019.

33

Table of Contents

Foreign Pension Benefit Plans—Our foreign pension plans are quite diverse. The following information applies only to our U.K. pension plan, which represents the majority of the amounts recorded in our financial statements for our foreign pension plans. The average remaining service period of active participants for our U.K. plan is 13 years, while the average remaining life expectancy of inactive participants is 24 years. We utilize the S2P (Light) mortality tables and allow for future projected improvements in life expectancy in line with the CMI 2017 model (with the default smoothing factor), with a long-term rate of improvement of 1% per year based on the membership of the plan, in determining the impact of the U.K. pension plans on our financial statements.

Investment Return Assumptions and Asset Allocation—We periodically review our assumptions for the long-term expected return on the U.K. pension plan assets. The expected long-term rate of return is based on both the asset allocation, as well as yields available in the U.K. markets.

The target asset allocation in the U.K. is to be invested 40% in pooled equities funds, 40% in pooled government bonds, and 20% in pooled diversified growth funds. The actual allocation at the end of 2018 was 39% in pooled equities funds, 41% in pooled government bonds, and 20% in pooled diversified growth funds. Based on the actual asset allocation and the expected yields available in the U.K. markets, the expected long-term rate of return for the U.K. pension plan was 5.7% at December 31, 2018.

An actuarial loss on the assets occurred during 2018 as the actual investment return was less than the expected investment return by approximately $16 million. An actuarial gain on the assets occurred during both 2017 and 2016 as the actual investment return exceeded the expected investment return by approximately $5 million in 2017 and $22 million in 2016. Investment gains and losses are recognized in earnings on an amortized basis over a period of years. The amortization of the actuarial net loss is expected to be approximately $0.5 million in 2019 resulting primarily from investment losses on the plan assets. We expect that there will be continued volatility in pension expense as actual investment returns vary from the expected return, but we continue to believe the potential benefits justify the risk premium for the target asset allocation.

Pension expense is sensitive to changes in the expected return on assets. For example, decreasing the expected rate of return by 100 basis points to 4.7% (while holding other assumptions constant) would increase the forecasted 2019 expense for our U.K. pension plan by approximately $2 million. Similarly, a 100 basis point increase in the expected rate of return to 6.7% (while holding other assumptions constant) would reduce forecasted 2019 pension expense by approximately $2 million.

Discount Rate Assumption—We utilize a yield curve based on AA-rated corporate bond yields in developing a discount rate assumption. The yield appropriate to the duration of the U.K. plan liabilities is then used. The discount rate at December 31, 2018 was 2.9%.

Pension expense is also sensitive to changes in the discount rate. For example, decreasing the discount rate by 100 basis points to 1.9% (while holding other assumptions constant) would increase the forecasted 2019 expense for our U.K. pension plans by approximately $1 million. A 100 basis point increase in the discount rate to 3.9% would reduce forecasted 2019 pension expense by approximately $1 million.

Rate of Projected Compensation Increase—Our rate of projected compensation increase at December 31, 2018 is 4.3%. The rate assumption was based on an analysis of our projected compensation increases for the foreseeable future.

Liquidity—Cash contribution requirements to the U.K. pension plan are sensitive to changes in assumed interest rates and investment gains or losses. We expect our aggregate U.K. cash contributions, before income taxes, will be approximately $4 million in 2019.

OUTLOOK

We are pleased with the overall solid performance of our business in 2018. Our stated goal is to provide a 10% compounded return per year for our shareholders over any five-year period (defined by earnings per share growth plus dividends), although we may not necessarily achieve a 10% return each year. We continue to have confidence in our customer-focused strategy and approach to the market. We believe the fundamentals of how we run our business - a long-term view, safety-first culture, customer-focused solutions, technology-driven product offerings, and world-class supply chain capability - will continue to be beneficial for all of our stakeholders over the long term.

34

Table of Contents

We expect our petroleum additives segment to deliver another year of solid performance in 2019. We expect that the petroleum additives industry shipment demand will grow in the 1% to 2% range over the long-term, and we plan to exceed the industry growth rate.

In the past several years we have made significant investments in our business as the industry fundamentals remain positive. These investments have been and will continue to be in organizational talent, technology development and processes, and global infrastructure, consisting of technical centers, production capability and geographic expansion. Our investments in support of our customers include significant research and development efforts, completing construction of a new manufacturing facility in Singapore and our recently acquired facility in Mexico. We intend to utilize these new investments to improve our ability to deliver the solutions that our customers value, expand our global reach, and enhance our operating results. We will continue to invest in our capabilities to provide even better value, service, technology, and customer solutions.

Our business generates significant amounts of cash beyond what is necessary for the expansion and growth of our current offerings. We regularly review our many internal opportunities to utilize excess cash from a technological, geographic, capability and product line perspective. We believe our capital spending is creating the capability we need to grow and support our customers worldwide, and our research and development investments are positioning us well to provide added value to our customers. Our focus in the acquisition area remains on the petroleum additives industry. It is our view that this industry segment will provide the greatest opportunity for solid returns on our investments while minimizing risk. We remain focused on this strategy and will evaluate any future opportunities. We will continue to evaluate all alternative uses of cash to enhance shareholder value, including stock repurchases and dividends.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The following discussion highlights some of the more critical areas where a significant change in facts and circumstances in our operating and financial environment could cause a change in future reported financial results.

Income Taxes

We file United States, foreign, state, and local income tax returns. Significant judgment is required in determining our worldwide provision for income taxes and recording the related tax assets and liabilities. Any significant impact as a result of changes in underlying facts, law, tax rates, or tax audits could lead to adjustments to our income tax expense, effective tax rate, financial position, or cash flow.

Deferred income taxes are provided for the estimated income tax effect of temporary differences between the financial statement carrying amounts and the tax basis of existing assets and liabilities, as well as for net operating losses and tax credit carryforwards. When recording these deferred tax assets and liabilities, we must estimate the tax rates we expect will apply to taxable income in the periods in which the deferred tax liability or asset is expected to be settled or realized. In addition, we may record valuation allowances to reduce deferred tax assets if it is more likely than not that some portion or all of the deferred tax assets will not be realized. Judgment is required as we consider the scheduled reversal of deferred tax assets and liabilities, projected future taxable income, and tax planning strategies in making this assessment. If our estimates and assumptions change from those used when we recorded deferred tax assets and liabilities, the effect on our results of operations and financial position could be material.

The income tax returns for our entities in the United States and in foreign jurisdictions are open for examination by tax authorities. We assess our income tax positions and record a liability for all years open for examination based upon our evaluation of the facts, circumstances, and information available at the reporting date. The economic benefit associated with a tax position will be recognized only if we determine it is more likely than not to be upheld on audit. Although we believe our estimates and judgments are reasonable, actual results could differ, resulting in gains or losses that may be material to our results of operations and financial position.

Table of Contents

At each interim reporting period, we estimate an effective income tax rate that is expected to be applicable for the full year. Our provision for income taxes is impacted by the income tax rates of the countries where we operate. A change in the geographical source of our income can affect the effective tax rate. Significant judgment is involved regarding the application of global income tax laws and regulations when projecting the jurisdictional mix of income. Additionally, interpretations of tax laws, court decisions, or other guidance provided by taxing authorities influence our estimate of the effective income tax rate. As a result, our actual effective income tax rate and related income tax liabilities may differ materially from our estimated effective tax rate and related income tax liabilities.

Intangibles (net of amortization) and Goodwill

We have certain identifiable intangibles amounting to $13 million and goodwill amounting to $123 million at December 31, 2018 that are discussed in Note 10. These intangibles and goodwill relate to our petroleum additives business. The intangibles are being amortized over periods with up to approximately 11 years of remaining life. We continue to assess the market related to the intangibles and goodwill, as well as their specific values, and have concluded the values are appropriate, as are the amortization periods for the intangibles. We also evaluate the intangibles and goodwill for any potential impairment when significant events or circumstances occur that might impair the value of these assets. As part of the impairment assessment, we estimate the fair value of the reporting unit using a discounted cash flow model. The determination of fair value of the reporting unit using this technique requires the use of estimates and assumptions related to cash flow projections. In particular, our cash flow projections include significant judgments and assumptions relating to revenue growth rates. These evaluations continue to support the values at which the identifiable intangibles and goodwill are carried on our financial statements. However, if conditions were to substantially deteriorate in the petroleum additives market, it could possibly cause a decrease in the estimated useful lives of the intangible assets or result in a noncash write-off of all or a portion of the intangibles and goodwill carrying amounts. A reduction in the amortization period of the intangibles would have no effect on cash flows. We do not anticipate such a change in the market conditions in the near term.

Pension Plans and Other Postretirement Benefits

We use assumptions to record the impact of the pension and postretirement benefit plans in the financial statements. These assumptions include the discount rate, expected long-term rate of return on plan assets, and rate of compensation increase. A change in any one of these assumptions could cause different results for the plans and therefore, impact our results of operations, cash flows, and financial condition. We develop these assumptions after considering available information that we deem relevant. Information is provided on the pension and postretirement plans in Note 18. In addition, further disclosure of the effect of changes in these assumptions is provided in the “Financial Position and Liquidity” section of Item 7.

Environmental and Legal Proceedings

We have disclosed our environmental matters in Item 1 of this Annual Report on Form 10-K, as well as in Note 17. Our estimates for costs that will be incurred to satisfy our obligations related to environmental matters are affected by many variables, including our judgment regarding the extent of remediation that will be required, future changes in and enforcement and interpretation of laws and regulations, current and future technology available, and timing of remediation activities. While we currently do not anticipate significant changes to the many factors that could impact our environmental requirements, we continue to keep our accruals consistent with these requirements as they change. Also, as noted in the discussion of “Legal Proceedings” in Item 3 of this Annual Report on Form 10-K, while it is not possible to predict or determine with certainty the outcome of any legal proceeding, it is our opinion, based on our current knowledge, that we will not experience any material adverse effects on our results of operations, cash flows, or financial condition as a result of any pending or threatened proceeding.

Table of Contents

RECENTLY ISSUED ACCOUNTING STANDARDS

For a full discussion of the more significant pronouncements which may impact our financial statements, see Note 23.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to many market risk factors, including fluctuations in interest and foreign currency rates, as well as changes in the cost of raw materials. These risk factors may affect our results of operations, cash flows, and financial position.

We manage these risks through regular operating and financing methods, including the use of derivative financial instruments. When we have derivative instruments, they are with major financial institutions and are not for speculative or trading purposes. Also, as part of our financial risk management, we regularly review significant contracts for embedded derivatives and, if identified, would record them in accordance with accounting principles generally accepted in the United States.

The following analysis presents the effect on our results of operations, cash flows, and financial position as if the hypothetical changes in market risk factors occurred at December 31, 2018. We analyzed only the potential impacts of our hypothetical assumptions. This analysis does not consider other possible effects that could impact our business.

Interest Rate Risk

At December 31, 2018, we had total long-term debt of $771 million. Of the total long-term debt, $600 million is at fixed rates. There was no interest rate risk at the end of the year associated with the fixed rate debt.

At December 31, 2018, we had $168 million of outstanding variable rate debt under our revolving credit facility. Holding all other variables constant, if the variable portion of the interest rates hypothetically increased 10%, the effect on our earnings and cash flows would have been higher interest expense of approximately $0.3 million.

A hypothetical 100 basis point decrease in interest rates, holding all other variables constant, would have resulted in a change of $33 million in fair value of our debt at December 31, 2018.

Foreign Currency Risk

We sell to customers in foreign markets through our foreign subsidiaries, as well as through export sales from the United States. These transactions are often denominated in currencies other than the U.S. Dollar. Our primary currency exposures are the European Union Euro, British Pound Sterling, Japanese Yen, Chinese Renminbi, Indian Rupee, Singapore Dollar, Mexican Peso, Australian Dollar, and Canadian Dollar. We may enter into forward contracts as hedges to minimize the fluctuation of intercompany accounts receivable denominated in foreign currencies. At December 31, 2018, we had no outstanding forward contracts.

Raw Material Price Risk

We utilize a variety of raw materials in the manufacture of our products, including base oil, polyisobutylene, antioxidants, alcohols, solvents, sulfonates, friction modifiers, olefins, and copolymers. We may also enter into contracts which commit us to purchase some of our more critical raw materials based on anticipated demand. Our profitability is sensitive to changes in the quantities of raw materials we may need and the costs of those materials which may be caused by changes in supply, demand or other market conditions, over which we have little or no control. In addition, political and economic conditions in certain regions of the world in which we operate have caused, and may continue to cause, our demand for and the cost of our raw materials to fluctuate. War, armed hostilities, terrorist acts, civil unrest, or other incidents may also cause a sudden or sharp change in our demand for and the cost of our raw materials. If we experience such increases in the cost of our raw materials, we may not be able to pass them along to our customers in the form of price increases for our products. The inability to do so would have a negative impact on our operating profit. In addition, if our demand for raw materials were to decline such that we would not have need for the quantities required to be purchased under commitment agreements, we could incur additional charges that would affect our profitability.

Table of Contents

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Independent Registered Public Accounting Firm
To the Board of Directors and Shareholders of NewMarket Corporation:
Opinions on the Financial Statements and Internal Control over Financial Reporting
We have audited the accompanying consolidated balance sheets of NewMarket Corporation and its subsidiaries (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).
In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.
Basis for Opinions
The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (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 audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. 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 audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Table of Contents

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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

/s/ PricewaterhouseCoopers LLP

Richmond, Virginia
February 19, 2019

We have served as the Company's or its predecessor's auditor since 1947.

Table of Contents

NewMarket Corporation and Subsidiaries
Consolidated Statements of Income

	Years Ended December 31,		
(in thousands, except per-share amounts)	2018	2017	2016
Net sales	$2,289,675	$2,198,404	$2,049,451
Cost of goods sold	1,704,312	1,562,017	1,372,269
Gross profit	585,363	636,387	677,182
Selling, general, and administrative expenses	152,400	167,651	161,635
Research, development, and testing expenses	140,289	146,002	160,788
Operating profit	292,674	322,734	354,759
Interest and financing expenses, net	26,723	21,856	16,785
Other income (expense), net	24,334	14,564	5,234
Income before income tax expense	290,285	315,442	343,208
Income tax expense	55,551	124,933	99,767
Net income	$234,734	$190,509	$243,441
Earnings per share - basic and diluted	$20.34	$16.08	$20.54

See accompanying Notes to Consolidated Financial Statements
40

Table of Contents

NewMarket Corporation and Subsidiaries
Consolidated Statements of Comprehensive Income

(in thousands)	Years Ended December 31, 2018	2017	2016
Net income	$234,734	$190,509	$243,441
Other comprehensive income (loss):			
Pension plans and other postretirement benefits:			
Prior service credit (cost) arising during the period, net of income tax expense (benefit) of $(91) in 2018 and $(286) in 2016	(446)	0	(463)
Amortization of prior service cost (credit) included in net periodic benefit cost (income), net of income tax expense (benefit) of $(720) in 2018, $(1,127) in 2017 and $(1,123) in 2016	(2,363)	(1,955)	(1,801)
Actuarial net gain (loss) arising during the period, net of income tax expense (benefit) of $(6,976) in 2018, $2,814 in 2017 and $(4,409) in 2016	(24,581)	10,966	(8,102)
Amortization of actuarial net loss (gain) included in net periodic benefit cost (income), net of income tax expense (benefit) of $1,381 in 2018, $2,028 in 2017 and $2,287 in 2016	4,355	3,656	3,977
Total pension plans and other postretirement benefits	(23,035)	12,667	(6,389)
Foreign currency translation adjustments, net of income tax expense (benefit) of $(535) in 2018, $703 in 2017 and $(895) in 2016	(12,287)	23,849	(31,595)
Other comprehensive income (loss)	(35,322)	36,516	(37,984)
Comprehensive income	$199,412	$227,025	$205,457

See accompanying Notes to Consolidated Financial Statements
41

Table of Contents

NewMarket Corporation and Subsidiaries
Consolidated Balance Sheets

(in thousands, except share amounts)	December 31, 2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	$73,040	$84,166
Trade and other accounts receivable, net	314,860	335,317
Inventories	396,341	383,097
Prepaid expenses and other current assets	29,179	31,074
Total current assets	813,420	833,654
Property, plant, and equipment, net	644,138	652,281
Intangibles (net of amortization) and goodwill	136,039	144,337
Prepaid pension cost	88,705	66,495
Deferred income taxes	5,094	4,349
Deferred charges and other assets	9,878	11,038
Total assets	$1,697,274	$1,712,154
LIABILITIES AND SHAREHOLDERS’ EQUITY		
Current liabilities:		
Accounts payable	$151,631	$159,408
Accrued expenses	91,202	107,999
Dividends payable	17,923	19,055
Income taxes payable	6,431	16,340
Other current liabilities	4,114	13,991
Total current liabilities	271,301	316,793
Long-term debt	770,999	602,900
Other noncurrent liabilities	165,067	190,812
Total liabilities	1,207,367	1,110,505
Commitments and contingencies (Note 17)		
Shareholders’ equity:		
Common stock and paid-in capital (without par value; authorized shares - 80,000,000; issued and outstanding - 11,184,482 at December 31, 2018 and 11,779,978 at December 31, 2017)	0	0
Accumulated other comprehensive loss	(181,316)	(145,994)
Retained earnings	671,223	747,643
Total shareholders' equity	489,907	601,649
Total liabilities and shareholders' equity	$1,697,274	$1,712,154

See accompanying Notes to Consolidated Financial Statements
42

Table of Contents

NewMarket Corporation and Subsidiaries
Consolidated Statements of Shareholders' Equity

(in thousands, except share and per-share amounts)	Common Stock and Paid-in Capital		Accumulated Other Comprehensive Loss	Retained Earnings	Total Shareholders' Equity
	Shares	Amount			
Balance at December 31, 2015	11,948,446	$ 0	$ (144,526)	$532,090	$ 387,564
Net income				243,441	243,441
Other comprehensive income (loss)			(37,984)		(37,984)
Cash dividends ($6.40 per share)				(75,829)	(75,829)
Repurchases of common stock	(98,867)	(252)		(35,563)	(35,815)
Tax withholdings related to stock-based compensation	(2,582)	(1,076)		0	(1,076)
Stock-based compensation	(1,025)	2,931		19	2,950
Balance at December 31, 2016	11,845,972	1,603	(182,510)	664,158	483,251
Net income				190,509	190,509
Other comprehensive income (loss)			36,516		36,516
Cash dividends ($7.00 per share)				(82,885)	(82,885)
Repurchases of common stock	(70,689)	(3,607)		(24,150)	(27,757)
Tax withholdings related to stock-based compensation	(2,328)	(915)		0	(915)
Stock-based compensation	7,023	2,919		11	2,930
Balance at December 31, 2017	11,779,978	0	(145,994)	747,643	601,649
Net income				234,734	234,734
Other comprehensive income (loss)			(35,322)		(35,322)
Cash dividends ($7.00 per share)				(80,448)	(80,448)
Repurchases of common stock	(603,449)	(2,038)		(229,978)	(232,016)
Tax withholdings related to stock-based compensation	(2,055)	0		(740)	(740)
Stock-based compensation	10,008	2,038		12	2,050
Balance at December 31, 2018	11,184,482	$ 0	$ (181,316)	$671,223	$ 489,907

See accompanying Notes to Consolidated Financial Statements
43

Table of Contents

NewMarket Corporation and Subsidiaries
Consolidated Statements of Cash Flows

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Cash and cash equivalents at beginning of year	$84,166	$192,154	$93,424
Cash flows from operating activities:			
Net income	234,734	190,509	243,441
Adjustments to reconcile net income to cash flows from operating activities:			
Depreciation and amortization	71,759	55,340	44,893
Noncash pension and postretirement expense	4,903	7,959	12,829
Deferred income tax expense	14,527	27,375	19,185
Tax Reform Act expense	0	31,375	0
Change in assets and liabilities:			
Trade and other accounts receivable, net	14,096	250	(38,231)
Inventories	(29,672)	(44,936)	14,480
Prepaid expenses and other current assets	702	(2,715)	8,790
Accounts payable and accrued expenses	(19,638)	17,955	18,455
Other current liabilities	(10,169)	1,595	10,149
Income taxes payable	(9,731)	(8,475)	7,172
Cash pension and postretirement contributions	(64,756)	(26,264)	(25,898)
Realized loss on derivative instruments, net	0	0	4,825
Other, net	(8,844)	(7,173)	33,344
Cash provided from (used in) operating activities	197,911	242,795	353,434
Cash flows from investing activities:			
Capital expenditures	(74,638)	(148,713)	(142,874)
Acquisition of business (net of $1,131 cash acquired)	0	(183,930)	0
Deposits for interest rate swap	0	0	(7,570)
Return of deposits for interest rate swap	0	0	11,832
Other, net	14,607	(2,000)	(4,749)
Cash provided from (used in) investing activities	(60,031)	(334,643)	(143,361)
Cash flows from financing activities:			
Net borrowings (repayments) under revolving credit facility	168,129	(156,000)	11,000
Issuance of 3.78% senior notes	0	250,000	0
Dividends paid	(80,448)	(82,885)	(75,829)
Repurchases of common stock	(232,016)	(25,998)	(35,815)
Other, net	(1,092)	(4,093)	(2,733)
Cash provided from (used in) financing activities	(145,427)	(18,976)	(103,377)
Effect of foreign exchange on cash and cash equivalents	(3,579)	2,836	(7,966)
(Decrease) increase in cash and cash equivalents	(11,126)	(107,988)	98,730
Cash and cash equivalents at end of year	$73,040	$84,166	$192,154

See accompanying Notes to Consolidated Financial Statements
44

Table of Contents
Notes to Consolidated Financial Statements

1. Summary of Significant Accounting Policies

Consolidation—Our consolidated financial statements include the accounts of NewMarket Corporation and its subsidiaries. All intercompany transactions are eliminated upon consolidation. References to "we," "us," "our," the "company," and "NewMarket" are to NewMarket Corporation and its consolidated subsidiaries, unless the context indicates otherwise.

NewMarket is the parent company of three operating companies, each managing its own assets and liabilities. Those companies are Afton, which focuses on petroleum additive products; Ethyl, representing certain contracted manufacturing and services, as well as the antiknock compounds business; and NewMarket Development, which manages the property and improvements that we own in Virginia. NewMarket is also the parent company of NewMarket Services, which provides various administrative services to NewMarket, Afton, Ethyl, and NewMarket Development.

Certain reclassifications have been made to the accompanying consolidated financial statements and the related notes to reflect the adoption of Accounting Standards Update No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." There was no impact to net income for any period presented.

Foreign Currency Translation—We translate the balance sheets of our foreign subsidiaries into U.S. Dollars based on the current exchange rate at the end of each period. We translate the statements of income using the weighted-average exchange rates for the period. NewMarket includes translation adjustments in the Consolidated Balance Sheets as part of accumulated other comprehensive loss and transaction adjustments in the Consolidated Statements of Income as part of cost of goods sold. Foreign currency transaction adjustments resulted in a net loss of $8 million in 2018 and a net gain of $5 million in both 2017 and 2016.

Revenue Recognition—We recognize revenue when control of the product is transferred to our customer and for an amount that reflects the consideration that we expect to collect from the customer. Net sales (revenues) are reported at the gross amount billed, including amounts related to shipping that are charged to the customer. Provisions for rebates to customers are recorded in the same period that the related sales are recorded. Freight costs incurred on the delivery of products are included in the Consolidated Statements of Income in cost of goods sold. Our standard terms of delivery are included in our contracts, sales order confirmation documents, and invoices. Taxes assessed by a governmental authority concurrent with sales to our customers, including sales, use, value-added, and revenue-related excise taxes, are not included as net sales, but are reflected in accrued expenses until remitted to the appropriate governmental authority.

Cash and Cash Equivalents—Our cash equivalents consist of government obligations and commercial paper with original maturities of 90 days or less. Throughout the year, we have cash balances in excess of federally insured amounts on deposit with various financial institutions. We state cash and cash equivalents at cost, which approximates fair value.

Accounts Receivable—We record our accounts receivable at net realizable value. We maintain an allowance for doubtful accounts for estimated losses resulting from our customers not making required payments. We determine the adequacy of the allowance by periodically evaluating each customer’s receivable balance, considering their financial condition and credit history, and considering current economic conditions. The allowance for doubtful accounts was not material at December 31, 2018 or December 31, 2017.

Inventories—NewMarket values its inventories at the lower of cost or net realizable value. In the United States, cost is determined on the last-in, first-out (LIFO) basis. In all other countries, we determine cost using the weighted-average method. Inventory cost includes raw materials, direct labor, and manufacturing overhead.

Property, Plant, and Equipment—We state property, plant, and equipment at cost and compute depreciation by the straight-line method based on the estimated useful lives of the assets. We capitalize expenditures for significant improvements that extend the useful life of the related property. We expense repairs and maintenance, including plant turnaround costs, as incurred. When property is sold or retired, we remove the cost and accumulated depreciation from

the accounts and any related gain or loss is included in earnings.

Table of Contents
Notes to Consolidated Financial Statements

Intangibles (Net of Amortization) and Goodwill—Identifiable intangibles include the cost of acquired contracts, formulas and technology, trademarks and trade names, and customer bases. We assign a value to identifiable intangibles based on independent third-party appraisals and management's assessment at the time of acquisition. NewMarket amortizes the cost of the customer bases by an accelerated method and the cost of the remaining identifiable intangibles by the straight-line method over the estimated economic life of the intangible.

Goodwill arises from the excess of cost over net assets of businesses acquired. Goodwill represents the residual purchase price after allocation to all identifiable net assets. We test goodwill for impairment each year, as well as whenever a significant event or circumstance occurs which could reduce the fair value of the reporting unit to which the goodwill applies below the carrying amount of the reporting unit.

Impairment of Long-Lived Assets—When significant events or circumstances occur that might impair the value of long-lived assets, we evaluate recoverability of the recorded cost of these assets. Assets are considered to be impaired if their carrying amount is not recoverable from the estimated undiscounted future cash flows associated with the assets. If we determine an asset is impaired and its recorded cost is higher than estimated fair market value based on the estimated present value of future cash flows, we adjust the asset to estimated fair market value.

Environmental Costs—NewMarket capitalizes environmental compliance costs if they extend the useful life of the related property or prevent future contamination. Environmental compliance costs also include maintenance and operation of pollution prevention and control facilities. We expense these compliance costs in cost of goods sold as incurred.

Accrued environmental remediation and monitoring costs relate to an existing condition caused by past operations. NewMarket accrues these costs in current operations within cost of goods sold in the Consolidated Statements of Income when it is probable that we have incurred a liability and the amount can be reasonably estimated. These estimates are based on an assessment of the site, available clean-up methods, and prior experience in handling remediation.

When we can reliably determine the amount and timing of future cash flows, we discount these liabilities, incorporating an inflation factor.

Legal Costs—We expense legal costs in the period incurred.

Employee Savings Plan—Most of our full-time salaried and hourly employees may participate in defined contribution savings plans. Employees who are covered by collective bargaining agreements may also participate in a savings plan according to the terms of their bargaining agreements. Employees, as well as NewMarket, contribute to the plans. We made contributions of $6 million in 2018, $6 million in 2017, and $7 million in 2016 related to these plans.

Research, Development, and Testing Expenses—NewMarket expenses all research, development, and testing costs as incurred. R&D costs include personnel-related costs, as well as internal and external testing of our products.

Income Taxes—We recognize deferred income taxes for temporary differences between the financial reporting basis and the income tax basis of assets and liabilities. We also adjust for changes in tax rates and laws at the time the changes are enacted. A valuation allowance is recorded when it is more likely than not that a deferred tax asset will not be realized. We recognize accrued interest and penalties associated with uncertain tax positions as part of income tax expense on our Consolidated Statements of Income.

Capital Lease Obligation—We record our capital lease obligations at the lower of fair market value of the related asset at the inception of the lease or the present value of the total minimum lease payments.

Derivative Financial Instruments and Hedging Activities—We are exposed to certain risks arising from both our business operations and economic conditions. We manage our exposures to a wide variety of business and operational risks through management of our core business activities.

We manage certain economic risks, including interest rate, liquidity, and credit risk primarily by managing the amount, sources, and duration of our debt funding, as well as through the use of derivative financial instruments. Specifically, we have entered, and in the future may enter, into interest rate swaps to manage our exposure to interest rate movements.

46

Table of Contents
Notes to Consolidated Financial Statements

In addition, our foreign operations expose us to fluctuations of foreign exchange rates. These fluctuations may impact our results of operations, financial position, and cash flows. To manage this exposure, we sometimes enter into foreign currency forward contracts to minimize currency exposure due to cash flows from foreign operations.

We record all derivatives on the balance sheet at fair value. The accounting for changes in the fair value of derivatives depends on the intended use of the derivative, whether we have elected to designate a derivative in a hedging relationship and apply hedge accounting, and whether the hedging relationship has satisfied the criteria necessary to apply hedge accounting. We may enter into derivative contracts that are intended to economically hedge certain of our risks, even though hedge accounting does not apply or we elect not to apply hedge accounting. We do not enter into derivative instruments for speculative purposes. We had no derivative financial instruments outstanding at December 31, 2018 or December 31, 2017.

Stock-based Compensation—We calculate the fair value of restricted stock and restricted stock units based on the closing price of our common stock on the date of grant. If award recipients are entitled to receive dividends during the vesting period, we make no adjustment to the fair value of the award for dividends. If the award does not entitle recipients to dividends during the vesting period, we reduce the grant-date price of our common stock by the present value of the dividends expected to be paid on the underlying shares during the vesting period, discounted at the risk-free interest rate.

We recognize stock-based compensation expense for the number of awards expected to vest on a straight-line basis over the requisite service period.

Estimates and Risks Due to Concentration of Business—The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates.

In addition, our financial results can be influenced by certain risk factors. Some of our significant concentrations of risk include the following:

- reliance on a small number of significant customers;
- customers concentrated in the fuel and lubricant industries; and
- production of several of our products solely at one facility.

Table of Contents
Notes to Consolidated Financial Statements

2. Acquisition of Business

On July 3, 2017, Afton Chemical de Mexico, S.A. de C.V., an indirect, wholly-owned subsidiary of NewMarket Corporation, acquired approximately 99.5% of the outstanding capital stock of Aditivos Mexicanos, S.A. de C.V. (AMSA) for $185 million in cash. AMSA is a petroleum additives manufacturing, sales and distribution company based in Mexico City, Mexico. The results of AMSA's operations have been included in our consolidated financial statements since the date of acquisition and are not material. The noncontrolling interest is also not material. The acquisition agreement included all physical assets of AMSA.

We performed a purchase price valuation to determine the fair values of the tangible and intangible assets acquired and liabilities assumed and the amount of goodwill to be recognized as of the acquisition date.

The allocation of the purchase price is as follows (in millions):

Cash	$1
Trade accounts receivable	16
Inventory	6
Property, plant, and equipment	53
Goodwill	118
Intangible assets	18
Other long-term assets	2
Other current liabilities	(7)
Other long-term liabilities	(3)
Deferred taxes	(19)
Fair value of net assets acquired	$185

Identified intangible assets acquired consisted of the following:

	Fair Value (in millions)	Estimated Useful Lives (in years)
Formulas and technology	$ 9	3-6
Customer base	9	4
Total identified intangible assets	$ 18	

As part of the acquisition, we recorded $118 million of goodwill. The goodwill recognized is attributable to expected synergies, including a secure supply source for certain raw materials, as well as the skilled assembled workforce of AMSA. All of the goodwill recognized is part of the petroleum additives segment, and none is deductible for Mexican tax purposes.

Pro forma results of operations are not presented as the acquisition was not considered material to our consolidated results.

3. Net Sales

On January 1, 2018, we adopted Accounting Standards Codification 606 (ASC 606), "Revenue from Contracts with Customers" using the modified retrospective method and applying the standard only to uncompleted contracts at the date of adoption. The impact of adopting ASC 606 did not result in a change to income, and therefore we are not reflecting a cumulative effect to the opening balance of retained earnings due to the adoption of ASC 606. The

comparative periods have not been adjusted and continue to be reported under the accounting standards in effect for those periods.

Table of Contents
Notes to Consolidated Financial Statements

Our revenues are primarily derived from the manufacture and sale of petroleum additives products. We sell petroleum additives products across the world including to customers located in the United States, Europe, Asia Pacific (including China), Latin America, Canada, India, and the Middle East. Our customers primarily consist of global, national, and independent oil companies. While some of our customers have payment terms beyond 30 days, we do not provide extended payment terms of a year or more, nor do our contracts include a financing component. Our allowance for doubtful accounts is immaterial, as are any bad debts we incur. In limited cases, we collect funds in advance of shipping product to our customers and recognizing the related revenue. These prepayments from customers are recorded as a contract liability to our customer until we recognize the revenue. Prepayments from our customers totaled $0.6 million at December 31, 2018. Revenue recognized from funds collected in advance from customers in an earlier period was $3.2 million in 2018.

We recognize revenue when control of the product is transferred to our customer and for an amount that reflects the consideration that we expect to collect from the customer. Control is generally transferred to the customer when title transfers (which may include physical possession by the customer), we have a right to payment from the customer, the customer has accepted the product, and the customer has assumed the risks and rewards of ownership. We have supplier managed inventory arrangements with some of our customers to facilitate on-demand product availability. In some cases, the inventory resides at a customer site, although title has not transferred, we are not entitled to payment, and we have not invoiced for the product. We have evaluated the contract terms under these arrangements and have determined that control transfers when the customer uses the product, at which time revenue is recognized. Our contracts generally include one performance obligation, which is providing petroleum additives products. The performance obligation is satisfied at a point in time when products are shipped, delivered, or consumed by the customer, depending on the underlying contracts.

Taxes assessed by a governmental authority which are concurrent with sales to our customers, including sales, use, value-added, and revenue-related excise taxes, are collected by us from the customer and are not included in net sales, but are reflected in accrued expenses until remitted to the appropriate governmental authority. When we are responsible for shipping and handling costs after title has transferred, we account for those as fulfillment costs and include them in cost of goods sold.

Some of our contracts include variable consideration in the form of rebates or business development funds. We record rebates at the point of sale as contra-revenue when we can reasonably estimate the amount of the rebate. The estimates are based on our best judgment at the time of sale, which includes anticipated as well as historical performance. Depending upon the specific terms of a business development fund, amounts are accrued as contra-revenue at the point of sale or are expensed when costs are incurred by us. We regularly review both rebates and business development funds and make adjustments when necessary, recognizing the full amount of any adjustment in the period identified. We recognized an increase to net sales of $3 million for 2018 related to adjustments to rebates or business development funds which were recognized in revenue in a prior period. At December 31, 2018, accrued rebates were $24.8 million and accrued business development funds were $1.7 million.

The following table provides information on our net sales by geographic area. Information on net sales by segment is in Note 21.

Table of Contents
Notes to Consolidated Financial Statements

(in thousands)	Twelve Months Ended December 31, 2018
Net sales	
United States	$722,576
China	239,406
Europe, Middle East, Africa, India	756,258
Asia Pacific, except China	335,119
Other foreign	236,316
Net sales	$2,289,675

4. Earnings Per Share

We had 18,892 shares in 2018, 16,708 shares in 2017, and 17,130 shares in 2016 of nonvested restricted stock that were excluded from the calculation of diluted earnings per share, as their effect on earnings per share would be anti-dilutive.

The nonvested restricted stock is considered a participating security since the restricted stock contains nonforfeitable rights to dividends. As such, we use the two-class method to compute basic and diluted earnings per share for all periods presented since this method yielded a more dilutive result than the treasury-stock method. The following table illustrates the earnings allocation method utilized in the calculation of basic and diluted earnings per share.

	Years Ended December 31,		
(in thousands, except per-share amounts)	2018	2017	2016
Earnings per share numerator:			
Net income attributable to common shareholders before allocation of earnings to participating securities	$234,734	$190,509	$243,441
Earnings allocated to participating securities	474	356	477
Net income attributable to common shareholders after allocation of earnings to participating securities	$234,260	$190,153	$242,964
Earnings per share denominator:			
Weighted-average number of shares of common stock outstanding - basic and diluted	11,515	11,824	11,828
Earnings per share - basic and diluted	$20.34	$16.08	$20.54

5. Supplemental Cash Flow Information

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Cash paid during the year for			
Interest and financing expenses (net of capitalization)	$28,915	$20,376	$18,775
Income taxes	76,859	59,010	60,998
Supplemental disclosure of non-cash transactions:			
Release of deposit account funds to terminate interest rate swap	$0	$0	$21,868
Non-cash additions to property, plant, and equipment	3,076	11,209	8,762
Non-cash obligation under capital lease	0	1,341	4,810

50

Table of Contents
Notes to Consolidated Financial Statements

6. Trade and Other Accounts Receivable, Net

	December 31,	
(in thousands)	2018	2017
Trade receivables	$276,667	$310,941
Income tax receivables	12,210	7,455
Other	25,983	16,921
	$314,860	$335,317

7. Inventories

	December 31,	
(in thousands)	2018	2017
Finished goods and work-in-process	$319,120	$319,036
Raw materials	63,403	51,485
Stores, supplies, and other	13,818	12,576
	$396,341	$383,097

Our U.S. finished goods, work-in-process, and raw materials inventories, which are stated on the LIFO basis, amounted to $137 million at December 31, 2018, which was below replacement cost by approximately $56 million. At December 31, 2017, LIFO basis inventories were $128 million, which was approximately $49 million below replacement cost.

Our foreign inventories amounted to $248 million at December 31, 2018 and $244 million at December 31, 2017.

Reserves for obsolete and slow-moving inventory included in the table above were not material at December 31, 2018 or December 31, 2017.

8. Prepaid Expenses and Other Current Assets

	December 31,	
(in thousands)	2018	2017
Dividend funding	$17,923	$19,055
Income taxes on intercompany profit	6,431	6,866
Other	4,825	5,153
	$29,179	$31,074

Table of Contents
Notes to Consolidated Financial Statements

9. Property, Plant, and Equipment, at Cost

	December 31,	
(in thousands)	2018	2017
Land	$39,396	$42,067
Land improvements	54,937	45,144
Leasehold improvements	1,968	1,636
Buildings	166,566	170,624
Machinery and equipment	1,143,106	1,043,194
Construction in progress	20,140	172,297
	1,426,113	1,474,962
Less accumulated depreciation and amortization	781,975	822,681
Net property, plant, and equipment	$644,138	$652,281

We depreciate the cost of property, plant, and equipment by the straight-line method over the following estimated useful lives:

Land improvements	5 - 25 years
Buildings	10 - 48 years
Machinery and equipment	3 - 25 years

Depreciation expense was $63 million in 2018, $51 million in 2017, and $42 million in 2016.

During 2018, we identified fully depreciated property, plant, and equipment that is no longer in use and should have been written off in prior periods. During 2018, we reduced both the cost and the related accumulated depreciation and amortization of property, plant, and equipment by $90 million each. There was no impact to net property, plant, and equipment. Prior period amounts were not revised as the adjustments were not considered material.

10. Intangibles (Net of Amortization) and Goodwill

The net carrying amount of intangibles and goodwill was $136 million at December 31, 2018 and $144 million at December 31, 2017. The gross carrying amount and accumulated amortization of each type of intangible asset and goodwill are presented in the table below.

	December 31,			
	2018		2017	
(in thousands)	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortizing intangible assets				
Formulas and technology	$9,600	$ 3,250	$12,339	$ 3,280
Contract	2,000	400	2,000	200
Customer bases	14,240	9,091	15,759	5,140
Trademarks and trade names	0	0	1,531	1,213
Goodwill	122,940		122,541	
	$148,780	$ 12,741	$154,170	$ 9,833
Aggregate amortization expense		$ 7,413		$ 2,845

Aggregate amortization expense was $2 million in 2016. All of the intangibles relate to the petroleum additives segment. The change in the gross carrying amount between 2017 and 2018 is primarily due to disposal of certain intangible assets, an immaterial adjustment to goodwill related to AMSA, and foreign currency fluctuations. See Note 2 for further information on the AMSA acquisition.

There is no accumulated goodwill impairment.

52

Table of Contents
Notes to Consolidated Financial Statements

Estimated annual amortization expense related to our intangible assets for the next five years is expected to be (in thousands):

2019	$4,207
2020	2,907
2021	2,156
2022	1,423
2023	907

We amortize the contract over 10 years; customer bases over 4 years to 20 years; and formulas and technology over 3 years to 6 years.

11. Deferred Charges and Other Assets

	December 31,	
(in thousands)	2018	2017
Asbestos insurance receivables	$3,727	$3,767
Deferred financing costs, net of amortization	2,060	2,614
Other	4,091	4,657
	$9,878	$11,038

Deferred financing costs, net of amortization in the table above include only those costs associated with the revolving credit facility. The amount of deferred financing costs, net of amortization related to the 4.10% senior notes is reported as a component of long-term debt. See Note 13 for further information on our long-term debt.

12. Accrued Expenses

	December 31,	
(in thousands)	2018	2017
Employee benefits, payroll, and related taxes	$30,824	$36,252
Customer rebates	24,822	20,703
Taxes other than income and payroll	5,778	5,398
Capital projects	2,779	6,316
Other	26,999	39,330
	$91,202	$107,999

Table of Contents
Notes to Consolidated Financial Statements

13. Long-term Debt

(in thousands)	December 31, 2018	2017
Senior notes - 4.10% due 2022 (net of related deferred financing costs)	$ 347,677	$ 347,091
Senior notes - 3.78% due 2029	250,000	250,000
Revolving credit facility	168,129	0
Capital lease obligations	5,193	5,809
	$ 770,999	$ 602,900

4.10% Senior Notes – In 2012, we issued $350 million aggregate principal amount of 4.10% senior notes due 2022 at an issue price of 99.83%. The notes are senior unsecured obligations and are registered under the Securities Act of 1933. We incurred financing costs totaling approximately $5 million related to the 4.10% senior notes, which are being amortized over the term of the agreement.

The 4.10% senior notes rank:

- equal in right of payment with all of our existing and future senior unsecured indebtedness; and
- senior in right of payment to any of our future subordinated indebtedness.

The indenture governing the 4.10% senior notes contains covenants that, among other things, limit our ability and the ability of our subsidiaries to:

- create or permit to exist liens;
- enter into sale-leaseback transactions;
- incur additional guarantees; and
- sell all or substantially all of our assets or consolidate or merge with or into other companies.

We were in compliance with all covenants under the indenture governing the 4.10% senior notes as of December 31, 2018 and December 31, 2017.

3.78% Senior Notes – On January 4, 2017, we issued $250 million in senior unsecured notes in a private placement with The Prudential Insurance Company of America and certain other purchasers. These notes bear interest at 3.78% and mature on January 4, 2029. Interest is payable semiannually. Principal payments of $50 million are payable annually beginning on January 4, 2025. We have the right to make optional prepayments on the notes at any time, subject to certain limitations. The note purchase agreement contains representations, warranties, terms and conditions customary for transactions of this type. These include negative covenants, certain financial covenants and events of default which are substantially similar to the covenants and events of default in our revolving credit facility.

We were in compliance with all covenants under the 3.78% senior notes as of December 31, 2018 and December 31, 2017.

Revolving Credit Facility – On September 22, 2017, we entered into a Credit Agreement (Credit Agreement) with a term of five years. The Credit Agreement provides for an $850 million, multicurrency revolving credit facility, with a $150 million sublimit for multicurrency borrowings, a $75 million sublimit for letters of credit, and a $20 million sublimit for swingline loans. The Credit Agreement includes an expansion feature which allows us, subject to certain conditions, to request an increase to the aggregate amount of the revolving credit facility or obtain incremental term loans in an amount up to $425 million. In addition, the Credit Agreement includes provisions that allow certain of our foreign subsidiaries to borrow under the agreement. The obligations under the Credit Agreement are unsecured and are fully and unconditionally guaranteed by NewMarket. The revolving credit facility matures on September 22, 2022.

We incurred financing costs totaling $2.8 million related to the Credit Agreement, which are being amortized over the term of the agreement.

Table of Contents
Notes to Consolidated Financial Statements

At December 31, 2018, the outstanding borrowings under the Credit Agreement amounted to $168 million. There were no outstanding borrowings under the Credit Agreement at December 31, 2017. Outstanding letters of credit amounted to $3 million at both December 31, 2018 and December 31, 2017 resulting in the unused portion of the credit facility amounting to $679 million at December 31, 2018 and $847 million at December 31, 2017.
Borrowings made under the revolving credit facility bear interest, at our option, at an annual rate equal to either (1) the Alternate Base Rate (ABR) plus the Applicable Rate (as defined in the Credit Agreement) (solely in the case of loans denominated in U.S. dollars to NewMarket) or (2) the Adjusted LIBO Rate plus the Applicable Rate. The ABR is the greater of (i) the rate of interest publicly announced by the Administrative Agent as its prime rate, (ii) the NYFRB Rate (as defined in the Credit Agreement) from time to time plus 0.5%, and (iii) the Adjusted LIBO Rate for a one month interest period plus 1%. The Adjusted LIBO Rate means the rate at which Eurocurrency deposits in the London interbank market for certain periods (as selected by NewMarket) are quoted, as adjusted for statutory reserve requirements for Eurocurrency liabilities and other applicable mandatory costs. The Applicable Rate ranges from 0.0% to 0.625% (depending on our consolidated Leverage Ratio or Credit Ratings) for loans bearing interest based on the ABR. The Applicable Rate ranges from 1.00% to 1.625% (depending on our Leverage Ratio or Credit Ratings) for loans bearing interest based on the Adjusted LIBO Rate. At December 31, 2018, the Applicable Rate was 0.25% for loans bearing interest based on the ABR and 1.25% for loans bearing interest based on the Adjusted LIBO Rate.
The average interest rate for borrowings under our revolving credit facilities was 3.0% during 2018 and 2.5% during 2017.
The Credit Agreement contains financial covenants that require NewMarket to maintain a consolidated Leverage Ratio (as defined in the Credit Agreement) of no more than 3.50 to 1.00 except during an Increased Leverage Period (as defined in the Credit Agreement) at the end of each quarter, and a consolidated Interest Coverage Ratio (as defined in the Credit Agreement) of no less than 3.00 to 1.00, calculated on a rolling four quarter basis, as of the end of each fiscal quarter.
We were in compliance with all covenants under the revolving credit facility at December 31, 2018 and at December 31, 2017.
Capital Lease Obligations – The capital lease obligations are related to the Singapore manufacturing facility.

14. Other Noncurrent Liabilities

	December 31,	
(in thousands)	2018	2017
Employee benefits	$81,473	$89,116
Deferred income taxes	43,071	35,303
Environmental remediation	9,854	11,753
Asbestos litigation reserve	8,296	8,251
Deemed repatriation of earnings	2,956	26,901
Other	19,417	19,488
	$165,067	$190,812

Table of Contents
Notes to Consolidated Financial Statements

15. Stock-based Compensation

The 2014 Incentive Compensation and Stock Plan (the Plan) was approved on April 24, 2014. Any employee of our company or an affiliate or a person who is a member of our Board of Directors or the board of directors of an affiliate is eligible to participate in the Plan if the Compensation Committee of the Board of Directors (the Administrator), in its sole discretion, determines that such person has contributed or can be expected to contribute to the profits or growth of our company or its affiliates (each, a participant). Under the terms of the Plan, we may grant participants stock awards, incentive awards, stock units, or options (which may be either incentive stock options or nonqualified stock options), or stock appreciation rights (SARs), which may be granted with a related option. Stock options entitle the participant to purchase a specified number of shares of our common stock at a price that is fixed by the Administrator at the time the option is granted; provided, however, that the price cannot be less than the shares' fair market value on the date of grant. The maximum period in which an option may be exercised is fixed by the Administrator at the time the option is granted but, in the case of an incentive stock option, cannot exceed ten years. No participant may be granted or awarded, in any calendar year, shares, options, SARs, or stock units covering more than 200,000 shares of our common stock in the aggregate. For purposes of this limitation and the individual limitation on the grant of options, an option and corresponding SAR are treated as a single award.

The maximum aggregate number of shares of our common stock that may be issued under the Plan is 1,000,000. At December 31, 2018, 964,036 shares were available for grant. During 2018, we granted 1,110 shares to five of our non-employee directors, which vested immediately.

A summary of activity during 2018 related to NewMarket's restricted stock and restricted stock units (stock awards) is presented below in whole shares:

	Number of Shares	Weighted Average Grant-Date Fair Value
Unvested stock awards at January 1, 2018	17,637	$ 397.18
Granted in 2018	9,357	415.98
Vested in 2018	6,714	375.65
Forfeited in 2018	952	381.68
Unvested stock awards at December 31, 2018	19,328	414.52

The weighted average grant-date fair value was $428.61 for stock awards granted in 2017. No awards were granted in 2016. The fair value of shares vested was $3 million in 2018, $3 million in 2017, and $3 million in 2016. We recognized compensation expense of $2 million in 2018, $3 million in 2017, and $3 million in 2016 related to stock awards. At December 31, 2018, total unrecognized compensation expense related to stock awards was $4 million, which is expected to be recognized over a period of 2.5 years.

Table of Contents
Notes to Consolidated Financial Statements

16. Fair Value Measurements

The carrying amount of cash and cash equivalents in the Consolidated Balance Sheets, as well as the fair value, was $73 million at December 31, 2018 and $84 million at December 31, 2017. The fair value is categorized in Level 1 of the fair value hierarchy.

No material events occurred during 2018 requiring adjustment to the recognized balances of assets or liabilities which are recorded at fair value on a nonrecurring basis.

Long-term debt - We record the carrying amount of our long-term debt at historical cost, less deferred financing costs related to the 4.10% senior notes. The estimated fair value of our long-term debt is shown in the table below and is based primarily on estimated current rates available to us for debt of the same remaining duration and adjusted for nonperformance risk and credit risk. The estimated fair value of our publicly traded 4.10% senior notes included in long-term debt in the table below is based on the last quoted price closest to December 31, 2018. The fair value of our debt instruments is categorized as Level 2.

	December 31, 2018		December 31, 2017	
(in thousands)	Carrying Amount	Fair Value	Carrying Amount	Fair Value
Long-term debt (excluding capital lease obligations)	$765,806	$757,414	$597,091	$623,557

17. Commitments and Contingencies

Contractual Commitments—NewMarket has operating lease agreements primarily for office space, land, transportation equipment, and storage facilities. Rental expense was $23 million in 2018, $33 million in 2017, and $33 million in 2016.

Future lease payments for all noncancelable operating leases as of December 31, 2018 are (in thousands):

2019	$17,223
2020	15,035
2021	10,502
2022	7,957
2023	6,810
After 2023	24,490

We have contractual obligations for the construction of assets, as well as purchases of property and equipment, of approximately $12 million at December 31, 2018, all of which are due within five years.

Purchase Obligations—We have purchase obligations for goods or services that are enforceable, legally binding, and specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum, or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable without penalty. Purchase orders made in the ordinary course of business are excluded from this amount. Any amounts for which we are liable under purchase orders are reflected in our Consolidated Balance Sheets as accounts payable or accrued expenses.

Table of Contents
Notes to Consolidated Financial Statements

Future payments for purchase obligations as of December 31, 2018 are (in thousands):

2019	$168,932
2020	148,772
2021	145,230
2022	134,573
2023	78,211
After 2023	17,138

Litigation—We are involved in legal proceedings that are incidental to our business and may include administrative or judicial actions. Some of these legal proceedings involve governmental authorities and relate to environmental matters. For further information, see Environmental below and Item 1 of this Form 10-K.

While it is not possible to predict or determine with certainty the outcome of any legal proceeding, we believe the outcome of any of these proceedings, or all of them combined, will not result in a material adverse effect on our consolidated results of operations, financial condition, or cash flows.

In late 2013, Afton initiated a voluntary self-audit of its compliance with certain sections of the USEPA Audit Policy. Afton concluded its self-audit, sending its notice of this conclusion to the USEPA on August 1, 2018. Any known potential findings and/or violations were disclosed on or before the conclusion of the self-audit. In August 2014, the USEPA staff began its own TSCA inspection of both Afton and Ethyl. To date, however, the USEPA has not notified Afton or Ethyl of any findings, violations, or the conclusion of this inspection. While it is not possible to predict or determine with certainty the outcomes of Afton's self-audit or the USEPA's inspection, we do not believe that any disclosures or findings identified as a result of Afton's self-audit or the USEPA’s TSCA inspection will have a material adverse effect on our consolidated results of operations, financial condition, or cash flows.

Asbestos

We are a defendant in personal injury lawsuits involving exposure to asbestos. These cases involve exposure to asbestos in premises owned or operated, or formerly owned or operated, by subsidiaries of NewMarket. We have never manufactured, sold, or distributed products that contain asbestos. Nearly all of these cases are pending in Texas, Louisiana, or Illinois and involve multiple defendants. We maintain an accrual for these proceedings, as well as a receivable for expected insurance recoveries.

The accrual for our premises asbestos liability related to currently asserted claims is based on the following assumptions and factors:

- We are often one of many defendants. This factor influences both the number of claims settled against us and the indemnity cost associated with such resolutions.
- The estimated percent of claimants in each case that, after discovery, will actually make a claim against us, out of the total number of claimants in a case, is based on a level consistent with past experience and current trends.
- We utilize average comparable plaintiff cost history as the basis for estimating pending premises asbestos related claims. These claims are filed by both former contractors and former employees who worked at past and present company locations. We also include an estimated inflation factor in the calculation.
- No estimate is made for unasserted claims.
- The estimated recoveries from insurance and Albemarle Corporation (a former operation of our company) for these cases are based on, and are consistent with, the 2005 settlement agreements with Travelers Indemnity Company.

Table of Contents
Notes to Consolidated Financial Statements

Based on the above assumptions, we have provided an undiscounted liability related to premises asbestos claims of $10 million at both December 31, 2018 and December 31, 2017. The liabilities related to asbestos claims are included in accrued expenses (current portion) and other noncurrent liabilities on the Consolidated Balance Sheets. Certain of these costs are recoverable through the settlement agreement with The Travelers Indemnity Company, as well as an agreement with Albemarle Corporation. The receivable for these recoveries related to premises asbestos liabilities was $5 million at both December 31, 2018 and December 31, 2017. These receivables are included in trade and other accounts receivable, net on the Consolidated Balance Sheets for the current portion. The noncurrent portion is included in deferred charges and other assets.

Environmental—We are involved in environmental proceedings and potential proceedings relating to soil and groundwater contamination, disposal of hazardous waste, and other environmental matters at several of our current or former facilities, or at third-party sites where we have been designated as a potentially responsible party (PRP). While we believe we are currently adequately accrued for known environmental issues, it is possible that unexpected future costs could have a significant impact on our financial position, results of operations, and cash flows. Our total accruals for environmental remediation, dismantling, and decontamination were approximately $12 million at December 31, 2018 and $14 million at December 31, 2017. Of the total accrual, the current portion is included in accrued expenses and the noncurrent portion is included in other noncurrent liabilities on the Consolidated Balance Sheets.

Our more significant environmental sites include a former plant site in Louisiana (the Louisiana site) and a Houston, Texas plant site (the Texas site). Together, the amounts accrued on a discounted basis related to these sites represented approximately $8 million of the total accrual above at December 31, 2018, using discount rates ranging from 3% to 9%, and $7 million of the total accrual above at December 31, 2017, using discount rates ranging from 4% to 9%. The aggregate undiscounted amount for these sites was $11 million at December 31, 2018 and $10 million at December 31, 2017. Of the total accrued for these two sites, the amount related to remediation of groundwater and soil was $4 million for the Louisiana site and $4 million for the Texas site at December 31, 2018 and $3 million for the Louisiana site and $4 million for the Texas site at December 31, 2017.

In 2000, the EPA named us as a PRP under Superfund law for the clean-up of soil and groundwater contamination at the five grouped disposal sites known as "Sauget Area 2 Sites" in Sauget, Illinois. Without admitting any fact, responsibility, fault, or liability in connection with this site, in November 2018, we resolved our purported liabilities with the government and those PRP's performing the remedial activities addressed in the EPA's December 2013 Record of Decision.

18. Pension Plans and Other Postretirement Benefits

NewMarket uses a December 31 measurement date for all of our plans.

U.S. Retirement Plans

NewMarket sponsors four pension plans for all full-time U.S. employees that offer a benefit based primarily on years of service and compensation. Employees do not contribute to these pension plans. The plans are as follows:

- Salaried employees pension plan;
- Afton pension plan for union employees (the Sauget plan);
- NewMarket retirement income plan for union employees in Houston, Texas (the Houston plan); and
- Afton Chemical Additives pension plan for union employees in Port Arthur, Texas (the Port Arthur plan).

Table of Contents
Notes to Consolidated Financial Statements

In addition, we offer an unfunded, nonqualified supplemental pension plan. This plan restores the pension benefits from our regular pension plans that would have been payable to designated participants if it were not for limitations imposed by U.S. federal income tax regulations.

We also provide postretirement health care benefits and life insurance to eligible retired employees. A plan amendment, with an effective date of January 1, 2016, was made in 2015 to provide post-65 medical and prescription drug benefits to retirees through a private healthcare exchange with fixed subsidies to eligible retirees through a health reimbursement account. As a result, the postretirement plan liabilities were remeasured at September 1, 2015 resulting in a non-cash improvement in the funded position. The adjustment to accumulated other comprehensive loss is reflected in prior service cost (credit) and is being amortized into expense.

The service cost component of net periodic benefit cost (income) is reflected in cost of goods sold; selling, general, and administrative expenses; or research, development, and testing expenses, to reflect where other compensation costs arising from services rendered by the pertinent employee are recorded on the Consolidated Statements of Income. The remaining components of net periodic benefit cost (income) are recorded in other income (expense), net on the Consolidated Statements of Income.

The components of net periodic pension and postretirement benefit cost (income), as well as other amounts recognized in other comprehensive income (loss), are shown below.

	Years Ended December 31,					
	Pension Benefits			Postretirement Benefits		
(in thousands)	2018	2017	2016	2018	2017	2016
Net periodic benefit cost (income)						
Service cost	$15,391	$13,679	$12,860	$896	$774	$705
Interest cost	13,256	13,289	13,175	1,458	1,582	1,653
Expected return on plan assets	(29,883)	(26,146)	(23,137)	(969)	(1,197)	(1,239)
Amortization of prior service cost (credit)	25	26	187	(3,028)	(3,029)	(3,028)
Amortization of actuarial net (gain) loss	5,139	4,725	5,243	0	0	0
Net periodic benefit cost (income)	3,928	5,573	8,328	(1,643)	(1,870)	(1,909)
Other changes in plan assets and benefit obligations recognized in other comprehensive income (loss)						
Actuarial net (gain) loss	29,215	(13,386)	9,140	(2,190)	2,635	156
Prior service cost (credit)	0	0	749	0	0	0
Amortization of actuarial net gain (loss)	(5,139)	(4,725)	(5,243)	0	0	0
Amortization of prior service (cost) credit	(25)	(26)	(187)	3,028	3,029	3,028
Total recognized in other comprehensive income (loss)	24,051	(18,137)	4,459	838	5,664	3,184
Total recognized in net periodic benefit cost (income) and other comprehensive income (loss)	$27,979	$(12,564)	$12,787	$(805)	$3,794	$1,275

The estimated actuarial net loss to be amortized from accumulated other comprehensive loss into net periodic benefit cost (income) during 2019 is expected to be $3 million for pension plans. The estimated prior service credit to be amortized from accumulated other comprehensive loss into net periodic benefit cost (income) during 2019 is not expected to be material for pension plans. The estimated prior service credit to be amortized from accumulated other comprehensive loss into net periodic benefit cost (income) during 2019 related to postretirement benefits is expected to be $3 million.

Table of Contents
Notes to Consolidated Financial Statements

Changes in the plans' benefit obligations and assets follow.

	December 31,			
	Pension Benefits		Postretirement Benefits	
(in thousands)	2018	2017	2018	2017
Change in benefit obligation				
Benefit obligation at beginning of year	$358,812	$316,366	$40,438	$38,110
Service cost	15,391	13,679	896	774
Interest cost	13,256	13,289	1,458	1,582
Actuarial net (gain) loss	(26,957)	25,828	(2,355)	2,506
Benefits paid	(11,290)	(10,350)	(2,925)	(2,534)
Benefit obligation at end of year	349,212	358,812	37,512	40,438
Change in plan assets				
Fair value of plan assets at beginning of year	365,421	291,092	22,904	23,238
Actual return on plan assets	(26,289)	65,360	803	1,067
Employer contributions	56,710	19,319	1,596	1,133
Benefits paid	(11,290)	(10,350)	(2,925)	(2,534)
Fair value of plan assets at end of year	384,552	365,421	22,378	22,904
Funded status	$35,340	$6,609	$(15,134)	$(17,534)
Amounts recognized in the Consolidated Balance Sheets				
Noncurrent assets	$75,206	$48,515	$0	$0
Current liabilities	(2,788)	(2,793)	(1,215)	(1,278)
Noncurrent liabilities	(37,078)	(39,113)	(13,919)	(16,256)
	$35,340	$6,609	$(15,134)	$(17,534)
Amounts recognized in accumulated other comprehensive loss				
Actuarial net (gain) loss	$113,026	$88,950	$(480)	$1,710
Prior service cost (credit)	7	32	(25,675)	(28,703)
	$113,033	$88,982	$(26,155)	$(26,993)

The accumulated benefit obligation for all domestic defined benefit pension plans was $303 million at December 31, 2018 and $307 million at December 31, 2017.

The fair market value of plan assets exceeded the accumulated benefit obligation for all domestic plans, except the nonqualified plan, at December 31, 2018 and December 31, 2017. The fair market value of plan assets exceeded the projected benefit obligation for all domestic plans, except the nonqualified plan, at December 31, 2018 and December 31, 2017.

The net asset position for plans in which assets exceeded the projected benefit obligation is included in prepaid pension cost on the Consolidated Balance Sheets. The net liability position of plans in which the projected benefit obligation exceeded assets is included in other noncurrent liabilities on the Consolidated Balance Sheets.

A portion of the accrued benefit cost for the nonqualified plan is included in current liabilities at both December 31, 2018 and December 31, 2017. As the nonqualified plan is unfunded, the amount reflected in current liabilities represents the expected benefit payments related to the nonqualified plan during 2019.

Table of Contents
Notes to Consolidated Financial Statements

The first table below shows information on domestic pension plans with the accumulated benefit obligation in excess of plan assets. The second table presents information on domestic pension plans with the projected benefit obligation in excess of plan assets.

(in thousands)	December 31, 2018	2017
Plans with the accumulated benefit obligation in excess of the fair market value of plan assets		
Projected benefit obligation	$39,866	$41,906
Accumulated benefit obligation	36,586	38,105
Fair market value of plan assets	0	0

(in thousands)	December 31, 2018	2017
Plans with the projected benefit obligation in excess of the fair market value of plan assets		
Projected benefit obligation	$ 39,866	$ 41,906
Fair market value of plan assets	0	0

There are no assets held by the trustee for the retired beneficiaries of the nonqualified plan. Payments to retired beneficiaries of the nonqualified plan are made with cash from operations.

Assumptions—We used the following assumptions to calculate the results of our retirement plans:

	Pension Benefits			Postretirement Benefits		
	2018	2017	2016	2018	2017	2016
Weighted-average assumptions used to determine net periodic benefit cost (income) for years ended December 31,						
Discount rate	3.75%	4.25%	4.50%	3.75%	4.25%	4.50%
Expected long-term rate of return on plan assets	8.50%	8.50%	8.50%	4.50%	5.50%	5.50%
Rate of projected compensation increase	3.50%	3.50%	3.50%			
Weighted-average assumptions used to determine benefit obligations at December 31,						
Discount rate	4.25%	3.75%	4.25%	4.25%	3.75%	4.25%
Rate of projected compensation increase	3.50%	3.50%	3.50%			

For pension plans, we base the assumed expected long-term rate of return for plan assets on an analysis of our actual investments, including our asset allocation, as well as an analysis of expected returns. This analysis reflects the expected long-term rates of return for each significant asset class and economic indicator. As of January 1, 2019, the expected rates were 8.5% for U.S. large cap stocks, 4.5% for fixed income, and 3.4% for inflation. The range of returns relies both on forecasts and on broad-market historical benchmarks for expected return, correlation, and volatility for each asset class. Our asset allocation is predominantly weighted toward equities. Through our ongoing monitoring of our investments and review of market data, we have determined that we should maintain the expected long-term rate of return for our U.S. plans at 8.5% at December 31, 2018. For the postretirement plan, we based the assumed expected long-term rate of return for plan assets on an evaluation of projected interest rates, as well as the guaranteed interest rate for our insurance contract.

62

Table of Contents
Notes to Consolidated Financial Statements

Plan Assets—Pension plan assets are held and distributed by trusts and consist principally of equity securities and investment-grade fixed income securities. We invest directly in equity securities, as well as in funds which primarily hold equity and debt securities. Our target allocation is 90% to 97% in equities, 3% to 10% in debt securities and 1% to 5% in cash.

The pension obligation is long-term in nature and the investment philosophy followed by the Pension Investment Committee is likewise long-term in its approach. The majority of the pension funds are invested in equity securities as historically, equity securities have outperformed debt securities and cash investments, resulting in a higher investment return over the long-term. While in the short-term, equity securities may underperform other investment classes, we are less concerned with short-term results and more concerned with long-term improvement. The pension funds are managed by five different investment companies who predominantly invest in U.S. and international equities. Each investment company's performance is reviewed quarterly. A small portion of the funds is in investments such as cash or short-term bonds, which historically has been less vulnerable to short-term market swings. These funds are used to provide the cash needed to meet our monthly obligations.

There are no significant concentrations of risk within plan assets, nor do the equity securities include any NewMarket common stock for any year presented.

The assets of the postretirement benefit plan are invested completely in an insurance contract held by Metropolitan Life. No NewMarket common stock is included in these assets.

The following table provides information on the fair value of our pension and postretirement benefit plans assets, as well as the related level within the fair value hierarchy. Investments that are measured at fair value using the net asset value per share (or its equivalent) practical expedient have not been classified by level in the fair value hierarchy.

	December 31, 2018				December 31, 2017			
		Fair Value Measurements Using				Fair Value Measurements Using		
(in thousands)	Fair Value	Level 1	Level 2	Level 3	Fair Value	Level 1	Level 2	Level 3
Pension Plans								
Equity securities:								
U. S. companies	$274,972	$274,972	$0	$ 0	$286,103	$286,103	$0	$ 0
International companies	4,223	4,223	0	0	2,074	2,074	0	0
Real estate investment trusts	5,745	5,745	0	0	3,487	3,487	0	0
Money market instruments	13,099	13,099	0	0	18,395	18,395	0	0
Pooled investment funds:								
Fixed income securities—mutual funds	9,039	9,039	0	0	8,958	8,958	0	0
International equities—mutual fund	14,302	14,302	0	0	16,715	16,715	0	0
Common collective trusts measured at net asset value	61,254				26,084			
Insurance contract	1,918	0	1,918	0	3,605	0	3,605	0
	$384,552	$321,380	$1,918	$ 0	$365,421	$335,732	$3,605	$ 0
Postretirement Plans								
Insurance contract	$22,378	$0	$22,378	$ 0	$22,904	$0	$22,904	$ 0

Table of Contents
Notes to Consolidated Financial Statements

The valuation methodologies used to develop the fair value measurements for the investments in the table above is outlined below. There have been no changes in the valuation techniques used to value the investments.

- Equity securities, including common stock and real estate investment trusts, are valued at the closing price reported on a national exchange.
- Money market instruments are valued at cost, which approximates fair value.
- Pooled investment funds—Mutual funds are valued at the closing price reported on a national exchange.
- The common collective trusts (the trusts) are valued at the net asset value of units held based on the quoted market value of the underlying investments held by the funds. One of the trusts invests primarily in a diversified portfolio of equity securities of companies located outside of the United States and Canada, as determined by a company's jurisdiction of incorporation. We may make withdrawals from this trust on the first business day of each month with at least ten business days' notice. Another trust invests primarily in a diversified portfolio of equity securities included in the S&P 500 index and a third trust invests primarily in a diversified portfolio of equity securities included in the Russell 1000 Value index. There are no restrictions on redemption for the index trusts and there were no unfunded commitments.
- Cash and cash equivalents are valued at cost.
- The insurance contracts are unallocated funds deposited with an insurance company and are stated at an amount equal to the sum of all amounts deposited less the sum of all amounts withdrawn, adjusted for investment return.

Cash Flows—For U.S. plans, NewMarket expects to contribute $3 million to our pension plans and $1 million to our postretirement benefit plan in 2019. The expected benefit payments for the next ten years are as follows.

(in thousands)	Expected Pension Benefit Payments	Expected Postretirement Benefit Payments
2019	$ 12,166	$ 2,616
2020	13,254	2,477
2021	14,293	2,366
2022	15,327	2,262
2023	16,307	2,164
2024 through 2028	98,861	10,065

Foreign Retirement Plans

For most employees of our foreign subsidiaries, NewMarket has defined benefit pension plans that offer benefits based primarily on years of service and compensation. These defined benefit plans provide benefits for employees of our foreign subsidiaries located in Belgium, the United Kingdom, Germany, Canada, and Mexico. NewMarket generally contributes to investment trusts and insurance accounts to provide for these plans.

Table of Contents
Notes to Consolidated Financial Statements

The components of net periodic pension cost (income), as well as other amounts recognized in other comprehensive income (loss), for these foreign defined benefit pension plans are shown below.

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Net periodic benefit cost (income)			
Service cost	$7,271	$7,437	$6,926
Interest cost	4,514	4,314	4,915
Expected return on plan assets	(9,918)	(8,479)	(6,638)
Amortization of prior service cost (credit)	(81)	(79)	(83)
Amortization of actuarial net (gain) loss	597	959	1,021
Net periodic benefit cost (income)	2,383	4,152	6,141
Other changes in plan assets and benefit obligations recognized in other comprehensive income (loss)			
Actuarial net (gain) loss	4,532	(3,029)	3,215
Prior service cost (credit)	537	0	0
Amortization of actuarial net gain (loss)	(597)	(959)	(1,021)
Amortization of prior service (cost) credit	81	79	83
Total recognized in other comprehensive income (loss)	4,553	(3,909)	2,277
Total recognized in net periodic benefit cost (income) and other comprehensive income (loss)	$6,936	$243	$8,418

The estimated actuarial net loss to be amortized from accumulated other comprehensive loss into net periodic benefit cost (income) during 2019 is expected to be $1 million. The estimated prior service credit to be amortized from accumulated other comprehensive loss into net periodic benefit cost (income) during 2019 is not expected to be material.

Changes in the benefit obligations and assets of the foreign defined benefit pension plans follow.

Table of Contents
Notes to Consolidated Financial Statements

	December 31,	
(in thousands)	2018	2017
Change in benefit obligation		
Benefit obligation at beginning of year	$185,815	$157,101
Service cost	7,271	7,437
Interest cost	4,514	4,314
Acquisition	0	1,888
Employee contributions	737	766
Actuarial net (gain) loss	(10,976)	2,417
Benefits paid	(4,144)	(5,157)
Foreign currency translation	(9,597)	17,049
Benefit obligation at end of year	173,620	185,815
Change in plan assets		
Fair value of plan assets at beginning of year	176,968	144,877
Actual return on plan assets	(6,357)	13,778
Employer contributions	5,968	5,646
Employee contributions	737	766
Benefits paid	(4,144)	(5,157)
Acquisition	0	1,910
Foreign currency translation	(9,426)	15,148
Fair value of plan assets at end of year	163,746	176,968
Funded status	$(9,874)	$(8,847)
Amounts recognized in the Consolidated Balance Sheets		
Noncurrent assets	$13,499	$17,980
Current liabilities	(301)	(346)
Noncurrent liabilities	(23,072)	(26,481)
	$(9,874)	$(8,847)
Amounts recognized in accumulated other comprehensive loss		
Actuarial net (gain) loss	$42,766	$38,831
Prior service cost (credit)	736	118
	$43,502	$38,949

The accumulated benefit obligation for all foreign defined benefit pension plans was $146 million at December 31, 2018 and $155 million at December 31, 2017.

The fair market value of plan assets exceeded both the accumulated benefit obligation and projected benefit obligation for the United Kingdom and the Canadian Salary plans at both year-end 2018 and 2017. The net asset position of the United Kingdom and Canadian Salary plans are included in prepaid pension cost on the Consolidated Balance Sheets at December 31, 2018 and December 31, 2017. The accumulated benefit obligation and projected benefit obligation exceeded the fair market value of plan assets for the German and Belgian plans at December 31, 2018 and December 31, 2017. For the two Mexican plans, the fair market value of plan assets exceeded the accumulated benefit obligation but not the projected benefit obligation at both December 31, 2018 and December 31, 2017. The accrued benefit cost of these plans is included in other noncurrent liabilities on the Consolidated Balance Sheets.

Table of Contents
Notes to Consolidated Financial Statements

As the German plan is unfunded, a portion of the accrued benefit cost for the German plan is included in current liabilities at year-end 2018 and 2017, reflecting the expected benefit payments related to the plan for the following year.

The first table below shows information on foreign pension plans with the accumulated benefit obligation in excess of plan assets. The second table shows information on foreign pension plans with the projected benefit obligation in excess of plan assets.

	December 31,	
(in thousands)	2018	2017
Plans with the accumulated benefit obligation in excess of the fair market value of plan assets		
Projected benefit obligation	$33,730	$36,687
Accumulated benefit obligation	22,803	23,704
Fair market value of plan assets	10,618	10,151

	December 31,	
(in thousands)	2018	2017
Plans with the projected benefit obligation in excess of the fair market value of plan assets		
Projected benefit obligation	$ 35,970	$ 39,074
Fair market value of plan assets	12,597	12,247

Assumptions—The information in the table below provides the weighted-average assumptions used to calculate the results of our foreign defined benefit pension plans.

	2018	2017	2016
Weighted-average assumptions used to determine net periodic benefit cost (income) for the years ended December 31,			
Discount rate	2.36%	2.53%	3.58%
Expected long-term rate of return on plan assets	5.50%	5.50%	5.10%
Rate of projected compensation increase	4.14%	4.20%	4.28%
Weighted-average assumptions used to determine benefit obligations at December 31,			
Discount rate	2.67%	2.36%	2.53%
Rate of projected compensation increase	4.10%	4.14%	4.20%

The actuarial assumptions used by the various foreign locations are based upon the circumstances of each particular country and pension plan. The factors impacting the determination of the long-term rate of return for a particular foreign pension plan include the market conditions within a particular country, as well as the investment strategy and asset allocation of the specific plan.

Plan Assets—Pension plan assets vary by foreign location and plan. Assets are held and distributed by trusts and, depending upon the foreign location and plan, consist primarily of pooled equity funds, pooled debt securities funds, pooled diversified funds, equity securities, debt securities, cash, and insurance contracts. The combined weighted-average target allocation of our foreign pension plans is 38% in equities (including pooled funds), 36% in debt securities (including pooled funds), 7% in insurance contracts, and 19% in pooled diversified funds.

Table of Contents
Notes to Consolidated Financial Statements

While the pension obligation is long-term in nature for each of our foreign plans, the investment strategies followed by each plan vary to some degree based upon the laws of a particular country, as well as the provisions of the specific pension trust. The United Kingdom and Canadian plans are invested predominantly in equity securities funds, diversified funds, and debt securities funds. The funds of these plans are managed by various trustees and investment companies whose performance is reviewed throughout the year. The Belgian plan is invested in an insurance contract. The Mexican plans are invested in various mutual funds, equities, and debt securities. The German plan has no assets. There are no significant concentrations of risk within plan assets, nor do the equity securities include any NewMarket common stock for any year presented.

The following table provides information on the fair value of our foreign pension plans assets, as well as the related level within the fair value hierarchy. Investments that are measured at fair value using net asset value per share (or its equivalent) have not been classified by level in the fair value hierarchy.

	December 31, 2018				December 31, 2017			
		Fair Value Measurements Using				Fair Value Measurements Using		
(in thousands)	Fair Value	Level 1	Level 2	Level 3	Fair Value	Level 1	Level 2	Level 3
Insurance contract	$10,618	$0	$10,618	$ 0	$10,151	$0	$10,151	$ 0
Equity securities—international companies	684	684	0	0	755	755	0	0
Debt securities	756	698	58	0	872	801	71	0
Pooled investment funds—mutual funds	538	538	0	0	469	469	0	0
Cash and cash equivalents	66	66	0	0	825	825	0	0
Pooled investment funds (measured at net asset value):								
Equity securities—U.S. companies	10,294				10,621			
Equity securities—international companies	49,610				56,803			
Debt securities	60,480				63,007			
Diversified growth funds	30,700				33,465			
	$163,746	$1,986	$10,676	$ 0	$176,968	$2,850	$10,222	$ 0

The valuation methodologies used to develop the fair value measurements for the investments in the table above are outlined below. There have been no changes in the valuation techniques used to value the investments.

- The insurance contract represents funds deposited with an insurance company and is stated at an amount equal to the sum of all amounts deposited less the sum of all amounts withdrawn, adjusted for investment return.
- Equity securities are valued at the closing price reported on a national exchange.
- Debt securities are valued by quoted market prices or valued based on yields currently available on comparable securities of issuers with similar credit ratings.
- Pooled investment funds that are mutual funds are valued at the closing price reported on a national exchange.
- Cash and cash equivalents are valued at cost.

Table of Contents
Notes to Consolidated Financial Statements

The pooled investment funds are valued at the net asset value of units held by the plans based on the quoted market value of the underlying investments held by the fund. The United Kingdom pension plan is invested in units of life insurance policies that are linked to equity securities funds, government bond funds and diversified growth funds. The underlying assets of the equity funds, bond funds, and diversified growth funds are traded on a national exchange and are based on tracking various indices of the London Stock Exchange. There are no redemption restrictions on these funds. There were no unfunded commitments for the United Kingdom pension plan funds. The Canadian pension plan is invested in a pooled Canadian equity fund and a pooled diversified fund. The Canadian equity fund invests in a diversification (sector and industry) of equities listed on a recognized Canadian exchange. The diversified fund invests in a diversified mix of equities, fixed income securities, cash, and cash equivalent securities. There are no redemption restrictions on the pooled Canadian funds and there were no unfunded commitments.

Cash Flows—For foreign pension plans, NewMarket expects to contribute $6 million to the plans in 2019. The expected benefit payments for the next ten years for our foreign pension plans are shown in the table below.

(in thousands)	Expected Pension Benefit Payments
2019	$ 3,937
2020	4,209
2021	4,280
2022	3,499
2023	5,153
2024 through 2028	27,292

Table of Contents
Notes to Consolidated Financial Statements

19. Income Taxes

On December 22, 2017, the U.S. enacted tax legislation commonly known as the Tax Cuts and Jobs Act (Tax Reform Act), which required a one-time transition tax in 2017 on the deemed repatriation of previously deferred foreign earnings and reduced the U.S. corporate tax rate to 21% beginning in 2018. In addition, the Tax Reform Act included several provisions effective in 2018 which impact NewMarket, including the global intangible low-taxed income (GILTI) inclusion from foreign subsidiaries and the foreign-derived intangible income deduction. We have elected to account for the impact of the tax on GILTI in the period in which it is incurred.

We recognized $31 million of income tax expense in the fourth quarter of 2017, as a result of the Tax Reform Act. This provisional expense included $32 million relating to the one-time tax on deferred foreign earnings, which we elected to pay over an eight-year period, partially offset by $1 million of reductions to deferred tax liabilities.

During the fourth quarter of 2018, we completed the accounting for the impact of the Tax Reform Act. We recorded $1 million of additional tax on previously deferred foreign earnings, which was offset by $8 million of reductions to deferred tax liabilities, as a result of the decrease in the U.S. corporate tax rate. These changes are the result of additional analysis, changes in previous interpretations and assumptions, additional regulatory guidance issued during 2018, and actions we took as a result of the Tax Reform Act. As of December 31, 2018, we have a remaining liability of $3 million associated with the one-time tax on the deemed repatriation of foreign earnings, which is recorded in other noncurrent liabilities.

Our income before income tax expense, as well as our provision for income taxes is shown in the table below.

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Income before income tax expense			
Domestic	$157,459	$140,779	$161,687
Foreign	132,826	174,663	181,521
	$290,285	$315,442	$343,208
Income tax expense			
Current income taxes			
Federal	$9,153	$61,188	$34,213
State	4,679	3,942	9,020
Foreign	27,192	32,428	37,349
	41,024	97,558	80,582
Deferred income taxes			
Federal	16,545	15,901	13,876
State	2,888	3,633	3,095
Foreign	(4,906)	7,841	2,214
	14,527	27,375	19,185
Total income tax expense	$55,551	$124,933	$99,767

Table of Contents
Notes to Consolidated Financial Statements

The reconciliation of the U.S. federal statutory rate to the effective income tax rate follows.

	% of Income Before Income Tax Expense		
	2018	2017	2016
Federal statutory rate	21.0 %	35.0 %	35.0 %
State taxes, net of federal tax	2.1	1.6	2.3
Foreign operations	(0.9)	(4.4)	(5.8)
Domestic research tax credit	(1.5)	(1.1)	(1.2)
Foreign-derived intangible tax benefit	(2.4)	0.0	0.0
U.S. minimum tax on foreign income	1.5	0.0	0.0
Domestic manufacturing tax benefit	0.0	(0.8)	(0.8)
Deemed repatriation of foreign earnings	0.5	10.1	0.0
Change in U.S. tax rate	(2.0)	0.2	0.0
Other items and adjustments	0.8	(1.0)	(0.4)
Effective income tax rate	19.1 %	39.6 %	29.1 %

Our deferred income tax assets and liabilities follow.

	December 31,	
(in thousands)	2018	2017
Deferred income tax assets		
Future employee benefits	$4,550	$8,039
Environmental and future shutdown reserves	2,854	3,327
Operating loss and credit carryforwards	16,578	6,312
Trademark expenses	3,833	3,852
Foreign currency translation adjustments	4,708	3,993
Other	3,071	3,248
Gross deferred income tax assets	35,594	28,771
Valuation allowance	(13,059)	(5,768)
Total deferred income tax assets	22,535	23,003
Deferred income tax liabilities		
Depreciation and amortization	51,601	45,128
Inventory	3,973	3,562
Other	4,938	5,267
Total deferred income tax liabilities	60,512	53,957
Net deferred income tax (liabilities) assets	$(37,977)	$(30,954)
Reconciliation to financial statements		
Deferred income tax assets	$5,094	$4,349
Deferred income tax liabilities	43,071	35,303
Net deferred income tax (liabilities) assets	$(37,977)	$(30,954)

Table of Contents
Notes to Consolidated Financial Statements

Deferred income tax liabilities are included in other noncurrent liabilities in our Consolidated Balance Sheets. Our deferred taxes are in a net liability position at December 31, 2018. Our deferred tax assets include $17 million of foreign operating loss carryforwards, foreign capital loss carryforwards, and foreign and state tax credits. The operating loss carryforwards expire in 2019 through 2028 and certain tax credits expire in 2026 through 2027. Based on current forecasted operating plans and historical profitability, we believe that we will recover the full benefit of our deferred tax assets with the exception of $13 million of certain credits, operating loss and capital loss carryforwards. Therefore, as of December 31, 2018, we have recorded an offsetting valuation allowance against these items, as we do not believe we will be able to utilize these credits and operating loss carryforwards before expiration. The largest change during 2018 related to a $6 million increase in foreign tax credit carryforwards, and the offsetting valuation allowance, due to recording additional foreign tax credits when finalizing the deemed repatriation of foreign earnings under the Tax Reform Act.

As a result of the Tax Reform Act, we do not expect to distribute earnings from our foreign subsidiaries in a manner that would result in significant U.S. tax, as these earnings have been previously taxed in the U.S. or meet the requirements for a dividends received deduction. Therefore, we have only recorded an immaterial deferred tax liability for the withholding taxes that will not be creditable upon distribution.

We have not provided a deferred tax liability on approximately $101 million of temporary differences related to investments in foreign subsidiaries that are essentially permanent in duration, as these earnings are considered to be indefinitely reinvested. If we were to repatriate these earnings, we could be subject to income taxes and withholding taxes in various countries. Determination of the amount of unrecognized deferred income tax liability is not practicable due to the complexity associated with the hypothetical calculation.

A reconciliation of the beginning and ending balances of the unrecognized tax benefits from uncertain positions is as follows:

	December 31,		
(in thousands)	2018	2017	2016
Balance at beginning of year	$9,102	$8,810	$2,322
Increases for tax positions of prior years	2,123	865	773
Increases for tax positions of the current year	614	453	5,826
Settlements	(252)	(260)	(111)
Lapses of statutes	(927)	(766)	0
Balance at end of year	$10,660	$9,102	$8,810

At December 31, 2018, $10 million of the amount of unrecognized tax benefits, if recognized, would affect our effective tax rate.

We expect the amount of unrecognized tax benefits to change in the next twelve months; however, we do not expect the change to have a material impact on our financial statements.

Our U.S. subsidiaries file a U.S. federal consolidated income tax return. We are currently under examination by various U.S. state and foreign jurisdictions and remain subject to examination until the statute of limitations expires for the respective tax jurisdiction. We are no longer subject to U.S. federal income examination for years before 2015. Foreign and U.S. state jurisdictions have statutes of limitations generally ranging from three to five years. Years still open to examination by foreign tax authorities in major jurisdictions include: the United Kingdom (2015 and forward); Singapore (2014 and forward); Belgium (2016 and forward); and Mexico (2013 and forward).

Table of Contents
Notes to Consolidated Financial Statements

20. Other Comprehensive Income (Loss) and Accumulated Other Comprehensive Loss

The balances of, and changes in, the components of accumulated other comprehensive loss, net of tax, consist of the following:

(in thousands)	Pension Plans and Other Postretirement Benefits	Foreign Currency Translation Adjustments	Accumulated Other Comprehensive (Loss) Income
Balance at December 31, 2015	$ (69,798)	$ (74,728)	$ (144,526)
Other comprehensive income (loss) before reclassifications	(8,565)	(31,595)	(40,160)
Amounts reclassified from accumulated other comprehensive loss (a)	2,176	0	2,176
Other comprehensive income (loss)	(6,389)	(31,595)	(37,984)
Balance at December 31, 2016	(76,187)	(106,323)	(182,510)
Other comprehensive income (loss) before reclassifications	10,966	23,849	34,815
Amounts reclassified from accumulated other comprehensive loss (a)	1,701	0	1,701
Other comprehensive income (loss)	12,667	23,849	36,516
Balance at December 31, 2017	(63,520)	(82,474)	(145,994)
Other comprehensive income (loss) before reclassifications	(25,027)	(12,287)	(37,314)
Amounts reclassified from accumulated other comprehensive loss (a)	1,992	0	1,992
Other comprehensive income (loss)	(23,035)	(12,287)	(35,322)
Balance at December 31, 2018	$ (86,555)	$ (94,761)	$ (181,316)

(a) The pension plan and other postretirement benefit components of accumulated other comprehensive loss are included in the computation of net periodic benefit cost (income). See Note 18 for further information.

Table of Contents
Notes to Consolidated Financial Statements

21. Segment and Geographic Area Information

Segment Information—The tables below show our consolidated segment results. The “All other” category includes the operations of the antiknock compounds business, as well as certain contracted manufacturing and services associated with Ethyl.

The segment accounting policies are the same as those described in Note 1. We evaluate the performance of the petroleum additives business based on segment operating profit. NewMarket Services departments and other expenses are billed to Afton and Ethyl based on the services provided under the holding company structure. Depreciation on segment property, plant, and equipment, as well as amortization of segment intangible assets, are included in segment operating profit. No transfers occurred between the petroleum additives segment and the “All other” category during the periods presented. The table below reports net sales and operating profit by segment, as well as a reconciliation to income before income tax expense, for the last three years.

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Net sales			
Petroleum additives			
Lubricant additives	$1,870,803	$1,790,254	$1,672,523
Fuel additives	410,000	397,029	362,122
Total	2,280,803	2,187,283	2,034,645
All other	8,872	11,121	14,806
Net sales (a)	$2,289,675	$2,198,404	$2,049,451
Segment operating profit			
Petroleum additives	$311,019	$345,017	$375,360
All other	(3,256)	4,135	388
Segment operating profit	307,763	349,152	375,748
Corporate, general, and administrative expenses	(19,651)	(26,641)	(20,026)
Interest and financing expenses, net	(26,723)	(21,856)	(16,785)
Other income (expense), net	28,896	14,787	4,271
Income before income tax expense	$290,285	$315,442	$343,208

(a) No single customer accounted for 10% or more of our total net sales in 2018, 2017, or 2016.

Table of Contents
Notes to Consolidated Financial Statements

The following tables show asset information by segment and the reconciliation to consolidated assets. Segment assets consist of accounts receivable, inventory, and long-lived assets. Long-lived assets included in the petroleum additives segment amounts in the table below include property, plant, and equipment, net of depreciation, as well as intangibles (net of amortization) and goodwill. The additions to long-lived assets include only property, plant, and equipment for each year presented.

	December 31,	
(in thousands)	2018	2017
Segment assets		
Petroleum additives	$1,448,737	$1,461,013
All other	12,200	14,089
	1,460,937	1,475,102
Cash and cash equivalents	73,040	84,166
Other accounts receivable	1,310	11,026
Deferred income taxes	5,094	4,349
Prepaid expenses and other current assets	29,179	31,074
Non-segment property, plant, and equipment, net	33,134	32,939
Prepaid pension cost	88,705	66,495
Deferred charges and other assets	5,875	7,003
Total assets	$1,697,274	$1,712,154

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Additions to long-lived assets			
Petroleum additives	$72,829	$196,951	$145,768
All other	0	0	21
Corporate	1,809	6,266	1,895
Total additions to long-lived assets	$74,638	$203,217	$147,684
Depreciation and amortization			
Petroleum additives	$69,029	$52,266	$42,128
All other	11	13	15
Corporate	2,719	3,061	2,750
Total depreciation and amortization	$71,759	$55,340	$44,893

Table of Contents
Notes to Consolidated Financial Statements

Geographic Area Information - We have operations in the United States, Europe, Asia Pacific, India, Latin America, Canada, and the Middle East. Our foreign customers consist primarily of global, national, and independent oil companies.

The tables below report net sales, total assets, and long-lived assets by geographic area, as well as by country for those countries with significant net sales or long-lived assets. Since our foreign operations are significant to our overall business, we are also presenting net sales in the table below by the major regions in which we operate. NewMarket assigns net sales to geographic areas based on the location to which the product was shipped to a third party.

Long-lived assets in the table below include property, plant, and equipment, net of depreciation.

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Net sales			
United States	$722,576	$696,138	$701,209
China	239,406	224,409	203,031
Europe, Middle East, Africa, India	756,258	742,337	653,341
Asia Pacific, except China	335,119	293,137	267,585
Other foreign	236,316	242,383	224,285
Net sales	$2,289,675	$2,198,404	$2,049,451

	December 31,	
(in thousands)	2018	2017
Total assets		
United States	$586,339	$557,488
Foreign	1,110,935	1,154,666
Total assets	$1,697,274	$1,712,154
Long-lived assets		
United States	$226,191	$230,049
Singapore	280,340	271,516
Other foreign	137,607	150,716
Total long-lived assets	$644,138	$652,281

Table of Contents
Notes to Consolidated Financial Statements

22. Selected Quarterly Consolidated Financial Data (unaudited)

(in thousands, except per-share amounts)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2018				
Net sales	$589,245	$598,952	$563,166	$538,312
Gross profit	156,783	145,859	140,883	141,838
Net income	60,565	52,885	58,481	62,803
Earnings per share - basic and diluted	5.14	4.53	5.12	5.58

2017	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Net sales	$542,818	$547,188	$548,416	$559,982
Gross profit	168,842	163,471	158,877	145,197
Net income	63,937	62,728	59,772	4,072
Earnings per share - basic and diluted	5.39	5.29	5.04	0.35

23. Recent Accounting Pronouncements

Recently Adopted Accounting Pronouncements

On January 1, 2018, we adopted Accounting Standards Codification 606 (ASC 606), "Revenue from Contracts with Customers." Further information on the adoption is in Note 3.

Also on January 1, 2018, we adopted Accounting Standards Update No. 2017-07, "Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost" (ASU 2017-07) on a retrospective basis for the consolidated statements of income and on a prospective basis for capitalization of the service cost component in assets. ASU 2017-07 requires that an employer report the service cost component of net benefit cost in the same line item as other compensation costs arising from services rendered by the pertinent employees during the period. The other components of net benefit cost are required to be presented in the consolidated statements of income outside of operating profit. There was no change to net income for any period presented as a result of adopting ASU 2017-07 on a retrospective basis for the consolidated statements of income, but there is a change within operating profit with a corresponding change in other income (expense), net to reflect the impact of presenting all components of net benefit cost, except for service cost, outside of operating profit. As a result of the retrospective application, operating profit decreased by $14 million and other income (expense), net increased by $14 million in income for the twelve months ended December 31, 2017. For the twelve months ended December 31, 2016, operating profit decreased by $8 million and other income (expense), net increased by $8 million in income. As allowed under ASU 2017-07, we utilized the amounts disclosed in the prior year for the various components of net benefit costs as the basis for the retrospective application. See Note 18 for the components of our net benefit costs.

Recently Issued Accounting Pronouncements

In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2016-02, "Leases (Topic 842)" (ASU 2016-02) to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and requiring disclosures related to certain information about leasing arrangements. Under the new guidance, leases are classified as either operating or financing,

with lease classification impacting the location of expense recognition in the consolidated statement of income.

Table of Contents
Notes to Consolidated Financial Statements

We plan to adopt ASU 2016-02 electing the transition approach allowing for retrospective adoption on January 1, 2019. We plan to elect the package of practical expedients permitted under the guidance, which, among other things, allows us to not reassess the historical lease classification of existing leases. In addition, we plan to elect the hindsight practical expedient and the land easement practical expedient, as well as the short-term lease exception, which allows us to not recognize on the balance sheet those leases with terms of 12 months or less. We also expect to make the accounting policy election to not separate lease and nonlease components in determining the right of use assets and lease liabilities. We are continuing to finalize the accounting for the adoption of ASU 2016-02, but currently expect the right of use assets and lease liabilities to be approximately $70 million. We do not expect the adoption of ASU 2016-02 to materially impact our consolidated net income, liquidity, or covenant compliance under our existing debt agreements.

In February 2018, the FASB issued Accounting Standards Update No. 2018-02, "Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income" (ASU 2018-02). ASU 2018-02 allows, but does not require, reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects that resulted from the Tax Reform Act at the end of 2017. ASU 2018-02, which is effective for our reporting period beginning January 1, 2019, also requires additional disclosures surrounding stranded tax effects.

Table of Contents

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain a system of internal control over financial reporting to provide reasonable, but not absolute, assurance of the reliability of the financial records and the protection of assets. Under Rule 13a-15(b) of the Securities Exchange Act of 1934 (the Exchange Act), we carried out an evaluation, with the participation of our management, including our principal executive officer and our principal financial officer, of the effectiveness of our disclosure controls and procedures, as such term is defined in Rule 13a-15(e) of the Exchange Act, as of the end of the period covered by this report. Based upon that evaluation, our principal executive officer and our principal financial officer concluded that our disclosure controls and procedures are effective at the reasonable assurance level.

There has been no change in our internal control over financial reporting, as such term is defined in Rule 13a-15(f) of the Exchange Act, during the quarter ended December 31, 2018 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Management’s Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) of the Securities Exchange Act of 1934.

Our 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 accounting principles generally accepted in the United States of America. Internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with accounting principles generally accepted in the United States of America and that our receipts and expenditures are being made only in accordance with authorization of our management and directors; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on the consolidated 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.

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in “Internal Control—Integrated Framework (2013)” issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on our evaluation under the framework in “Internal Control—Integrated Framework (2013),” our management concluded that our internal control over financial reporting was effective at the reasonable assurance level as of December 31, 2018. The effectiveness of our internal control over financial reporting as of December 31, 2018, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which is included in Item 8 of this Annual Report on Form 10-K.

Table of Contents

ITEM 9B. OTHER INFORMATION

None.

Table of Contents

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is incorporated by reference to our definitive Proxy Statement for our 2019 annual meeting of shareholders (Proxy Statement) under the headings entitled “Election of Directors,” “Committees of Our Board,” “Certain Relationships and Related Transactions,” and “Section 16(a) Beneficial Ownership Reporting Compliance” and is included in Part I of this Form 10-K under the heading entitled “Executive Officers of the Registrant.”

We have adopted a Code of Conduct that applies to our directors, officers, and employees (including our principal executive officer, principal financial officer, and principal accounting officer) and have posted the Code of Conduct on our internet website. We intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K relating to amendments to or waivers from any provision of our Code of Conduct applicable to the principal executive officer, principal financial officer, and principal accounting officer by posting this information on our internet website. Our internet website address is www.newmarket.com.

We have filed, as exhibits to this Annual Report on Form 10-K, the certifications of our principal executive officer and principal financial officer required under Sections 906 and 302 of the Sarbanes Oxley Act of 2002 to be filed with the SEC regarding the quality of our public disclosure.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference to our Proxy Statement under the headings (including the narrative disclosures following a referenced table) entitled “Compensation Discussion and Analysis,” “The Compensation Committee Report,” “Compensation of Executive Officers,” and “Compensation of Directors.”

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

Except as noted below, the information required by this item is incorporated by reference to our Proxy Statement under the heading “Stock Ownership.”

The following table presents information as of December 31, 2018 with respect to equity compensation plans under which shares of our common stock are authorized for issuance.

Plan Category	Number of Securities to be Issued upon Exercise of Outstanding Options, Warrants and Rights (a)	Weighted-Average Exercise Price of Outstanding Options, Warrants and Rights	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans
Equity compensation plans approved by shareholders:			
2014 Incentive Compensation and Stock Plan	0	$ 0	964,036
Equity compensation plans not approved by shareholders (b):	0	0	0
Total	0	$ 0	964,036

(a) There are no outstanding options, rights, or warrants.

(b) We do not have any equity compensation plans that have not been approved by shareholders.

Table of Contents

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

The information required by this item is incorporated by reference to our Proxy Statement under the headings entitled "Board of Directors" and "Certain Relationships and Related Transactions."

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item is incorporated by reference to our Proxy Statement under the heading "Ratification of Appointment of Independent Registered Public Accounting Firm."

Table of Contents

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(A)(1) Management's Report on Internal Control Over Financial Reporting

Report of Independent Registered Public Accounting Firm

Consolidated Statements of Income for each of the three years in the period ended December 31, 2018

Consolidated Statements of Comprehensive Income for each of the three years in the period ended December 31, 2018

Consolidated Balance Sheets as of December 31, 2018 and 2017

Consolidated Statements of Shareholders' Equity for each of the three years in the period ended December 31, 2018

Consolidated Statements of Cash Flows for each of the three years in the period ended December 31, 2018

Notes to Consolidated Financial Statements

(A)(2) Financial Statement Schedules—none required

(A)(3) Exhibits

2.1	Share Sale Agreement dated December 16, 2016, by and among Afton Chemical de México, S.A. de C.V., Chevron Oronite Company LLC, the individual Local Sellers listed therein, the Local Sellers' Representative listed therein and NewMarket Corporation, as Buyer Guarantor (incorporated by reference to Exhibit 2.1 to Form 8-K (File No. 1-32190) filed December 19, 2016
2.2	First Amendment to Share Sale Agreement, dated as of June 30, 2017, by and among Afton Chemical de Mexico, S.A. de C.V., Chevron Oronite Company LLC, the individual Local Sellers referred to therein, the Local Sellers' Representative referred to therein, Aditivos Mexicanos, S.A. de C.V., NewMarket Corporation, as Buyer Guarantor, and Afton Chemical Corporation (incorporated by reference to Exhibit 2.1 to Form 8-K (File No. 1-32190) filed July 3, 2017)
3.1	Articles of Incorporation Amended and Restated effective April 27, 2012 (incorporated by reference to Exhibit 3.1 to Form 8-K (File No. 1-32190) filed April 30, 2012)
3.2	NewMarket Corporation Bylaws Amended and Restated effective August 6, 2015 (incorporated by reference to Exhibit 3.1 to Form 8-K (File No. 1- 32190) filed August 6, 2015)
4.1	Indenture, dated as of December 20, 2012, among NewMarket Corporation, the guarantors listed on the signature pages thereto and U.S. Bank National Association, as trustee, (incorporated by reference to Exhibit 4.1 to Form 8-K (File No. 1-32190) filed December 21, 2012)
4.2	Form of 4.10% Senior Notes due 2022 (included in Exhibit 4.1) (incorporated by reference to Exhibit 4.1 to Form 8-K (File No. 1-32190) filed December 21, 2012)

4.3	Registration Rights Agreement, dated as of December 20, 2012, among NewMarket Corporation, the guarantors listed on the signature pages thereto and J.P. Morgan Securities LLC and the other several initial purchasers of the Notes (incorporated by reference to Exhibit 4.3 to Form 8-K (File No. 1-32190) filed December 21, 2012)
10.1	Note Purchase Agreement dated January 4, 2017, by and among NewMarket Corporation, The Prudential Life Insurance Company of America, The Gibraltar Life Insurance Co., Ltd, The Lincoln National Life Insurance Company and The Prudential Life Insurance Company, Ltd., (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed January 5, 2017)
10.2	First Amendment, dated as of October 10, 2017, to Note Purchase Agreement dated January 4, 2017, by and among NewMarket Corporation, The Prudential Insurance Company of America, The Gibraltar Life Insurance Co., Ltd, The Lincoln National Life Insurance Company and The Prudential Life Insurance Company, Ltd. (incorporated by reference to Exhibit 10.2 to Form 10-Q (file No. 1-32190) filed October 26, 2017)
10.3	2014 Incentive Compensation and Stock Plan (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed April 24, 2014)*

Table of Contents

10.4	Excess Benefit Plan (incorporated by reference to Exhibit 10.4 to Ethyl Corporation's Form 10-K (File No. 1-5112) filed February 25, 1993)*
10.5	Trust Agreement between Ethyl Corporation and Merrill Lynch Trust Company of America (incorporated by reference to Exhibit 4.5 to Ethyl Corporation's Registration Statement on Form S-8 (Registration No. 333-60889) filed August 7, 1998)
10.6	NewMarket Corporation and Affiliates Bonus Plan (incorporated by reference to Exhibit 10.9 to Ethyl Corporation's Form 10-K (File No. 1-5112) filed March 14, 2003)*
10.7	Indemnification Agreement, dated as of July 1, 2004 by and among NewMarket Corporation, Ethyl Corporation and Afton Chemical Corporation (incorporated by reference to Exhibit 10.5 to Form 10-Q (File No. 1-32190) filed August 5, 2004)
10.8	Services Agreement, dated as of July 1, 2004, by and between NewMarket Services Corporation and Afton Chemical Corporation (incorporated by reference to Exhibit 10.2 to Form 10-Q (File No. 1-32190) filed November 5, 2004)
10.9	Services Agreement, dated as of July 1, 2004, by and between NewMarket Services Corporation and Ethyl Corporation (incorporated by reference to Exhibit 10.3 to Form 10-Q (File No. 1-32190) filed November 5, 2004)
10.10	Services Agreement, dated as of July 1, 2004, by and between NewMarket Services Corporation and NewMarket Corporation (incorporated by reference to Exhibit 10.4 to Form 10-Q (File No. 1-32190) filed November 5, 2004)
10.11	Base Salaries of Named Executive Officers*
10.12	Summary of Directors' Compensation (incorporated by reference to Exhibit 10.1 to Form 10-Q (1-32190) filed October 26, 2017)*
10.13	Form of 2014 Restricted Stock Award Agreement *
10.14	Form of Performance Stock Award Agreement (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed December 14, 2016)*
10.15	Credit Agreement, dated as of September 22, 2017, by and among the Company and the Foreign Subsidiary Borrowers party thereto; the Lenders party thereto; JPMorgan Chase Bank, N.A. as Administrative Agent; Bank of America, N.A. and PNC Bank, National Association as Co-Syndication Agents and Citibank, N.A., DBS Bank, Ltd. and US Bank, National Association as Co-Documentation Agents (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed September 26, 2017)
10.16	Form of Performance Stock Award Agreement (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed February 26, 2018)*
10.17	Consulting Agreement, dated November 16, 2018, between NewMarket Corporation and Robert A. Shama (incorporated by reference to Exhibit 10.1 to Form 8-K (File No. 1-32190) filed November 19, 2018) *
21	Subsidiaries of the Registrant

23	Consent of Independent Registered Public Accounting Firm
31(a)	Certification pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, by Thomas E. Gottwald
31(b)	Certification pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, by Brian D. Paliotti
32(a)	Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, by Thomas E. Gottwald
32(b)	Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, by Brian D. Paliotti
101	XBRL Instance Document and Related Items

* Indicates management contracts, compensatory plans or arrangements of the company required to be filed as an exhibit

(B) Exhibits—The response to this portion of Item 15 is submitted as a separate section of this Annual Report on Form 10-K.

Table of Contents

ITEM 16. FORM 10-K SUMMARY

None.

Table of Contents

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.

NEWMARKET CORPORATION

By: /s/ Thomas E. Gottwald
(Thomas E. Gottwald, Chairman of the Board, President, and Chief Executive Officer)
Date: February 19, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated as of February 19, 2019.

SIGNATURE	TITLE
/S/ THOMAS E. GOTTWALD (Thomas E. Gottwald)	Chairman of the Board, President, Chief Executive Officer, and Director (Principal Executive Officer)
/S/ BRIAN D. PALIOTTI (Brian D. Paliotti)	Chief Financial Officer and Vice President (Principal Financial Officer)
/S/ WILLIAM J. SKROBACZ (William J. Skrobacz)	Controller (Principal Accounting Officer)
/S/ PHYLLIS L. COTHRAN (Phyllis L. Cothran)	Director
/S/ MARK M. GAMBILL (Mark M. Gambill)	Director
/S/ BRUCE C. GOTTWALD (Bruce C. Gottwald)	Director
/S/ P. D. HANLEY (Patrick D. Hanley)	Director
/s/ H. HITER HARRIS (H. Hiter Harris III)	Director
/S/ J. E. ROGERS (James E. Rogers)	Director