W R GRACE & CO
Form 10-K
February 23, 2017

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

FORM 10-K
ý ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2016
or
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____
Commission file number 1-13953
W. R. GRACE & CO.

Delaware	65-0773649
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

7500 Grace Drive, Columbia, Maryland 21044-4098
(Address of principal executive offices) (Zip code)
(410) 531-4000
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Exchange Act:

Title of each class	Name of each exchange on which registered
Common Stock, $.01 par value per share	New York Stock Exchange, Inc.
Preferred Stock Purchase Rights	

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 ý No o
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes o No ý
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 ý No o
Indicate by check mark whether the registrant has submitted electronically and posted on its corporate website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ý No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulations S-K 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. ý
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ý Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company) Smaller reporting company o
Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes o No ý
The aggregate market value of W. R. Grace & Co. voting and non-voting common equity held by non-affiliates as of June 30, 2016 (the last business day of the registrant's most recently completed second fiscal quarter) based on the closing sale price of $73.21 as reported on the New York Stock Exchange was $4,574,202,603.
Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Section 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court. Yes ý No o
At January 31, 2017, 68,280,258 shares of W. R. Grace & Co. Common Stock, $.01 par value per share, were outstanding.
DOCUMENTS INCORPORATED BY REFERENCE
Portions of the definitive Proxy Statement to be delivered to stockholders in connection with the Annual Meeting of Stockholders to be held on May 9, 2017, are incorporated by reference into Part III.

Table of Contents

TABLE OF CONTENTS

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Unless the context otherwise indicates, in this document the terms "Grace," "we," "us," or "our" mean W. R. Grace & Co. and/or its consolidated subsidiaries and affiliates, and the term the "Company" means W. R. Grace & Co. Unless otherwise indicated, the contents of websites mentioned in this report are not incorporated by reference or otherwise made a part of this Report. GRACE®, the GRACE® logo and, except as otherwise indicated, the other trademarks, service marks or trade names used in the text of this Report are trademarks, service marks, or trade names of operating units of W. R. Grace & Co. or its affiliates and/or subsidiaries.

The Financial Accounting Standards Board is referred to in this Report as the "FASB." The FASB issues, among other things, Accounting Standards Codifications (ASCs) and Accounting Standards Updates (ASUs).

Table of Contents

PART I

Item 1. BUSINESS

BUSINESS OVERVIEW

W. R. Grace & Co. is engaged in the production and sale of specialty chemicals and specialty materials on a global basis through two reportable business segments: Grace Catalysts Technologies, which includes catalysts and related products and technologies used in refining, petrochemical and other chemical manufacturing applications; and Grace Materials Technologies, which includes specialty materials, including silica-based and silica-alumina-based materials, used in coatings, consumer, industrial, and pharmaceutical applications. We entered the specialty chemicals industry in 1954, the year in which we acquired the Davison Chemical Company. Grace is the successor to a company that began in 1854 and originally became a public company in 1953. W. R. Grace & Co. is a Delaware corporation. Our principal executive offices are located at 7500 Grace Drive, Columbia, Maryland 21044, telephone (410) 531-4000. As of December 31, 2016, we had approximately 3,700 global employees.

On January 27, 2016, Grace entered into a separation agreement with GCP Applied Technologies Inc., then a wholly-owned subsidiary of Grace ("GCP"), pursuant to which Grace agreed to transfer its Grace Construction Products operating segment and the packaging technologies business of its Grace Materials Technologies operating segment to GCP (the "Separation"). Grace and GCP completed the Separation on February 3, 2016 (the "Distribution Date"), by means of a pro rata distribution to the Company's stockholders of all of the outstanding shares of GCP common stock (the "Distribution"), with one share of GCP common stock distributed for each share of Company common stock held as of the close of business on January 27, 2016. As a result of the Distribution, GCP became an independent public company. GCP's historical financial results through the Distribution Date are reflected in Grace's Consolidated Financial Statements as discontinued operations.

On June 30, 2016, we completed the acquisition of the assets of the BASF Polyolefin Catalysts business (the "polyolefin catalysts acquisition"), which included technologies, patents, trademarks, and production plants in Pasadena, Texas, and Tarragona, Spain, for a purchase price of $250.6 million. We added the following technologies to our catalysts portfolio: (1) LYNX® high-activity polyethylene ("PE") catalyst technologies used commercially in slurry processes for the production of high-density PE resins such as bimodal film and pipe, and (2) LYNX® polypropylene ("PP") catalyst technologies used commercially in all major PP process technologies including slurry, bulk loop, stirred gas, fluid gas, and stirred bulk. The acquisition also provided us with significant additional flexibility and capacity for our global polyolefin catalysts manufacturing network.

In 2016, we exited certain product lines that were previously part of our Discovery Sciences product group included in our Grace Materials Technologies operating segment, as these product lines no longer fit into our strategic growth plans. As part of the exit, we sold certain assets to unaffiliated buyers for aggregate proceeds of $12.9 million.

In 2001, Grace and 61 of its United States subsidiaries and affiliates filed voluntary petitions for reorganization under Chapter 11 of the United States Bankruptcy Code in the United States Bankruptcy Court for the District of Delaware. On February 3, 2014, the joint plan of reorganization (the "Joint Plan") filed by Grace and certain other parties became effective, concluding Grace's status as a debtor under Chapter 11.

Grace Catalysts Technologies produces and sells catalysts and related products and technologies used in refining, petrochemical and other chemical manufacturing applications, as follows:

- Fluid catalytic cracking catalysts, also called FCC catalysts, that help to "crack" the hydrocarbon chain in distilled crude oil to produce transportation fuels, such as gasoline and diesel fuels, and other petroleum-based products; and FCC additives used to reduce sulfur in gasoline, maximize propylene production from refinery FCC units, and reduce emissions of sulfur oxides, nitrogen oxides and carbon monoxide from refinery FCC units.
- Hydroprocessing catalysts (HPC), most of which are marketed through our Advanced Refining Technologies LLC, or ART, joint venture with Chevron Products Company in which we hold a 50% economic interest, that are used in process reactors to upgrade heavy oils into lighter, more useful products by removing impurities such as nitrogen, sulfur and heavy metals, allowing less expensive

1

Table of Contents

feedstocks to be used in the petroleum refining process. (ART is not consolidated in our financial statements so ART's sales are excluded from our sales.)

- Polyolefin catalysts and catalyst supports, also called specialty catalysts (SC), for the production of polypropylene and polyethylene thermoplastic resins, which can be customized to enhance the performance of a wide range of industrial and consumer end-use applications including high pressure pipe, geomembranes, food packaging, automotive parts, medical devices, and textiles; chemical catalysts used in a variety of industrial, environmental and consumer applications; and gas-phase polypropylene process technology, which provides our licensees with a reliable capability to manufacture polypropylene products for a broad array of end-use applications.

Grace Materials Technologies produces and sells specialty materials, including silica-based and silica-alumina-based materials, used in coatings, consumer, industrial, and pharmaceutical applications, as follows:

- Coatings and print media applications, functional additives that provide matting effects and corrosion protection for industrial and consumer coatings and media and paper products to enhance quality in ink jet coatings.
- Consumer/Pharma applications, as a free-flow agent, carrier or processing aid in food and personal care products; as a toothpaste abrasive and thickener; and for the processing and stabilization of edible oils and beverages; as well as pharmaceutical, life science and related applications including silica-based separation media, excipients and pharmaceutical intermediates.
- Chemical Process applications, such as tires and rubber, plastics, precision investment casting, refractory, insulating glass windows, adsorbents for use in petrochemical and natural gas processes and biofuels, various functions such as reinforcement, high temperature binding and moisture scavenging.

Global Scope

We operate our business on a global scale with approximately 72% of our 2016 sales outside the United States. We operate and/or sell to customers in over 60 countries and in 30 currencies. We manage our operating segments on a global basis, to serve global markets. Currency fluctuations affect our reported results of operations, cash flows, and financial position.

Strategy Overview

Our strategy is to increase enterprise value by profitably growing our specialty chemicals and specialty materials businesses in the global marketplace and achieving high levels of efficiency and cash flow. To meet these objectives, we plan to:

- invest in research and development activities, with the goal of introducing new high-performance, technically differentiated products and services and enhancing manufacturing processes and operations;
- expand sales and manufacturing into emerging regions, including China, India, other economies in Asia, Eastern Europe, the Middle East and Latin America;
- pursue selected acquisitions and alliances that complement our current product offerings or provide opportunities for faster penetration of desirable market or geographic segments; and
- continue our commitment to process and productivity improvements and cost-management, such as rigorous controls on working capital and capital spending, integration of functional support services worldwide, and programs for improving operations and supply chain management.

PRODUCTS AND MARKETS

Specialty Chemicals and Materials Industry Overview

Specialty chemicals and specialty materials are high value-added products used as catalysts, intermediates, components, protectants or additives in a wide variety of products and applications. They are generally produced in relatively small volumes (compared with commodity chemicals) and must satisfy well-defined performance

Table of Contents

requirements and specifications. Specialty chemicals and specialty materials are often critical components of end products, catalysts for the production of end products, and components used in end products. Consequently, they are tailored to meet customer needs, which generally results in a close relationship between the producer and the customer.

We focus our business on the following, which we believe are important competitive factors in the specialty chemicals and specialty materials industry:

- value-added products, technologies and services, sold at competitive prices;
- customer service, including rapid response to changing customer needs;
- technological leadership (resulting from investment in research and development and technical customer service); and
- reliability of product and supply.

We believe that our focus on these competitive factors enables us to deliver increased value to customers and competitive operating margins notwithstanding the increased customer service and research and development costs that this focus entails.

Grace Catalysts Technologies Reportable Segment

Catalysts Technologies principally applies alumina, zeolite and inorganic support technologies in the design and manufacture of products with the goal of creating significant value for our diverse customer base. Our customers include major oil refiners and plastics and chemicals manufacturers. We believe that our technological expertise provides a competitive advantage, allowing us to quickly design products that help our customers create value in their markets.

The following table sets forth Catalysts Technologies sales of similar products, technologies, and services as a percentage of Grace total revenue.

(In millions)	2016 Sales	% of Grace Revenue		2015 Sales	% of Grace Revenue		2014 Sales	% of Grace Revenue	
Refining Catalysts	$724.9	45.3	%	$764.5	47.0	%	$845.5	48.1	%
Polyolefin and Chemical Catalysts	438.8	27.5	%	397.6	24.4	%	401.3	22.8	%
Total Catalysts Technologies Revenue	$1,163.7	72.8	%	$1,162.1	71.4	%	$1,246.8	70.9	%

The following table sets forth Catalysts Technologies sales by region as a percentage of Catalysts Technologies total revenue.

(In millions)	2016 Sales	% of Catalysts Technologies Revenue		2015 Sales	% of Catalysts Technologies Revenue		2014 Sales	% of Catalysts Technologies Revenue	
North America	$386.2	33.2	%	$375.9	32.4	%	$392.9	31.5	%
Europe Middle East Africa	438.8	37.7	%	402.5	34.6	%	459.1	36.8	%
Asia Pacific	261.1	22.4	%	293.0	25.2	%	291.4	23.4	%
Latin America	77.6	6.7	%	90.7	7.8	%	103.4	8.3	%
Total Catalysts Technologies Revenue	$1,163.7	100.0	%	$1,162.1	100.0	%	$1,246.8	100.0	%

Table of Contents

Grace Catalysts Technologies—Refining Catalysts
FCC Catalysts
We are a global leader in developing and manufacturing fluid catalytic cracking, or FCC, catalysts and additives that are designed to enable petroleum refiners to increase profits by improving product yields, value and quality. Our FCC products also enable refiners to reduce emissions from their FCC units and reduce sulfur content in the transportation fuels they produce. Oil refining is a highly specialized discipline and FCC catalysts must be tailored to meet local variations in crude oil feedstocks and a refinery's product mix. We work regularly with our customers to identify the most appropriate catalyst and additive formulations for their changing needs.
Since our customers are refiners, our business is highly dependent on the economics of the petroleum refining industry. In particular, demand for our FCC products is affected by refinery throughput, the type and quality of refinery feedstocks, and the demand for transportation fuels and other refinery products, such as propylene.

In general, as a refinery utilizes more of its FCC unit capacity, it needs a greater amount of FCC catalyst. Refinery throughput, or the extent to which refiners utilize their available FCC capacity, is generally determined by demand for transportation fuels and petrochemical products and the availability of crude oil supply. In recent years, global economic growth, especially in emerging regions, has increased global demand for transportation fuels and petrochemical products. Retail gasoline and diesel fuel prices and the level of economic activity has also directly influenced transportation fuel demand. Improvements in vehicular fuel economy, as well as consumer trends and government policies that increase the use of non-petroleum-based fuels and/or decrease the use of petroleum-based fuels also will affect transportation fuel demand over time.
Refinery crude oil feedstocks vary in quality from light and sweet to heavy and sour. Light and sweet feedstocks are typically more expensive than heavy and sour feedstocks and yield a greater proportion of high-value petroleum products. They also yield a lower proportion of residual oil, or "resid," which is generally the lowest value feedstock contained in crude oil. Although heavy and sour feedstocks with high resid content are typically less expensive than higher quality feedstocks, the processing of high-resid feedstocks is more difficult because these feedstocks have more impurities and higher boiling points. Our customers generally determine the feedstocks to be used in their refineries based on relative pricing and availability of various quality feedstocks. Refinery configuration and complexity also plays a role in feedstock selection; more complex refineries tend to process a higher proportion of heavy and sour feedstocks. In general, as a refinery uses more heavy and sour feedstocks, it uses a greater amount of FCC catalyst. In addition, refiners use special high value-added formulations of FCC catalysts for efficient refining of heavy and sour feedstocks. We have designed our MIDAS® catalyst, IMPACT® catalyst, NEKTOR™ catalyst, and GENESIS® catalyst product portfolios to enable our customers to increase the efficiency and yield of high-resid feedstock refining.
Heavy and sour crude oil has a relatively high level of metals, nitrogen and sulfur contamination. Many countries and regions, including the U.S., European Union, Japan, Russia, India and China have imposed regulatory limitations on the sulfur content of gasoline and diesel fuel. We have developed a portfolio of products designed to assist refiners in meeting their gasoline sulfur-reduction targets, including our D-PRISM® and GSR® additives and our SURCA® catalyst family.
Within certain limits, refiners have the ability to adjust their relative output of transportation fuels versus petrochemicals. Global economic growth, especially in emerging regions, has increased the demand for plastics. As a result, some of our refinery customers have sought increased profits from petrochemicals by increasing the yield of propylene from their FCC units. Our ZSM-5-based technology, including our OLEFINSMAX® and OLEFINSULTRA® additive products, is designed to maximize the propylene output of FCC units.
Many U.S. petroleum refiners have entered into consent decrees with the U.S. Environmental Protection Agency (the "EPA") under which the refiners have agreed to reduce emissions of nitrogen oxides and sulfur oxides. The European Union has also imposed requirements on refineries with respect to nitrogen oxides and sulfur oxides emissions. FCC units are generally the largest emitters of these pollutants in a refinery. Our additives are designed to assist refineries in meeting their obligations to reduce these pollutants. Our Super DESOX® additive reduces sulfur oxides emissions from commercial FCC units. Our DENOX® additives are designed to achieve reductions in nitrogen oxides emissions

comparable to those obtained from capital intensive

4

Table of Contents

alternatives available to a refinery, while our non-platinum-based combustion promoters XNOX® and CP®P are designed to enable refiners to control carbon monoxide emissions without increasing nitrogen oxides.

Competition in FCC catalysts and additives is based on technology, product performance, customer service and price. Our principal global FCC catalyst competitors are Albemarle Corp., BASF, and SINOPEC. Our principal global competitors in FCC additives are BASF and Johnson Matthey. We also have multiple regional competitors for FCC catalysts and additives.

Hydroprocessing Catalysts

We market hydroprocessing catalysts primarily through ART, our joint venture with Chevron. We established ART to combine our technology with that of Chevron and to develop, market and sell hydroprocessing catalysts to customers in the petroleum refining industry worldwide.

As discussed above, our business is dependent on the economics of the petroleum industry. We are a leading supplier of hydroprocessing catalysts designed for processing high resid content feedstocks. We offer products for fixed-bed resid hydrotreating, on-stream catalyst replacement and ebullating-bed resid hydrocracking processes.

We also offer a full line of catalysts, customized for individual refiners, used in distillate hydrotreating to produce ultra-low sulfur content gasoline and diesel fuel, including our SMART CATALYST SYSTEM® and APART® catalyst systems. As discussed above, regulatory limitations on the sulfur content of gasoline and diesel fuel are becoming more common. These products are designed to help refiners to reduce the sulfur content of their products.

We have rights to sell hydrocracking and lubes hydroprocessing catalysts to licensees of Chevron Lummus Global and other petroleum refiners for unit refills. These rights allow us to streamline hydroprocessing catalyst supply and improve technical service for refining customers by establishing ART as their single point of contact for all their hydroprocessing catalyst needs.

Competition in the hydroprocessing catalyst industry is based on technology, product performance, customer service and price. Criterion, Albemarle, Haldor Topsoe, UOP and Axens are our leading global competitors in hydroprocessing catalysts. We also have multiple regional competitors.

Grace Catalysts Technologies—Polyolefin Catalysts, Catalyst Supports and Polypropylene Process Technology

We are a leading provider of catalyst systems and catalyst supports to the polyolefins industry for a variety of polyethylene and polypropylene process technologies. These types of catalysts are used for the manufacture of polyethylene and polypropylene thermoplastic resins used in products such as plastic film, high-performance plastic pipe, automobile parts, household appliances and household containers. We use a combination of proprietary catalyst and support technology and technology licensed from third parties to provide unique catalyst-based solutions to our customers and to provide a broad technology portfolio for enhancing collaboration opportunities with technology leaders.

Our MAGNAPORE® polymerization catalyst is used to produce high performance polyethylene in the slurry loop process for pipe and film applications. We offer our LYNX® catalysts systems for the production of high-density polyethylene resins, such as bimodal film and pipe, as well as commercial use for the production of polypropylene in all major process technologies including slurry, bulk loop, stirred gas, fluid gas, and stirred bulk. Our CONSISTA® 6th generation, non-phthalate catalysts are used to produce polypropylene resins that exhibit enhanced clarity, stiffness, and impact strength. Our POLYTRAK® polymerization catalyst is designed to achieve improved polypropylene performance, particularly for impact resistant applications such as automobile bumpers and household appliances.

Our standard and customized DAVICAT® catalysts offer a wide range of chemical and physical properties based on our material science technology for supported catalysts, polystyrene, herbicide, neutraceuticals and on-purpose olefins. Our RANEY® nickel, cobalt and copper hydrogenation and dehydrogenation catalysts are used for the synthesis of organic compounds for the fibers, polyurethanes, engineered plastics, pharmaceuticals, sweeteners and petroleum industries.

The polyolefin catalyst and supports industry is technology-intensive, and suppliers must provide products formulated to meet customer specifications. There are many manufacturers of polyolefin catalysts and supports including Univation, LyondellBasell, Albemarle and PQ, and most sell their products worldwide.

We are also a leading licensor of gas-phase polypropylene process technology to polypropylene manufacturers. Our UNIPOL® polypropylene technology is designed to have fewer moving parts and require less equipment than other competing technologies in order to reduce operating costs. This technology provides our licensees with a reliable capability to manufacture products for a broad array of end-use applications. The polypropylene process licensing industry is technology-intensive and licensors must adapt the technology and the related licenses to meet individual customer needs. The major competing polypropylene process licensors are LyondellBasell, INEOS Technologies and Lummus Novolen Technology.

Grace Catalysts Technologies—Manufacturing, Marketing and Raw Materials

Our Catalysts Technologies products are manufactured by a network of globally coordinated plants. Our integrated planning organization is responsible for the effective utilization of our manufacturing capabilities.

We use a global organization of technical professionals with extensive experience in refining processes, catalyst development, and catalyst applications to market our refining catalysts and additives. These professionals work to tailor our technology to the needs of each specific customer. We generally negotiate prices for our refining catalysts because our formulations are specific to the needs of each customer and each customer receives individual attention and technical service. We sell a significant portion of our hydroprocessing catalysts through multiple-year supply agreements with our geographically diverse customer base.

We use a global direct sales force for our polyolefin catalysts, supports and technologies and chemical catalysts that seeks to maintain close working relationships with our customers. These relationships enable us to cooperate with major polymer and chemical producers to develop catalyst technologies that complement their process or application developments. We have geographically distributed our sales and technical service professionals to make them responsive to the needs of our geographically diverse customers. We typically operate under long-term contracts with our customers.

Seasonality does not have a significant overall effect on our Catalysts Technologies reportable segment. However, sales of FCC catalysts tend to be lower in the first calendar quarter prior to the shift in production by refineries from home heating oil for the winter season to gasoline production for the summer season. FCC catalysts and ebullating-bed hydroprocessing catalysts are consumed at a relatively steady rate and are replaced regularly. Fixed-bed hydroprocessing catalysts are consumed over a period of years and are replaced in bulk in an irregular pattern. Since our customers periodically shut down their refining processes to replace fixed-bed hydroprocessing catalysts in bulk, our hydroprocessing catalyst sales to any customer can vary substantially over the course of a year and between years based on that customer's catalyst replacement schedule.

The principal raw materials for Catalysts Technologies products include molybdenum oxide, zeolite, caustic soda, sodium aluminate, aluminum sulfate, alumina, sodium silicate, rare earths, aluminum metal, and tungsten salt. Multiple suppliers are generally available for each of these materials; however, some of our raw materials may be provided by single sources of supply. We seek to mitigate the risk of using single source suppliers by identifying and qualifying alternative suppliers or, for unique materials, by using alternative formulations from other suppliers or by passing price increases on to customers. In some instances, we produce our own raw materials and intermediates.

Prices for many of our raw materials, including metals, and energy can be volatile. In response to increases in raw material and energy costs, we generally take actions to mitigate the effect of higher costs including increasing prices, developing alternative formulations for our products, increasing productivity, and hedging purchases of certain raw materials.

As in many chemical businesses, we consume significant quantities of natural gas in the production of Catalysts Technologies products. World events and other economic factors cause volatility in the price of natural gas. Increases or decreases in the cost of natural gas and raw materials can have a significant impact on our operating margins. We have implemented a risk management program under which we hedge natural gas in a way that is designed to provide protection against price volatility. See also disclosure in this Report in Item 7A (Quantitative and Qualitative

Disclosures about Market Risk).

Table of Contents

Grace Materials Technologies Reportable Segment

Materials Technologies principally applies specialty silica, zeolite and fine chemical technologies in the design and manufacture of products to create significant value for our diverse customer base. Our customers include coatings manufacturers, consumer product manufacturers, plastics manufacturers, petrochemical and natural gas processors, and pharmaceutical companies. We believe that our technological expertise and broad technology platform provide a competitive advantage, allowing us to tailor our products to specific customers' requirements and help them create value in their markets.

The following table sets forth Materials Technologies sales of similar products as a percentage of Grace total revenue.

	2016			2015			2014		
(In millions)	Sales	% of Grace Revenue		Sales	% of Grace Revenue		Sales	% of Grace Revenue	
Coatings and print media	$136.5	8.5	%	$133.6	8.2	%	$151.5	8.6	%
Consumer/Pharma	121.9	7.6	%	125.1	7.7	%	136.8	7.8	%
Chemical process and other	176.5	11.1	%	207.4	12.7	%	222.2	12.7	%
Total Materials Technologies Revenue(1)	$434.9	27.2	%	$466.1	28.6	%	$510.5	29.1	%

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(1) In 2016, we exited certain product lines that accounted for approximately $35 million and $38 million of Materials Technologies sales in 2015 and 2014, respectively.

The following table sets forth Materials Technologies sales by region as a percentage of Materials Technologies total revenue.

	2016			2015			2014		
(In millions)	Sales	% of Materials Technologies Revenue		Sales	% of Materials Technologies Revenue		Sales	% of Materials Technologies Revenue	
North America	$104.5	24.0	%	$114.1	24.5	%	$116.2	22.8	%
Europe Middle East Africa	209.0	48.1	%	218.7	46.9	%	247.3	48.4	%
Asia Pacific	87.8	20.2	%	97.9	21.0	%	105.8	20.7	%
Latin America	33.6	7.7	%	35.4	7.6	%	41.2	8.1	%
Total Materials Technologies Revenue	$434.9	100.0	%	$466.1	100.0	%	$510.5	100.0	%

Grace Materials Technologies—Engineered Materials

We globally manufacture functional additives and process aids, such as silica gel, colloidal silica, zeolitic adsorbents, precipitated silica and silica-aluminas, for a wide variety of applications and end-use industries. We also custom manufacture fine chemical intermediates and regulatory starting materials used primarily in the pharmaceutical and nutritional supplements industries. Our product portfolio includes:

Table of Contents

Application	Use	Key Brands
Coatings and Print Media	Matting agents, anticorrosion pigments, TiO_2 extenders and moisture scavengers for paints and lacquers	SYLOID®, SHIELDEX®, SYLOSIV®, SYLOWHITE™
	Additives for matte, semi-glossy and glossy ink receptive coatings on high performance ink jet papers, photo paper, and commercial wide-format print media	SYLOJET®, DURAFILL®, LUDOX®
	Paper retention aids, functional fillers, paper frictionizers	DURAFILL®, LUDOX®
Consumer/ Pharma	Toothpaste abrasives and thickening agents	SYLODENT®, SYLOBLANC®
	Free-flow agents, anticaking agents, heating agents, tabletting aids, cosmetic additives and flavor carriers	PERKASIL®, SYLOID®, SYLOSIV®
	Edible oil refining agents, stabilizers and clarification aids for beer, juices and other beverages	TRISYL®, DARACLAR®
	Pharmaceutical excipients and drug delivery	SYLOID® FP, SYLOID® XDP, SILSOL™
	Fine chemical intermediates and regulatory starting materials	SYNTHETECH™
	Chromatography purification media	DAVISIL®, VYDAC®
Chemical Process	Reinforcing agents for rubber and tires	PERKASIL®
	Inorganic binders and surface smoothening aids for precision investment casting and refractory applications	LUDOX®
	Static adsorbents for dual pane windows and refrigerant applications, moisture scavengers, and package desiccants	PHONOSORB®, SYLOSIV®, CRYOSIV®, PROTEKSORB®
	Chemical metal polishing aids and formulations for chemical mechanical planarization/electronics applications	POLIEDGE®
	Antiblocking additives for plastic films to prevent adhesion of layers in manufacturing	SYLOBLOC®
	Process adsorbents used in petrochemical and natural gas processes for such applications as ethylene-cracked-gas-drying, natural gas drying and sulfur removal	SYLOBEAD®

Our materials are integrated into our customers' manufacturing processes and when combined with our technical support, can increase the efficiency and performance of their products. By working closely with our customers, we seek to help them respond quickly to changing consumer demands. In addition, we focus on developing and manufacturing products that differentiate our customers’ products and help them meet evolving regulatory and environmental requirements. For example, our coatings additives are designed to be used in more sustainable water-based and VOC-compliant coatings, our pharmaceutical excipients help improve bioavailability, extend shelf-life, and/or make drug manufacturing more efficient. Our dental silicas are engineered to provide high cleaning with gentle abrasivity. Recent innovations in our beer stabilization silicas offer greater productivity to breweries while reducing solid waste and water usage. Our custom manufacturing of intermediates supports pharmaceutical drug development processes enabling commercialization of life saving therapies. Our products are used in a wide range of industries, including paint and coatings, pharmaceutical, food and beverage, personal care, plastics and rubber, and petrochemical and biofuels. We can modify the base silica and surface chemistry for our customers in order to enhance our product performance for their unique applications.

Our global footprint allows us to partner effectively with both multi-national and regional companies requiring multiple manufacturing facilities complimented by regional technical expertise in local languages. There are many manufacturers of engineered materials that market their products on a global basis including Evonik, PQ, and UOP. Competition is generally based on product performance, technical service, quality and reliability, price, and other differentiated product features to address the needs of customers, end-users and brand owners. Our products compete on the basis of distinct technology, product quality, and customer support. Competition for these products is highly fragmented, with a large number of companies that sell their products on a global or regional basis.

Table of Contents

Grace Materials Technologies—Manufacturing, Marketing and Raw Materials

Our Materials Technologies products are manufactured by a network of globally integrated plants that are positioned to service our customers regionally. Our integrated planning organization is responsible for the effective utilization of our manufacturing capabilities.

We use country-based direct sales forces that are dedicated to each product line and backed by application-specific technical customer service teams to market our Materials Technologies products. Our sales force seeks to develop long-term relationships with our customers and focuses on consultative sales, technical support and key account growth programs. To ensure full geographic coverage, our direct sales organization is further supplemented by a network of distributors and agents.

Seasonality does not have a significant overall effect on our Materials Technologies reportable segment; however, our adsorbents for dual frame windows are affected by seasonal and weather-related factors and the level of construction activity, and our edible oil refining agents, stabilizers and clarification aids for beer, juices and other beverages are affected by the level of consumption of beverages. These impacts are mitigated by the global scope of our business.

The principal raw materials for Materials Technologies products include sodium silicate, soda ash, zeolite, sulfuric acid, and caustic soda. Multiple suppliers are generally available for each of these materials; however, some of our raw materials may be provided by single sources of supply. We seek to mitigate the risk of using single source suppliers by identifying and qualifying alternative suppliers or, for unique materials, by using alternative formulations from other suppliers or by passing price increases on to customers. In some instances, we produce our own raw materials and intermediates.

Prices for many of our raw materials and energy can be volatile. In response to increases in raw material and energy costs, we generally take actions intended to mitigate the effect of higher costs including increasing prices, developing alternative formulations for our products, increasing productivity, and hedging purchases of certain raw materials.

As in many chemical businesses, we consume significant quantities of natural gas in the production of Materials Technologies products. World events and other economic factors can cause volatility in the price of natural gas. Increases or decreases in the cost of natural gas and raw materials can have a significant impact on our operating margins. We have implemented a risk management program under which we hedge natural gas in a way that is intended to provide protection against price volatility. See also disclosure in this Report in Item 7A (Quantitative and Qualitative Disclosures about Market Risk).

FINANCIAL INFORMATION ABOUT INDUSTRY SEGMENTS AND GEOGRAPHIC AREAS

Disclosure of financial information about industry segments and geographic areas for 2016, 2015 and 2014 is provided in this Report in Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 17 (Segment Information) to the Consolidated Financial Statements, which disclosure is incorporated herein by reference. Disclosure of risks attendant to our foreign operations is provided in this Report in Item 1A (Risk Factors).

BACKLOG OF ORDERS

While at any given time there may be some backlog of orders, this backlog is not material in respect to our total annual sales, nor are the changes, from time to time, significant.

INTELLECTUAL PROPERTY; RESEARCH ACTIVITIES

Competition in the specialty chemicals and specialty materials industry is often based on technological superiority and innovation. Our ability to maintain our margins and effectively compete with other suppliers depends on our ability to introduce new products based on innovative technology, as well as our ability to obtain patent or other intellectual property protection. Our research and development programs emphasize development of new products and processes, improvement of existing products and processes and application of existing products and processes to new industries and uses. Most research activity is conducted in North America and Europe.

Table of Contents

We routinely file and obtain patents in a number of countries around the world that are significant to our businesses in order to protect our investments in innovation, research, and product development. Numerous patents and patent applications protect our products, formulations, manufacturing processes, equipment, and improvements. We also benefit from the use of trade secret information, including know-how and other proprietary information relating to many of our products and processing technologies. There can be no assurance, however, that our patents, patent applications and precautions to protect trade secrets and know-how will provide sufficient protection for our intellectual property. In addition, other companies may independently develop technology that could replicate, and thus diminish the advantage provided by, our trade secrets. Other companies may also develop alternative technology or design-arounds that could circumvent our patents or may acquire patent rights applicable to our business which might interpose a limitation on expansion of our business in the future.

Research and development expenses were approximately $49 million, $47 million, and $51 million in 2016, 2015, and 2014, respectively. These amounts include depreciation and amortization expenses related to research and development assets and expenses incurred in funding external research projects. The amount of research and development expenses relating to government- and customer-sponsored projects (rather than projects that we sponsor) was not material during these periods. Grace also conducts research and development activities with our ART joint venture, which are not included in the amounts above.

ENVIRONMENT, HEALTH AND SAFETY MATTERS

We are subject, along with other manufacturers of specialty chemicals, to stringent regulations under numerous regional, national, provincial, state and local environment, health and safety laws and regulations relating to the manufacture, storage, handling, disposal and stewardship of chemicals and other materials. Environmental laws require that certain responsible parties, as defined in the relevant statute, fund remediation actions regardless of legality of original disposal or ownership of a disposal site. We are involved in various response actions to address the presence of chemical substances as required by applicable laws.

We have expended substantial funds to comply with environmental laws and regulations and expect to continue to do so in the future. The following table sets forth our expenditures in the past three years, and our estimated expenditures in 2017 and 2018, for (i) the operation and maintenance of manufacturing facilities and the disposal of wastes; (ii) capital expenditures for environmental control facilities; and (iii) site remediation:

Year (In millions)	Operation of Facilities and Waste Disposal	Capital Expenditures	Site Remediation	
2014	$ 53	$ 22	$ 12	
2015	47	15	12	
2016	62	10	18	
2017	53	15	23	(1)
2018	53	14	14	(1)

(1) Amounts are based on environmental response matters for which sufficient information is available to estimate costs, and reflect estimated spending following the Separation. We do not have sufficient information to estimate all of Grace's possible future environmental response costs. As we receive new information, our estimate of such costs may change materially.

Additional information about our environmental remediation activities is provided in this Report in Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 10 (Commitments and Contingent Liabilities) to the Consolidated Financial Statements.

We continuously seek to improve our environment, health and safety performance. To the extent applicable, we extend the basic elements of the American Chemistry Council's RESPONSIBLE CARE® program to all our locations worldwide, embracing specific performance objectives in the key areas of management systems, product stewardship, employee health and safety, community awareness and emergency response, distribution, process safety and pollution prevention. We have implemented the RESPONSIBLE CARE® Security Code through a company-wide security program focused on the security of our people, processes, and systems. We have reviewed existing security (including cybersecurity) vulnerability and taken actions to enhance security systems where deemed necessary. In addition, we are complying with the Department of Homeland Security's

Table of Contents

Chemical Facility Anti-Terrorism Standards, including identifying facilities subject to the standards, conducting security vulnerability assessments and developing site security plans, as necessary.

EMPLOYEE RELATIONS

As of December 31, 2016, we employed approximately 3,700 persons, of whom approximately 1,900 were employed in the United States and approximately 1,000 were employed in Germany. Of our total employees, approximately 2,300 were salaried and 1,400 were hourly.

As of December 31, 2016, approximately 630 of our manufacturing employees in the United States are represented by unions. We have operated without a labor work stoppage for more than 10 years.

As of December 31, 2016, we have works councils representing the majority of our European sites serving approximately 1,100 employees.

AVAILABILITY OF REPORTS AND OTHER DOCUMENTS

We maintain an Internet website at www.grace.com. Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports, filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available, free of charge, on our website as soon as reasonably practicable after such reports are electronically filed with, or furnished to, the Securities and Exchange Commission, or SEC. These reports may be accessed through our website's investor information page.

In addition, the charters for the Audit, Compensation, Nominating and Governance, and Corporate Responsibility Committees of our Board of Directors, our corporate governance principles and code of ethics are available, free of charge, on our website at www.grace.com/en-us/corporate-leadership/pages/governance.aspx. Printed copies of the charters, governance principles and code of ethics may be obtained free of charge by contacting Grace Shareholder Services at 410-531-4167.

The information on our website is not, and shall not be deemed to be, a part of this report or incorporated into any other filings we make with the SEC.

Our Chief Executive Officer and Chief Financial Officer have submitted certifications to the SEC pursuant to the Sarbanes Oxley Act of 2002 as exhibits to this Report.

EXECUTIVE OFFICERS

See "Executive Officers of the Registrant" following Part I, Item 4 of this Report for information about our Executive Officers.

Item 1A. RISK FACTORS

This Report, including the Financial Supplement, contains, and our other public communications may contain, forward-looking statements; that is, information related to future, not past, events. Such statements generally include the words "believes," "plans," "intends," "targets," "will," "expects," "suggests," "anticipates," "outlook," "continues" or similar expressions. Forward-looking statements include, without limitation, all statements regarding: expected financial positions; results of operations; cash flows; financing plans; business strategy; operating plans; capital and other expenditures; competitive positions; growth opportunities for existing products; benefits from new technology and cost reduction initiatives, plans and objectives; and markets for securities. For these statements, we claim the protection of the safe harbor for forward-looking statements contained in Section 27A of the Securities Act and Section 21E of the Exchange Act. We are subject to risks and uncertainties that could cause our actual results to differ materially from our projections or that could cause other forward-looking statements to prove incorrect. Factors that could cause actual events to materially differ from those contained in the forward-looking statements include those factors set forth below and elsewhere in this Annual Report on Form 10-K. Our reported results should not be considered as an indication of our future performance. Readers are cautioned not to place undue reliance on our projections and forward-looking statements, which speak only as of the date thereof. We undertake no obligation to publicly release any revisions to the projections and forward-looking statements contained in this document, or to update them to reflect events or circumstances occurring after the date of this document. In addition to general economic, business and market conditions, we are subject to other risks and uncertainties, including, without limitation, the following:

11

Table of Contents

Risks Related to the Business

The global scope of our operations subjects us to the risks of doing business in foreign countries, which could adversely affect our business, financial condition and results of operations.

We operate our business on a global scale with approximately 72% of our 2016 sales outside the United States. We operate and/or sell to customers in over 60 countries and in 30 currencies. We currently have many production facilities, research and development facilities and administrative and sales offices located outside North America, including facilities and offices located in EMEA, Asia Pacific and Latin America. We expect non-U.S. sales to continue to represent a substantial majority of our revenue. Accordingly, our business is subject to risks related to the differing legal, political, social and regulatory requirements and economic conditions of many jurisdictions. Risks inherent in non-U.S. operations include the following:

- commercial agreements may be more difficult to enforce and receivables more difficult to collect;
- intellectual property rights may be more difficult to enforce;
- increased shipping costs, disruptions in shipping or reduced availability of freight transportation;
- we may have difficulty transferring our profits or capital from foreign operations to other countries where such funds could be more profitably deployed;
- we may experience unexpected adverse changes in export duties, quotas and tariffs and difficulties in obtaining export licenses;
- some foreign countries have adopted, and others may impose, additional withholding and other taxes or adopt other restrictions on foreign trade or investment, including import, currency exchange and capital controls, charges and limitations;
- foreign governments may nationalize private enterprises;
- our business and profitability in a particular country could be affected by political or economic repercussions on a domestic, country-specific or global level from terrorist activities and the response to such activities;
- we may be affected by unexpected adverse changes in foreign laws or regulatory requirements; and
- we are exposed to geopolitical risk, where unexpected changes in global, regional, or local political or social conditions could adversely affect our foreign operations.

Our success as a global business will depend, in part, upon our ability to succeed in differing legal, regulatory, economic, social and political conditions by developing, implementing and maintaining policies and strategies that are effective in each location where we do business.

We are exposed to currency exchange rate changes that impact our profitability.

We are exposed to currency exchange rate risk through our U.S. and non-U.S. operations. Changes in currency exchange rates may materially affect our operating results. For example, changes in currency exchange rates may affect the relative prices at which we and our competitors sell products in the same region and the cost of materials used in our operations. A substantial portion of our net sales and assets are denominated in currencies other than the U.S. dollar, particularly the euro. When the U.S. dollar strengthens against other currencies, at a constant level of business, our reported sales, earnings, assets and liabilities are reduced because the non-U.S. currencies translate into fewer U.S. dollars.

We incur a currency transaction risk whenever one of our operating subsidiaries enters into either a purchase or a sales transaction using a currency different from the operating subsidiary's functional currency. Given the volatility of exchange rates, we may not be able to manage our currency transaction risks effectively, or volatility in currency exchange rates may expose our financial condition or results of operations to a significant additional risk.

Prices for certain raw materials and energy are volatile and can have a significant effect on our manufacturing and supply chain strategies as we seek to maximize our profitability. If we are unable to successfully adjust our strategies in response to volatile raw materials and energy prices, such volatility could have a negative effect on our earnings in future periods.

We use petroleum-based materials, metals, natural gas and other materials in the manufacture of our products. We consume substantial amounts of energy in our manufacturing processes. Prices for these materials and energy are volatile and can have a significant effect on our pricing, sales, manufacturing and supply chain strategies as we seek to maximize our profitability. Our ability to successfully adjust strategies in response to

12

Table of Contents

volatile raw material and energy prices is a significant factor in maintaining or improving our profitability. If we are unable to successfully adjust our strategies in response to volatile prices, such volatility could have a negative effect on our sales and earnings in future periods.

A substantial portion of our raw materials are commodities whose prices fluctuate as market supply and demand fundamentals change.

We attempt to manage exposure to price volatility of major commodities through:

- long-term supply contracts;
- contracts with customers that permit adjustments for changes in prices of commodity-based materials and energy;
- forward buying programs that layer in our expected requirements systematically over time; and
- limited use of financial instruments.

Although we regularly assess our exposure to raw material price volatility, we cannot always predict the prospects of volatility and we cannot always cover the risk in a cost effective manner.

We have a policy of maintaining, when available, multiple sources of supply for raw materials. However, certain of our raw materials may be provided by single sources of supply. We may not be able to obtain sufficient raw materials due to unforeseen developments that would cause an interruption in supply. Even if we have multiple sources of supply for raw materials, these sources may not make up for the loss of a major supplier.

If we are not able to continue our technological innovation and successful introduction of new products, our customers may turn to other suppliers to meet their requirements.

The specialty chemicals industry and the end-use markets into which we sell our products experience ongoing technological change and product improvements. A key element of our business strategy is to invest in research and development activities with the goal of introducing new high-performance, technically differentiated products. We may not be successful in developing new technology and products that effectively compete with products introduced by our competitors, and our customers may not accept, or may have lower demand for, our new products. If we fail to keep pace with evolving technological innovations or fail to improve our products in response to our customers' needs, then our business, financial condition and results of operations could be adversely affected as a result of reduced sales of our products.

We spend large amounts of money for environmental compliance in connection with our current and former operations.

As a manufacturer of specialty chemicals and specialty materials, we are subject to stringent regulations under numerous U.S. federal, state, local and foreign environmental, health and safety laws and regulations relating to the generation, storage, handling, discharge, disposition and stewardship of chemicals and other materials. We have expended substantial funds to comply with such laws and regulations and have established a policy to minimize our emissions to the environment. Nevertheless, legislative, regulatory and economic uncertainties (including existing and potential laws and regulations pertaining to climate change) make it difficult for us to project future spending for these purposes and if there is an acceleration in new regulatory requirements, we may be required to expend substantial additional funds to remain in compliance.

We are subject to environmental clean-up costs, fines, penalties and damage claims that have been and continue to be costly.

In the U.S., we are subject to lawsuits and regulatory actions, in connection with current and former operations (including some divested businesses and off-site disposal facilities), that seek clean-up or other remedies. We are also subject to similar risks outside of the U.S.

We operated a vermiculite mine in Libby, Montana, until 1990. Some of the vermiculite ore that was mined at the Libby mine contained naturally occurring asbestos. We are cooperating with the U.S. Environmental Protection Agency (the "EPA") and other federal, state and local governmental agencies in a remedial investigation and feasibility study ("RI/FS") of the Libby mine and the surrounding area to determine the location, scope and extent of required remediation. The EPA is also investigating or remediating formerly owned or operated sites that processed Libby vermiculite into finished products. We are cooperating with the EPA on these

13

Table of Contents

investigation and remediation activities, and have recorded a liability to the extent that our review has indicated that a probable liability has been incurred and the cost is estimable.

We have recorded liabilities for all environmental matters for which a loss is considered to be probable and sufficient information is available to reasonably estimate the loss. These liabilities do not include the cost to remediate the Libby vermiculite mine and surrounding area or costs related to any additional EPA claims, whether resulting from the EPA's investigation of vermiculite facilities or otherwise, which may be material but are not currently estimable. Due to these vermiculite-related matters, it is probable that our ultimate liability for environmental matters will exceed our current estimates by material amounts.

Our indebtedness may materially affect our business, including our ability to fulfill our obligations, react to changes in our business and incur additional debt to fund future needs.

We have a substantial amount of debt. As of December 31, 2016, we had $1,028.2 million of unsecured indebtedness outstanding and $555.9 million of secured indebtedness outstanding. Our indebtedness may have material effects on our business, including to:

- require us to dedicate a substantial portion of our cash flow to debt payments, thereby reducing funds available for working capital, capital expenditures, acquisitions, research and development, distributions to stockholders, stock repurchase programs and other purposes;
- restrict us from making strategic acquisitions or taking advantage of favorable business opportunities;
- limit our flexibility in planning for, or reacting to, changes in our business and the industries in which we operate;
- increase our vulnerability to adverse economic, credit and industry conditions, including recessions;
- make it more difficult for us to satisfy our debt service and other obligations;
- place us at a competitive disadvantage compared to our competitors that have relatively less debt; and
- limit our ability to borrow additional funds, or to dispose of assets to raise funds, if needed, for working capital, capital expenditures, acquisitions, research and development and other purposes.

If we incur additional debt, the risks related to our indebtedness may intensify.

Restrictions imposed by agreements governing our indebtedness may limit our ability to operate our business, finance our future operations or capital needs, or engage in other business activities. If we fail to comply with certain restrictions under these agreements, our debt could be accelerated and we may not have sufficient cash to pay our accelerated debt.

The agreements governing our indebtedness contain various covenants that limit, among other things, our ability, and the ability of certain of our subsidiaries, to:

- incur certain liens;
- enter into sale and leaseback transactions; and
- consolidate, merge or sell all or substantially all of our assets or the assets of our guarantors.

As a result of these covenants, we will be limited in the manner in which we can conduct our business, and may be unable to engage in favorable business activities or finance future operations or capital needs. Accordingly, these restrictions may limit our flexibility to operate our business. A failure to comply with the restrictions contained in these agreements, including maintaining the financial ratios required by our credit facilities, could lead to an event of default which could result in an acceleration of our indebtedness. We cannot assure you that our future operating results will be sufficient to enable us to comply with the covenants contained in the agreements governing our indebtedness or to remedy any such default. In addition, in the event of an acceleration, we may not have or be able to obtain sufficient funds to make any accelerated payments.

Our indebtedness exposes us to interest expense increases if interest rates increase.

As of December 31, 2016, $313.0 million, or approximately 20%, of our borrowings were at variable interest rates and expose us to interest rate risk. If interest rates increase, our debt service obligations on the variable rate indebtedness would increase even though the amount borrowed would remain the same, and our net income would decrease. An increase of 100 basis points in the interest rates payable on our variable rate indebtedness would increase our annual estimated debt-service requirements by $3.1 million, assuming our consolidated variable interest rate indebtedness outstanding as of December 31, 2016, remains the same.

Table of Contents

We have unfunded and underfunded pension plan liabilities. We will require future operating cash flow to fund these liabilities. We have no assurance that we will generate sufficient cash to satisfy these obligations.

We maintain U.S. and non-U.S. defined benefit pension plans covering current and former employees who meet or met age and service requirements. Our net pension liability and cost is materially affected by the discount rate used to measure pension obligations, the longevity and actuarial profile of our workforce, the level of plan assets available to fund those obligations and the actual and expected long-term rate of return on plan assets. Significant changes in investment performance or a change in the portfolio mix of invested assets can result in corresponding increases and decreases in the valuation of plan assets or in a change in the expected rate of return on plan assets. Assets available to fund the pension benefit obligation of the U.S. advance-funded pension plans at December 31, 2016, were approximately $1,086 million, or approximately $82 million less than the measured pension benefit obligation on a U.S. GAAP basis. In addition, any changes in the discount rate could result in a significant increase or decrease in the valuation of pension obligations, affecting the reported funded status of our pension plans as well as the net periodic pension cost in the following years. Similarly, changes in the expected return on plan assets can result in significant changes in the net periodic pension cost in the following years.

Our obligation to make payments to the PD Trust in respect of asbestos PD Claims (other than ZAI PD Claims) is not capped and we may be obligated to make additional payments.

Under the Joint Plan of reorganization that concluded Grace's status as a debtor under Chapter 11, as discussed above (the "Joint Plan"), an asbestos property damage trust has been established and funded under Section 524(g) of the Bankruptcy Code. The order of the Bankruptcy Court confirming the Joint Plan contains a channeling injunction which provides that all pending and future asbestos-related property damage claims and demands, PD Claims, can only be brought against the PD Trust. The PD Trust contains two accounts. One of these accounts, the PD Account, is funded solely in respect of PD Claims other than those PD Claims related to our former ZAI attic insulation product. Unresolved and future non-ZAI PD Claims are to be litigated pursuant to procedures approved by the Bankruptcy Court and, to the extent such PD claims are determined to be allowed claims, are to be paid in cash by the PD Trust. We are obligated to make a payment to the PD Trust every six months in the amount of any non-ZAI PD Claims allowed during the preceding six months plus interest (if any) and the amount of PD Trust expenses for the preceding six months (the "PD Obligation"). The aggregate amount we are required to pay under the PD Obligation is not capped so we may have to make additional payments to the PD Account in respect of the PD Obligation. We are also obligated to make up to 10 contingent deferred payments to the PD Trust of $8 million each during the 20-year period beginning February 3, 2019, in respect of ZAI PD Claims in the event the ZAI PD Account's assets fall below $10 million in the preceding year. We have accrued liabilities for probable PD Claims but have not accrued any liability for the contingent ZAI PD payments as we do not believe they are probable.

Table of Contents

Our ability to use net operating losses and tax credits to reduce future tax payments may be limited if there is a change in ownership of Grace or if Grace does not generate sufficient U.S. taxable income. Our ability to use these attributes is also subject to time limitations. Changes in tax laws and regulations may reduce their value and availability.

Our ability to use future tax deductions, including net operating losses ("NOLs"), is dependent on our ability to generate sufficient future taxable income in the U.S. In addition, our ability to use future tax deductions may be limited by Section 382 of the Internal Revenue Code resulting from future changes in the ownership of outstanding Company common stock. Our Amended and Restated Certificate of Incorporation provides that under certain circumstances, our Board of Directors would have the authority to impose restrictions on the transfer of Company common stock with respect to certain 5% stockholders in order to preserve these future tax deductions.

Under U.S. federal income tax law, a corporation is generally permitted to carry forward NOLs for a 20-year period for deduction against future taxable income. Foreign tax credits also expire over time. Also, our ability to use NOLs and tax credits and their value may be adversely affected by changes in tax laws and regulations.

We intend to pursue acquisitions, joint ventures and other transactions that complement or expand our businesses. We may not be able to complete proposed transactions and even if completed, the transactions may involve a number of risks that may materially and adversely affect our business, financial condition and results of operations.

We intend to continue to pursue opportunities to buy other businesses or technologies that could complement, enhance or expand our current businesses or product lines or that might otherwise offer us growth opportunities. We may have difficulty identifying appropriate opportunities or, if we do identify opportunities, we may not be successful in completing transactions for a number of reasons. Any transactions that we are able to identify and complete may involve a number of risks, including:

- the diversion of management's attention from our existing businesses to integrate the operations and personnel of the acquired or combined business or joint venture;
- possible adverse effects on our operating results during the integration process;
- failure of the acquired business to achieve expected operational objectives; and
- our possible inability to achieve the intended objectives of the transaction.

In addition, we may not be able to successfully or profitably integrate, operate, maintain and manage any newly acquired operations or their employees. We may not be able to maintain uniform standards, controls, procedures and policies, which may lead to operational inefficiencies.

We work with dangerous materials that can injure our employees, damage our facilities and disrupt our operations.

Some of our operations involve the handling of hazardous materials that may pose the risk of fire, explosion, or the release of hazardous substances. Such events could result from natural disasters, operational failures or terrorist attacks, and might cause injury or loss of life to our employees and others, environmental contamination, and property damage. These events might cause a temporary shutdown of an affected plant, or portion thereof, and we could be subject to penalties or claims as a result. A disruption of our operations caused by these or other events could have a material adverse effect on our results of operations.

Some of our employees are unionized, represented by works councils or employed subject to local laws that are less favorable to employers than the laws in the United States.

As of December 31, 2016, we had approximately 3,700 global employees. Approximately 630 of our approximately 1,900 U.S. employees are unionized. In addition, a large number of our employees are employed in countries in which employment laws provide greater bargaining or other rights to employees than the laws in the United States. Such employment rights require us to work collaboratively with the legal representatives of the employees to effect any changes to labor arrangements. For example, most of our employees in Europe are represented by works councils that have co-determination rights on any changes in conditions of employment, including certain salaries and benefits and staff changes, and may impede efforts to restructure our workforce. A strike, work stoppage or slowdown by our employees or significant dispute with our employees, whether or not related to these negotiations, could result in a significant disruption of our operations or higher ongoing labor costs.

Table of Contents

We may be subject to claims of infringement of the intellectual property rights of others, which could hurt our business.

From time to time, we face infringement claims from our competitors or others alleging that our processes or products infringe on their proprietary technologies. Any claims that our products or processes infringe the intellectual property rights of others, regardless of the merit or resolution of the claims, could cause us to incur significant costs in responding to, defending and resolving the claims, and may divert the efforts and attention of our management and technical personnel from our business. If we are 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, pay others to use the technology or stop using the technology or producing the infringing product. Even if we ultimately prevail, the existence of the lawsuit could prompt our customers to switch to products that are not the subject of infringement suits.

We are subject to business continuity risks that may adversely affect our business, financial condition and results of operations.

We are subject to significant risks from both natural disasters and accidents such as fires, storms and floods, and other disruptive events, such as war, insurrection and terrorist actions. These types of occurrences can negatively affect our manufacturing, supply chain, logistics, transportation, and communications functions. Similarly, they can strike major suppliers and customers, thus restricting or delaying our supply of raw materials or energy as well as reducing or deferring demand for our products and services. Also, we have centralized certain administrative functions, primarily in North America, Europe and Asia, to improve efficiency and reduce costs. To the extent that these central locations are disrupted or disabled, key business processes, such as invoicing, payments and general management operations, could be interrupted.

As we operate worldwide in a competitive environment, global economic and financial market conditions may adversely affect our business, financial condition and results of operations.

We compete by selling value-added products, technologies and services. Increased levels and numbers of competitors, globally or regionally, could negatively impact our results of operations. Economic conditions around the world can have a direct impact on our revenues. A global or regional economic downturn or market uncertainty could reduce the demand for our products, technologies and services, which could negatively impact our results of operations. Since many of our customers are refiners, our fluid catalytic cracking (FCC) catalyst business is highly dependent on the economics of the petroleum refining industry. Demand for our FCC products is affected by refinery throughput, the type and quality of refinery feedstocks, and the demand for transportation fuels and other refinery products, such as propylene. Also, disruptions in the financial markets could have an adverse effect on our ability to finance our operations and growth plans, and could negatively impact our suppliers and customers in similar manners.

Our ability to operate our businesses and our financial condition could be significantly undermined by cybersecurity breaches.

Despite our implementation of security measures, our information technology (“IT”) systems are subject to cyber attack and other similar disruptions. Breaches by hackers, the introduction of computer viruses and other cybersecurity incidents affecting our IT systems could result in disruptions to our operations. Also, such incidents could include theft of our trade secrets and other intellectual property, as well as confidential customer and business information, which could be used by unauthorized parties and publicly disclosed. This could negatively affect our relationships with customers and our ability to compete effectively, and could ultimately harm our reputation, business, financial condition and results of operations. In addition, we may be required to incur significant costs to protect against damage caused by cybersecurity breaches in the future.

A failure of our information technology infrastructure could adversely impact our business and operations.

We rely upon the capacity, reliability and security of our IT infrastructure and our ability to expand and continually update this infrastructure in response to the changing needs of our business. If we experience a problem with the functioning of an important IT system, the resulting disruptions could have an adverse effect on our business. Our IT systems affect virtually every aspect of our business, including supply chain, manufacturing, logistics, finance and communications. We and certain of our third-party vendors receive and store personal

Table of Contents

information in connection with our human resources operations and other aspects of our business. Any IT system failure, natural disaster, accident, or intentional breach could result in disruptions to our operations.

Risks Related to the Separation

Grace and GCP are subject to restrictions under a Tax Sharing Agreement between them, and a violation of the Tax Sharing Agreement may result in tax liability to Grace and its stockholders.

We entered into a Tax Sharing Agreement with GCP to preserve the tax-free treatment, for U.S. federal income tax purposes, of the separation and distribution of GCP common stock to Grace stockholders. Under this Tax Sharing Agreement, we and GCP will be restricted from engaging in certain transactions that could result in the Separation becoming taxable to us and our stockholders. Compliance with the Tax Sharing Agreement and the restrictions therein may limit our near-term ability to pursue certain strategic transactions or engage in activities that might be beneficial from a business perspective. This may result in missed opportunities or the pursuit of business strategies that may not be as beneficial for us and which may negatively affect our anticipated profitability. If GCP fails to comply with the restrictions in the Tax Sharing Agreement and as a result the Separation was determined to be taxable for U.S. federal income tax purposes, we and our stockholders at the time of the Separation that are subject to U.S. federal income tax could incur significant U.S. federal income tax liabilities. Although the Tax Sharing Agreement provides that GCP is required to indemnify us for taxes incurred that may arise were GCP to fail to comply with its obligations under the Tax Sharing Agreement, there is no assurance that GCP will have the funds to satisfy that liability. Also, GCP will not be required to indemnify our stockholders for any tax liabilities they may incur for its violation of the Tax Sharing Agreement.

In connection with the Separation, GCP will indemnify us and we will indemnify GCP for certain liabilities. There can be no assurance that the indemnities from GCP will be sufficient to insure us against the full amount of such liabilities, or that GCP's ability to satisfy its indemnification obligation will not be impaired in the future.

Pursuant to the Separation and Distribution Agreement and other agreements we entered into in connection with the Separation, GCP agreed to indemnify us for certain liabilities, and we agreed to indemnify GCP for certain liabilities. However, third parties might seek to hold us responsible for liabilities that GCP agreed to assume or retain under these agreements, and there can be no assurance that GCP will be able to fully satisfy its indemnification obligations under these agreements.

A court could deem the Distribution in the Separation to be a fraudulent conveyance and void the transaction or impose substantial liabilities upon us.

If the transaction is challenged by a third party, notwithstanding the fact that we received an opinion from a nationally recognized financial firm that we were solvent and had adequate surplus to make the Distribution, a court could deem the distribution of GCP common stock or certain internal restructuring transactions undertaken by us in connection with the Separation to be a fraudulent conveyance or transfer. Fraudulent conveyances or transfers are defined to include transfers made or obligations incurred with the actual intent to hinder, delay or defraud current or future creditors or transfers made or obligations incurred for less than reasonably equivalent value when the debtor was insolvent, or that rendered the debtor insolvent, inadequately capitalized or unable to pay its debts as they become due. In such circumstances, a court could void the transactions or impose substantial liabilities upon us, which could adversely affect our financial condition and our results of operations. Among other things, the court could require our stockholders to return to us some or all of the shares of GCP common stock issued in the Distribution or require us to fund liabilities of other companies involved in the Separation for the benefit of creditors. Whether a transaction is a fraudulent conveyance or transfer will vary depending upon the laws of the applicable jurisdiction.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

We operate manufacturing plants and other facilities (including offices, warehouses, labs and other service facilities) throughout the world. Some of these plants and facilities are shared by our reportable segments. We consider our major operating properties to be in good operating condition and suitable for their current use. We

18

Table of Contents

believe that the productive capacity of our plants and other facilities is generally adequate for current operations. The table below summarizes our primary facilities by reportable segment and region as of December 31, 2016:

	Number of Facilities(1)				
	North America	Europe Middle East Africa (EMEA)	Asia Pacific	Latin America	Total
Catalysts Technologies	10	4	1	—	15
Leased	2	3	—	—	5
Owned	8	1	1	—	10
Materials Technologies	4	2	1	1	8
Leased	2	1	—	1	4
Owned	2	1	1	—	4

(1) Shared facilities are counted in all applicable reportable segments. The total number of facilities included in the above table, without regard to sharing amongst reportable segments, is 20 of which we leased 9 and owned 11.

We own our principal facilities. With respect to our other facilities, we either own, lease or hold them under a land lease arrangement. Our corporate headquarters is in Columbia, Maryland, and we also lease and operate a shared services facility in Manila, Philippines. Our largest Catalysts Technologies facilities are located in Baltimore, Maryland; Lake Charles, Louisiana; and Worms, Germany. Our largest Materials Technologies facilities are located in Baltimore, Maryland; Albany, Oregon; and Worms, Germany.

For information on our net properties and equipment by region and country, see disclosure set forth in Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 17 (Segment Information) to our Consolidated Financial Statements, which disclosure is incorporated herein by reference.

In connection with our credit agreement, we executed security agreements with respect to certain of our larger United States facilities. As of December 31, 2016, mortgages or deeds of trust were in effect with respect to facilities in the following locations: Chicago, Illinois; Lake Charles, Louisiana; Baltimore and Columbia, Maryland; and Albany, Oregon. The Mount Pleasant, Tennessee facility, with respect to which Grace previously had executed a security interest, became a GCP site at the time of the Separation. For a description of our credit agreement see Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 5 (Debt) to the Consolidated Financial Statements.

Item 3. LEGAL PROCEEDINGS

CHAPTER 11 PROCEEDINGS

Disclosures provided in this Report in Item 1 (Business) and Item 8 (Financial Statements and Supplementary Data), and in the Financial Supplement under Note 1 (Basis of Presentation and Summary of Significant Accounting and Financial Reporting Policies, under the caption "Chapter 11 Proceedings"), Note 10 (Commitments and Contingent Liabilities, under the caption "Legacy Product and Environmental Liabilities"), and Note 19 (Chapter 11 and Joint Plan of Reorganization) to the Consolidated Financial Statements, are incorporated herein by reference.

ASBESTOS LITIGATION

Disclosures provided in this Report in Item 8 (Financial Statements and Supplementary Data) and in the Financial Supplement under Note 10 (Commitments and Contingent Liabilities) and Note 19 (Chapter 11 and Joint Plan of Reorganization) to the Consolidated Financial Statements are incorporated herein by reference.

ENVIRONMENTAL INVESTIGATIONS AND CLAIMS

Disclosures provided in this Report in Item 1 (Business) under the caption "Environment, Health and Safety Matters" and Item 8 (Financial Statements and Supplementary Data), and in the Financial Supplement under Note 10 (Commitments and Contingent Liabilities, under the caption "Legacy Environmental Liabilities") to the Consolidated Financial Statements, are incorporated herein by reference.

Table of Contents

TAX CLAIMS

Disclosures provided in this Report in Item 8 (Financial Statements and Supplementary Data) and in the Financial Supplement under Note 7 (Income Taxes) to the Consolidated Financial Statements are incorporated herein by reference.

OTHER CLAIMS RECEIVED PRIOR TO THE CHAPTER 11 CLAIMS BAR DATE

Disclosures provided in this Report in Item 8 (Financial Statements and Supplementary Data) and in the Financial Supplement under Note 10 (Commitments and Contingent Liabilities) and Note 19 (Chapter 11 and Joint Plan of Reorganization) to the Consolidated Financial Statements are incorporated herein by reference.

Item 4. MINE SAFETY DISCLOSURES

Information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K (17 CFR 229.104) is included in Exhibit 95 to this Report.

Table of Contents

EXECUTIVE OFFICERS OF THE REGISTRANT

Pursuant to General Instruction G(3) of Form 10-K, the following list of executive officers of Grace as of February 15, 2017, is included as an unnumbered Item in Part I of this report in lieu of being included in the Grace Proxy Statement relating to the Annual Meeting of Stockholders to be held on May 9, 2017. Our executive officers are elected annually.

Name and Age	Office	First Elected
Alfred E. Festa (57)	Chairman of the Board	01/01/08
	Chief Executive Officer	06/01/05
Hudson La Force III (52)	President and Chief Operating Officer	02/04/16
Thomas E. Blaser (55)	Senior Vice President and Chief Financial Officer	02/25/16
Elizabeth C. Brown (53)	Vice President and Chief Human Resources Officer	01/21/15
Keith N. Cole (58)	Vice President, Government Relations and Environmental, Health and Safety	02/10/14
Mark A. Shelnitz (58)	Vice President, General Counsel and Secretary	04/27/05

Messrs. Festa, La Force and Shelnitz have been actively engaged in Grace's business for the past five years.

Mr. Blaser joined Grace in 2016. Mr. Blaser was most recently during 2015 President of Arysta LifeScience North America, LLC, a global agricultural chemical and life science business where he also served for ten years as Chief Financial Officer.

Ms. Brown joined Grace in 2015. From 2010 until she joined Grace, Ms. Brown held leadership positions in human resources for Tyco International Limited (now Johnson Controls, Inc.).

Mr. Cole joined Grace in 2014. From 2002 until he joined Grace, Mr. Cole held leadership positions in government relations and public policy for General Motors Corporation.

Table of Contents

PART II

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

Except as provided below, the disclosure required by this Item appears in this Report in: Item 6 (Selected Financial Data); under the heading "Selected Financial Data" opposite the caption "Other Statistics—Common shareholders of record" in the Financial Supplement; Item 8 (Financial Statements and Supplementary Information) in the Financial Supplement in Note 14 (Shareholders' Equity) and Note 22 (Quarterly Summary and Statistical Information (Unaudited) opposite the captions "Dividends declared per share" and "Market price of common stock") to the Consolidated Financial Statements; and Item 12 (Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters), and such disclosure is incorporated herein by reference.

SHAREHOLDER RIGHTS AGREEMENT

On March 31, 1998, we paid a dividend of one Preferred Stock Purchase Right on each share of Company common stock. Subject to our prior redemption for $.01 per right, rights will become exercisable on the earlier of:

- 10 days after an acquiring person, composed of an individual or group, has acquired beneficial ownership of 20% or more of the outstanding Company common stock or
- 10 business days (or a later date fixed by the Board of Directors) after an acquiring person commences (or announces the intention to commence) a tender offer or exchange offer for beneficial ownership of 20% or more of the outstanding Company common stock.

Until these events occur, the rights will automatically trade with the Company common stock, and separate certificates for the rights will not be distributed. The rights do not have voting or dividend rights.

Generally, each right not owned by an acquiring person:

- will initially entitle the holder to buy from Grace one hundredth of a share of the Company Junior Participating Preferred Stock, at an exercise price of $100, subject to adjustment;
- will entitle such holder to receive upon exercise, in lieu of shares of Company junior preferred stock, that number of shares of Company common stock having a market value of two times the exercise price of the right; and
- may be exchanged by Grace for one share of Company common stock or one hundredth of a share of Company junior preferred stock, subject to adjustment.

Generally, if there is an acquiring person and we are acquired, each right not owned by an acquiring person will entitle the holder to buy a number of shares of common stock of the acquiring company having a market value equal to twice the exercise price of the right.

Each share of Company junior preferred stock will be entitled to a minimum preferential quarterly dividend payment of $1.00 per share but will be entitled to an aggregate dividend equal to 100 times the dividend declared per share of Company common stock whenever such dividend is declared. In the event of liquidation, holders of Company junior preferred stock will be entitled to a minimum preferential liquidation payment of $100 per share but will be entitled to an aggregate payment equal to 100 times the payment made per share of Company common stock. Each share of Company junior preferred stock will have 100 votes, voting together with the Company common stock. Finally, in the event of any business combination, each share of Company junior preferred stock will be entitled to receive an amount equal to 100 times the amount received per share of Company common stock. These rights are protected by customary antidilution provisions.

The terms of the rights may be amended by the Board of Directors without the consent of the holders of the rights. The rights expire on March 30, 2018. The rights have been approved by the U.S. Bankruptcy Court for the District of Delaware and the Official Committee of Equity Security Holders in connection with our Chapter 11 proceedings.

Table of Contents

This summary of the rights does not purport to be complete and is qualified in its entirety by reference to the Rights Agreement, which has been filed with the SEC.

DIVIDENDS ON COMPANY COMMON STOCK

Prior to 2016, we had not paid a cash dividend on Company common stock since 1997. However, on January 26, 2016, we announced that our Board of Directors approved a policy of paying a regular quarterly cash dividend at an initial annual rate of $0.68 per share of Company common stock. On February 8, 2017, we announced that our Board of Directors approved an increase to the annual cash dividend rate, raising it to $0.84 per share of Company common stock. Although our credit agreement and indentures (as described in Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 5 (Debt) to the Consolidated Financial Statements and filed as an exhibit to this Report) contain certain restrictions on the payment of dividends on, and redemptions of, equity interests and other restricted payments, we believe that such restrictions do not currently materially limit our ability to pay dividends. Any determination to pay cash dividends in the future may be affected by business and market conditions, our views on potential future capital requirements, the restrictions noted above, covenants contained in any agreements we may enter into in the future and changes in federal income tax law.

SHARE REPURCHASES

Share Repurchase Program

On February 5, 2015, we announced that the Board of Directors authorized a share repurchase program of up to $500 million. On February 8, 2017, we announced that the Board of Directors authorized an additional share repurchase program of up to $250 million. Repurchases under the program may be made through one or more open market transactions at prevailing market prices; unsolicited or solicited privately negotiated transactions; accelerated share repurchase programs; or through any combination of the foregoing, or in such other manner as determined by management. The timing of the repurchases and the actual amount repurchased will depend on a variety of factors, including the market price of Grace's shares, the strategic deployment of capital, and general market and economic conditions.

The following table presents information regarding the repurchase of Company common stock by Grace or any "affiliated purchaser" of Grace during the three months ended December 31, 2016:

	Total number of shares purchased (#)	Average price paid per share ($/share)	Total number of shares purchased as part of publicly announced plans or programs (#)	Approximate dollar value of shares that may yet be purchased under the plans or programs ($ in millions)
10/1/2016 - 10/31/2016	158,100	70.69	158,100	162.7
11/1/2016 - 11/30/2016	1,879,275	68.55	1,879,275	33.9
12/1/2016 - 12/31/2016	—	—	—	33.9
Total	2,037,375	68.72	2,037,375	33.9

PI Warrant Settlement

As of February 3, 2014, the effective date of the Grace Joint Plan of Reorganization, we issued to the WRG Personal Injury Trust warrants (the "PI Warrant") to acquire 10 million shares of Company common stock at a price of $17 per share. On February 3, 2015, we repurchased the PI Warrant for a payment of $490 million.

STOCK TRANSFER RESTRICTIONS

Under the terms of our Amended and Restated Certificate of Incorporation, as approved by the Bankruptcy Court as part of the confirmation of the Joint Plan, in order to preserve significant tax benefits which are subject to elimination or limitation, the Board of Directors has the authority to impose restrictions on the transfer of Company common stock with respect to certain 5% shareholders. Imposing such restrictions requires at least a 25% ownership shift to occur (as determined under Internal Revenue Code regulations) and at least a two-thirds vote of all of the directors. These restrictions would generally not limit the ability of a person that holds less than 5% of Company common stock to either buy or sell stock on the open market.

Table of Contents

This summary does not purport to be complete and is qualified in its entirety by reference to the Amended and Restated Certificate of Incorporation, which has been filed with the SEC and is incorporated by reference as Exhibit 3.1 to this Annual Report on Form 10-K.

STOCK PERFORMANCE GRAPH

The following information in Item 5 is not deemed to be "soliciting material" or to be "filed" with the SEC or subject to Regulation 14A or 14C under the Securities Exchange Act of 1934, as amended (the "Exchange Act") or to the liabilities of Section 18 of the Exchange Act, and will not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act, except to the extent Grace specifically incorporates it by reference into such a filing.

The line graph and table below compare the cumulative total shareholder return on Company common stock with the cumulative total return of companies on the Standard & Poor’s ("S&P") 500 Stock Index, the S&P Composite 1500 Specialty Chemicals Index and S&P 1500 Diversified Chemicals Index. This graph and table assume the investment of $100 in Company common stock on December 31, 2011. Cash dividends paid in 2016 are assumed reinvested for the graph and table below.

	2011	2012	2013	2014	2015	2016
W. R. Grace & Co.(1)	$100	$146	$215	$208	$217	$206
S&P 500 Index	100	116	154	175	177	198
S&P 1500 Specialty Chemicals	100	138	183	216	212	238
S&P 1500 Diversified Chemicals	100	121	173	185	188	219

(1) Return on W. R. Grace & Co. stock for 2016 includes the return on GCP stock from the Distribution Date through December 31, 2016.

Table of Contents

Item 6. SELECTED FINANCIAL DATA

The disclosure required by this Item appears in the Financial Supplement under the heading "Selected Financial Data" which disclosure is incorporated herein by reference.

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

The disclosure required by this Item appears in the Financial Supplement under the heading "Management's Discussion and Analysis of Financial Condition and Results of Operations" which disclosure is incorporated herein by reference.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Our global operations, raw materials and energy requirements, and debt obligations expose us to various market risks. We use derivative financial instruments to mitigate certain of these risks. The following is a discussion of our primary market risk exposures, how those exposures are managed, and certain quantitative data pertaining to our market risk-sensitive instruments.

Currency Exchange Rate Risk

We operate and/or sell to customers in over 60 countries and in 30 currencies; therefore, our results of operations are exposed to changes in currency exchange rates. We seek to minimize exposure to these changes by matching revenue streams in volatile currencies with expenditures in the same currencies, but it is not always possible to do so. From time to time, we use financial instruments such as currency forward contracts, options, or combinations of them to reduce the risk of certain specific transactions. However, we do not have a policy of hedging all exposures, because management does not believe that such a level of hedging would be cost-effective. Significant uses of derivatives to mitigate the effects of changes in currency exchange rates are as follows.

In May 2016, Grace entered into a fixed-to-fixed cross-currency swap maturing in October 2021 to hedge its net investment in non-U.S. subsidiaries. On every April 1 and October 1, Grace will swap interest payments. Grace will pay euro fixed at the annual rate of 3.426% on €170.0 million and receive U.S. dollars fixed at the annual rate of 5.125% on $190.3 million. The agreement requires an exchange of the notional amounts at maturity. The following tables provide information about the cross-currency swap at December 31, 2016, specifically, the aggregate future cash flows for each of the five next years and thereafter and the fair value. The fair value represents the value of the derivative contract, and is included in "other current assets" and "other assets" in the Consolidated Balance Sheets.

(In millions)	2017	2018	2019	2020	2021	Thereafter
Payable—interest and principal in euro	€5.8	€5.8	€5.8	€5.8	€175.8	€ —
Receivable—interest and principal in U.S. dollars	$9.8	$9.8	$9.8	$9.8	$200.1	$ —

(In millions)	December 31, 2016
Current asset	$ 3.6
Non-current asset	4.0
Net fair value	$ 7.6

There were no significant currency forward exchange agreements outstanding at December 31, 2016.

Commodity Price Risk

We operate in markets where the prices of raw materials and energy are commonly affected by cyclical movements in the economy and other factors. The principal raw materials used in our products include molybdenum oxide, sodium silicate, zeolite, caustic soda, sodium aluminate, aluminum sulfate, rare earths, alumina, aluminum metal and tungsten salt. Natural gas is the largest single energy source that we purchase. These commodities are generally available to be purchased from more than one supplier. In order to minimize the

Table of Contents

risk of increasing prices on certain raw materials and energy, we use a centralized supply chain organization for sourcing in order to optimize procurement activities. We have a risk management committee to review proposals to hedge purchases of raw materials and energy.

We have implemented a risk management program under which we hedge natural gas and aluminum supply in a way that seeks to provide protection against price volatility in the natural gas and aluminum markets. In order to mitigate volatility in natural gas prices, we have entered into both fixed-rate swaps and options contracts to hedge a portion of our U.S. natural gas requirements. Additionally, in order to mitigate volatility in aluminum prices, we have entered into fixed-rate swaps to hedge a portion of our U.S. aluminum requirements.

The following tables provide information about our commodity fixed-rate swaps. For natural gas commodity fixed-rate swaps, contract volumes, or notional amounts, are presented in millions of MMBtu (million British thermal units), weighted average contract prices are presented in U.S. dollars per million MMBtu, and the total contract amount and fair value are presented in millions of U.S. dollars. For aluminum commodity fixed-rate swaps, contract volumes, or notional amounts, are presented in millions of pounds, weighted average contract prices are presented in U.S. dollars per pound, and the total contract amount and fair value are presented in millions of U.S. dollars. The fair values of the commodity fixed-rate swaps represent the excess of the variable price (market price) over the fixed price (pay price) multiplied by the nominal contract volumes. All commodity fixed-rate swaps mature within 15 months.

	Commodity Derivatives—December 31, 2016			
Type of Contract	Contract Volumes	Weighted Average Price	Total Contract Amount	Fair Value
Aluminum swaps	1.3	$ 0.77	$ 1.0	$ —

	Commodity Derivatives—December 31, 2015			
Type of Contract	Contract Volumes	Weighted Average Price	Total Contract Amount	Fair Value
Natural gas swaps	1.3	$ 1.90	$ 2.4	$ 0.5
Aluminum swaps	1.4	$ 0.78	$ 1.1	$ —

The fair value of commodity derivative contracts is presented as other assets or other liabilities and allocated between current and non-current, as appropriate, in the Consolidated Balance Sheets.

We have also entered into forward contracts for natural gas and aluminum that qualify for the normal purchases and normal sales exception from Accounting Standards Codification ("ASC") 815 "Derivatives and Hedging," as they do not contain net settlement provisions and therefore result in physical delivery of natural gas and aluminum from suppliers. Accordingly, the fair values of these contracts are not recorded in our Consolidated Balance Sheets.

Interest Rate Risk

As of December 31, 2016, approximately $313.0 million of our borrowings were at variable interest rates and expose us to interest rate risk. As a result, we have been and will continue to be subject to the variations on interest rates in respect of our floating-rate debt. A 100 basis point increase in the interest rates payable on our variable rate debt outstanding as of December 31, 2016, would increase our annual interest expense by approximately $3.1 million.

In connection with our emergence financing, we entered into an interest rate swap beginning on February 3, 2015, and maturing on February 3, 2020, fixing the LIBOR component of the interest on $250 million of Grace's term debt at a rate of 2.393%. While we have and may continue to enter into agreements intending to limit our exposure to higher interest rates, any such agreements may not offer complete protection from this risk.

See Item 8 (Financial Statements and Supplementary Data) in the Financial Supplement under Note 6 (Fair Value Measurements and Risk) to the Consolidated Financial Statements for additional disclosure around market risk, which disclosure is incorporated herein by reference.

Table of Contents

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The disclosure required by this Item appears in the Financial Supplement which disclosure is incorporated herein by reference.

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

None.

Item 9A. CONTROLS AND PROCEDURES

Except as provided below, the disclosure required by this Item appears in the Financial Supplement under the headings "Management's Report on Financial Information and Internal Controls" and "Report of Independent Registered Public Accounting Firm," which disclosure is incorporated herein by reference.

There was no change in Grace's internal control over financial reporting during the quarter ended December 31, 2016, that has materially affected, or is reasonably likely to materially affect, Grace's internal control over financial reporting.

Item 9B. OTHER INFORMATION

None.

Table of Contents

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Incorporated by reference to the sections entitled "Proposal One: Election of Directors," "—Nominees for Election as Directors," "—Continuing Directors," and "—Corporate Governance," "Questions and Answers—Where can I find Grace corporate governance materials?," and "Other Information—Section 16(a) Beneficial Ownership Reporting Compliance" of a definitive proxy statement that Grace will file with the SEC no later than 120 days after December 31, 2016 (the "2017 Proxy Statement"). Required information on executive officers of Grace appears at Part I after Item 4 of this report.

Item 11. EXECUTIVE COMPENSATION

Incorporated by reference to the sections entitled "Proposal One: Election of Directors—Corporate Governance," and "—Director Compensation," and "Executive Compensation" of the 2017 Proxy Statement.

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

Incorporated by reference to the sections entitled "Other Information—Stock Ownership of Certain Beneficial Owners and Management" and "—Equity Compensation Plan Information" of the 2017 Proxy Statement.

Item 13. CERTAIN RELATIONSHIPS, RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

Incorporated by reference to the sections entitled "Proposal One: Election of Directors—Corporate Governance" and "Other Information—Related Party Transactions" of the 2017 Proxy Statement.

Item 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

Incorporated by reference to the sections entitled "Proposal Two: Ratification of the Appointment of Independent Registered Public Accounting Firm—Principal Accountant Fees and Services" and "—Audit Committee Pre-Approval Policies and Procedures" of the 2017 Proxy Statement.

Table of Contents

PART IV

Item 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

Financial Statements and Schedules. The required information is set forth in the Financial Supplement under the heading "Table of Contents" which is incorporated herein by reference.

Exhibits. The exhibits to this Report are listed below. Other than exhibits that are filed herewith, all exhibits listed below are incorporated by reference.

In reviewing the agreements included as exhibits to this and other Reports filed by Grace with the Securities and Exchange Commission, please remember they are included to provide you with information regarding their terms and are not intended to provide any other factual or disclosure information about Grace or other parties to the agreements. The agreements generally contain representations and warranties by each of the parties to the applicable agreement. These representations and warranties have been made solely for the benefit of the other parties to the applicable agreement. These representations and warranties:

- are not statements of fact, but rather are used to allocate risk to one of the parties if the statements prove to be inaccurate;
- may have been qualified by disclosures that were made to the other parties in connection with the negotiation of the applicable agreement, which disclosures are not necessarily reflected in the agreement;
- may apply standards of materiality in a way that is different from what may be viewed as material to you or other investors; and
- were made only as of the date of the applicable agreement or such other date or dates as may be specified in the agreement and do not reflect more recent developments.

Accordingly, these representations and warranties may not describe the actual state of affairs as of the date they were made or at any other time. Additional information about Grace may be found elsewhere in this report and Grace's other public filings, which are available without charge through the Securities and Exchange Commission's website at http://www.sec.gov.

Exhibit No.	Exhibit	Location
2.1	Joint Plan of Reorganization of W. R. Grace & Co. and its Debtor Subsidiaries.	Exhibit 2.01 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
2.2	Order Confirming Joint Plan of Reorganization.	Exhibit 2.02 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
2.3	Separation and Distribution Agreement dated as of January 27, 2016 by and among W. R. Grace & Co., W. R. Grace & Co.-Conn. and GCP Applied Technologies Inc.	Exhibit 2.1 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
3.1	Amended and Restated Certificate of Incorporation.	Exhibit 3.01 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
3.2	Amended and Restated By-laws.	

		Exhibit 3.01 to Form 8-K (filed 1/23/15) SEC File No.: 001-13953
4.1	Amended and Restated Rights Agreement dated as of March 25, 2008 between W. R. Grace & Co. and Mellon Investor Services LLC, as Rights Agent.	Exhibit 4.1 to Form 10/A (filed 3/25/08) SEC File No.: 001-13953
4.2	Receivables Purchase Agreement dated as of January 23, 2007 between Grace GmbH & Co. KG and Coface Finanz GmbH.	Exhibit 4.10 to Form 10-K (filed 3/02/07) SEC File No.: 001-13953
4.3	Credit Agreement dated as of February 3, 2014 by and among W. R. Grace & Co., W. R. Grace & Co.-Conn., Grace GmbH & Co. KG, a Federal Republic of Germany limited partnership, each lender from time to time party thereto, and Goldman Sachs Bank USA, as Administrative Agent.	Exhibit 4.01 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953

Table of Contents

Exhibit No.	Exhibit	Location
4.4	First Amendment and Consent to Credit Agreement and First Amendment to Security Agreement, by and among W. R. Grace & Co., W. R. Grace & Co.–Conn., Grace GmbH & Co. KG, Alltech Associates, Inc., each lender from time to time party thereto, and Goldman Sachs Bank USA, as Administrative Agent and lender.	Exhibit 10.1 to Form 8-K (filed 11/25/15) SEC File No.: 001-13953
4.5	Deferred Payment Agreement (PD) dated as of February 3, 2014 by and between W. R. Grace & Co.-Conn. and the WRG Asbestos PD Trust.	Exhibit 4.04 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
4.6	Guarantee Agreement (PD) dated as of February 3, 2014 by and between W. R. Grace & Co. and the WRG Asbestos PD Trust.	Exhibit 4.05 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
4.7	Deferred Payment Agreement (PD-ZAI) dated as of February 3, 2014 by and between W. R. Grace & Co.-Conn. and the WRG Asbestos PD Trust.	Exhibit 4.06 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
4.8	Guarantee Agreement (PD-ZAI) dated as of February 3, 2014 by and between W. R. Grace & Co. and the WRG Asbestos PD Trust.	Exhibit 4.07 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
4.9	Share Issuance Agreement dated as of February 3, 2014 by and among W. R. Grace & Co., the WRG Asbestos PD Trust and the WRG Asbestos PI Trust.	Exhibit 4.08 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
4.10	Indenture, dated as of September 16, 2014, by and among W. R. Grace & Co.—Conn., the guarantors party there to and Wilmington Trust, National Association, as trustee.	Exhibit 4.1 to Form 8-K (filed 9/19/14) SEC File No.: 001-13953
4.11	First Supplemental Indenture, dated as of September 16, 2014, by and among W. R. Grace & Co.—Conn., the guarantors party thereto and Wilmington Trust, National Association, as trustee.	Exhibit 4.2 to Form 8-K (filed 9/19/14) SEC File No.: 001-13953
4.12	Form of 5.125% Note due 2021 (included as Exhibit A-1 to Exhibit 4.11)	Exhibit 4.3 (included as Exhibit A-1 to Exhibit 4.2) to Form 8-K (filed 9/19/14) SEC File No.: 001-13953
4.13	Form of 5.625% Note due 2024 (included as Exhibit A-2 to Exhibit 4.11)	Exhibit 4.4 (included as Exhibit A-2 to Exhibit 4.2) to Form 8-K (filed 9/19/14) SEC File No.: 001-13953
10.1	WRG Asbestos Property Damage Settlement Trust Agreement dated as of February 3, 2014 by and between W. R. Grace & Co., the Asbestos PD Future Claimants' Representative, the Official Committee of Asbestos Property Damage Claimants, the Asbestos PD Trustees, Wilmington Trust Company, and the members of the Zonolite Attic Insulation Trust Advisory Committee.	Exhibit 10.02 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953
10.2	W. R. Grace & Co. 2011 Stock Incentive Plan.	Exhibit 10.1 to Form 8-K (filed 4/13/11) SEC File No.: 001-13953*
10.3	W. R. Grace & Co. Amended and Restated 2011 Stock Incentive Plan.	Exhibit 10.1 to Form 8-K (filed 5/01/13) SEC File No.: 001-13953*
10.4	W. R. Grace & Co. 2014 Stock Incentive Plan.	

		Exhibit 10.03 to Form 8-K (filed 2/07/14) SEC File No.: 001-13953*
10.5	Form of Stock Option Award Agreement (2013).	Exhibit 10.1 to Form 10-Q (filed 8/02/13) SEC File No.: 001-13953*
10.6	Form of Performance-based Unit Agreement (2013).	Exhibit 10.2 to Form 10-Q (filed 8/02/13) SEC File No.: 001-13953*
10.7	Form of Performance-based Unit Agreement (2016).	Exhibit 10.2 to Form 8-K (filed 2/09/16) SEC File No.: 001-13953*
10.8	Form of Stock Option Award Agreement (2011).	Exhibit 10.2 to Form 8-K (filed 4/13/11) SEC File No.: 001-13953*
10.9	Form of Stock Option Award Agreement (2016).	Exhibit 10.1 to Form 8-K (filed 2/09/16) SEC File No.: 001-13953*

Table of Contents

Exhibit No.	Exhibit	Location
10.10	Form of Restricted Stock Award Agreement (2014)	Exhibit 10.4 to Form 10-Q (filed 5/8/14) SEC File No.: 001-13953*
10.11	Form of Restricted Stock Award Agreement (2016)	Exhibit 10.3 to Form 8-K (filed 2/09/16) SEC File No.: 001-13953*
10.12	W. R. Grace & Co. Supplemental Executive Retirement Plan, as amended.	Exhibit 10.7 to Form 10-K (filed 3/28/02) SEC File No.: 001-13953*
10.13	W. R. Grace & Co. Executive Salary Protection Plan, as amended.	Exhibit 10.8 to Form 10-K (filed 3/28/02) SEC File No.: 001-13953*
10.14	Form of Executive Change in Control Severance Agreement between Grace and certain officers.	Exhibit 10.17 to Form 10-K (filed 3/13/03) SEC File No.: 001-13953*
10.15	Severance Plan for Leadership Team Officers of W. R. Grace & Co.	Exhibit 10.2 to Form 8-K (filed 2/04/16) SEC File No.: 001-13953*
10.16	Annual Incentive Compensation Program.	Exhibit 10.15 to Form 10-Q (filed 5/8/14) SEC File No.: 001-13953*
10.17	2015 Executive Annual Incentive Compensation Plan	Exhibit 10.1 to Form 8-K (filed 5/12/15) SEC File No.: 001-13953*
10.18	Tax Sharing Agreement, dated as of January 27, 2016, by and among W. R. Grace & Co., W. R. Grace & Co.–Conn. and GCP Applied Technologies Inc.	Exhibit 10.1 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
10.19	Employee Matters Agreement, dated as of January 27, 2016, by and among W. R. Grace & Co., W. R. Grace & Co.–Conn. and GCP Applied Technologies Inc.	Exhibit 10.2 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
10.20	Transition Services Agreement, dated as of January 27, 2016, by and between W. R. Grace & Co.–Conn. and GCP Applied Technologies Inc.	Exhibit 10.3 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
10.21	Cross-License Agreement, dated as of January 27, 2016, by and among GCP Applied Technologies Inc., W. R. Grace & Co.–Conn. and Grace GmbH & Co. KG.	Exhibit 10.4 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
10.22	Grace Transitional License Agreement, dated as of January 27, 2016, by and between W. R. Grace & Co.–Conn. and GCP Applied Technologies Inc.	Exhibit 10.5 to Form 8-K (filed 1/28/16) SEC File No.: 001-13953
10.23	Letter Agreement dated May 27, 2009 between John F. Akers, on behalf of Grace, and Fred Festa (includes indemnification and arbitration provisions).	Exhibit 10.1 to Form 8-K (filed 5/29/09)

		SEC File No.: 001-13953*
10.24	Letter Agreement dated February 28, 2008 between Fred Festa, on behalf of Grace, and Hudson La Force III (includes indemnification provision).	Exhibit 10.1 to Form 8-K (filed 3/07/08) SEC File No.: 001-13953*
10.25	Letter Agreement dated November 13, 2013, between Fred Festa, on behalf of Grace, and Keith N. Cole (includes indemnification provision).	Exhibit 10.20 to Form 10-K (filed 2/25/15) SEC File No.: 001-13953*
10.26	Letter Agreement dated December 3, 2014, between Fred Festa, on behalf of Grace, and Elizabeth C. Brown (includes indemnification provision).	Exhibit 10.1 to Form 10-Q (filed 5/07/15) SEC File No.: 001-13953*
10.27	Accepted Letter dated January 21, 2016, between Fred Festa, on behalf of Grace, and Thomas E. Blaser (includes indemnification provision).	Exhibit 10.10 to Form 10-Q (filed 5/05/16) SEC File No.: 001-13953*
12	Computation of Ratio of Earnings to Fixed Charges and Combined Fixed Charges and Preferred Stock Dividends.	Filed herewith
21	List of Subsidiaries of W. R. Grace & Co.	Filed herewith
23	Consent of Independent Registered Public Accounting Firm.	Filed herewith
24	Powers of Attorney.	Filed herewith
31		

Table of Contents

Exhibit No.	Exhibit	Location
31.(i).1	Certification of Periodic Report by Chief Executive Officer under Section 302 of the Sarbanes-Oxley Act of 2002	Filed herewith
31.(i).2	Certification of Periodic Report by Chief Financial Officer under Section 302 of the Sarbanes-Oxley Act of 2002	Filed herewith
32	Certification of Periodic Report by Chief Executive Officer and Chief Financial Officer under Section 906 of the Sarbanes-Oxley Act of 2002	Filed herewith
95	Mine Safety Disclosure Exhibit	Filed herewith
101.INS	XBRL Instance Document	Filed herewith
101.SCH	XBRL Taxonomy Extension Schema	Filed herewith
101.CAL	XBRL Taxonomy Extension Calculation Linkbase	Filed herewith
101.DEF	XBRL Taxonomy Extension Definition Linkbase	Filed herewith
101.LAB	XBRL Taxonomy Extension Label Linkbase	Filed herewith
101.PRE	XBRL Taxonomy Extension Presentation Linkbase	Filed herewith

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* Management contracts and compensatory plans, contracts or arrangements required to be filed as exhibits to this Report.

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.

W. R. GRACE & CO.

By: /s/ A. E. FESTA
A. E. Festa
(Chairman and Chief Executive Officer)

By: /s/ THOMAS E. BLASER
Thomas E. Blaser
(Senior Vice President and Chief Financial Officer)

By: /s/ WILLIAM C. DOCKMAN
William C. Dockman
(Vice President and Controller)

Dated: February 23, 2017

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 on February 23, 2017.

Signature		Title
H. F. Baldwin*	}	
R. F. Cummings, Jr.*	}	
J. Fasone Holder*	}	
D. H. Gulyas*	}	Directors
J. N. Quinn*	}	
C. J. Steffen*	}	
M. E. Tomkins*	}	

/s/ A. E. FESTA (A. E. Festa)	Chairman, Chief Executive Officer and Director (Principal Executive Officer)
/s/ THOMAS E. BLASER (Thomas E. Blaser)	Senior Vice President and Chief Financial Officer (Principal Financial Officer)
/s/ WILLIAM C. DOCKMAN (William C. Dockman)	Vice President and Controller (Principal Accounting Officer)

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* By signing his name hereto, Mark A. Shelnitz is signing this document on behalf of each of the persons indicated above pursuant to powers of attorney duly executed by such persons and filed with the Securities and Exchange Commission.

By: /s/ MARK A. SHELNITZ
Mark A. Shelnitz
(Attorney-in-Fact)

Table of Contents

FINANCIAL SUPPLEMENT
W. R. GRACE & CO.
ANNUAL REPORT ON FORM 10-K
FOR THE YEAR ENDED DECEMBER 31, 2016

Table of Contents

TABLE OF CONTENTS