



who solves for a
more sustainable future?
—
we do.

annual report
fiscal 2019



Our Story

Ashland Global Holdings Inc. (NYSE: ASH) is a premier, global specialty materials company serving customers in a wide range of consumer and industrial markets, including adhesives, architectural coatings, automotive, construction, energy, food and beverage, nutraceuticals, personal care and pharmaceutical. At Ashland, **we are approximately 4,700 passionate, tenacious solvers** – from renowned scientists and research chemists to talented engineers and plant operators – who thrive on developing practical, innovative and elegant solutions to complex problems for customers in more than 100 countries. Our people are distinguished by their ability to create and apply specialized chemistry in ways that enable customers to amplify the **efficacy**, refine the **usability**, add to the **allure**, ensure the **integrity**, and improve the **profitability** of their products and applications. Visit ashland.com to learn more.

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Financial Highlights*

(Dollars in millions except per share data)

	2019	2018	2017
Sales	\$ 2,493	\$ 2,589	\$ 2,309
Operating income	\$ 166	\$ 102	\$ 49
EBITDA	\$ 900	\$ 471	\$ 487
Adjusted EBITDA	\$ 532	\$ 515	\$ 430
Income (loss) from continuing operations	\$ 24	\$ 19	\$ (180)
Net income	\$ 505	\$ 114	\$ 28
Net income attributable to Ashland	\$ 505	\$ 114	\$ 1
Diluted EPS			
Income (loss) from continuing operations	\$.39	\$.29	\$ (2.90)
Income from discontinued operations attributable to Ashland	7.64	1.50	2.91
Net income attributable to Ashland	\$ 8.03	\$ 1.79	\$.01
Cash flows provided by operating activities from continuing operations	\$ 228	\$ 241	\$ 174
Additions to PP&E	\$ 154	\$ 157	\$ 168
Number of employees	4,700	6,000	6,500
Number of common stockholders of record	10,500	11,100	11,500

This Annual Report contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These forward-looking statements are not historical facts and generally are identified by words such as "anticipates," "believes," "estimates," "expects," "is likely," "predicts," "projects," "forecasts," "may," "will," "should," and "intends" and the negative of these words or other comparable terminology. Although Ashland believes that its expectations are based on reasonable assumptions, such expectations are subject to risks and uncertainties that are difficult to predict and may be beyond Ashland's control. Please see "Item 1A. Risk Factors" and "Use of estimates, risks and uncertainties" in Note A of Notes to Consolidated Financial Statements in this Annual Report. Unless legally required, Ashland undertakes no obligation to update any forward-looking statements made in this Annual Report, whether as a result of new information, future events or otherwise.



A Note from Our CEO



William A. Wulfsohn
Chairman and Chief
Executive Officer

To Our Shareholders:

Fiscal year 2019 was a year of important gains in the context of difficult external conditions.

In fiscal 2019 operating income was \$166 million compared to \$102 million a year ago. Income from continuing operations was \$24 million, or \$0.39 per diluted share, versus \$19 million, or \$0.29 per diluted share in fiscal 2018. Net income attributable to Ashland was \$505 million or \$8.03 per diluted share compared to \$114 million, or \$1.79 per diluted share, while adjusted EBITDA was \$532 million in fiscal 2019, compared to \$515 million in fiscal 2018.

From a financial perspective, we faced challenging end market conditions and a stronger U.S. dollar. In this context, Ashland took aggressive action. We implemented a program to reduce layers, increase operational agility, and improve our competitiveness by reducing our fixed costs by \$120 million on a run-rate basis by end of the calendar year. This drove an increase in adjusted EBITDA margins to 21.3 percent of sales compared to 19.9 percent in the prior fiscal year. In total, Ashland delivered adjusted earnings per share (EPS) growth of 14 percent versus fiscal 2018. Thus, while lower than we originally anticipated, Ashland made important financial gains in a difficult context.

From an operational perspective, we also made many important gains. In fiscal 2019, we launched 23 new products to support targeted growth in our pharmaceutical, nutrition, personal care, nutraceutical and coatings businesses. We expanded the use of Ashland's Production System (APS), which helped drive improvements in safety, quality, asset reliability and overall customer experience.

During the year, we substantially expanded our focus on sustainability. We established a Sustainability Council which is focused on sustainable sourcing, reducing our environmental

impact and increasing sales of natural-based products. We have had numerous and important gains in this critical area, which are profiled in our sustainability report and can be found on ashland.com.

From a capital allocation perspective, we made great gains in fiscal year 2019. In August, Ashland divested the Composites business and Marl BDO facility to INEOS Enterprise. The proceeds from this transaction and ongoing cash flow generation enabled Ashland to return over \$260 million to shareholders in fiscal 2019 through both share repurchases and dividends, while reducing debt by \$940 million.

Importantly, just after the close of fiscal 2019, we announced that I will leave Ashland at the end of the calendar year and Guillermo Novo will take on the role as Ashland's next chairman and CEO.

As I reflect upon my tenure with Ashland, I am proud of the transformation we have completed and the team's many accomplishments.

Our first priority has been safe and responsible operations. In 2018, Ashland was recognized by the American Chemistry Council as the Responsible Care® Company of the year and we were also named one of America's Safest Companies by EHS Today.

We completed Ashland's multi-decade transformation from a conglomerate focused on oil refining and marketing in 1997 to the pure-play specialty materials company we are today. When I joined the company five years ago, our specialty materials portion of our business represented 41 percent of our sales versus 96 percent today. As part of this effort, we created an independent, publicly-traded Valvoline in 2017, acquired several businesses including Pharmachem and Vornia, and sold the Composites business and Marl BDO facility to INEOS. We now have a focused business with many highly differentiated products that

we are supplying to industry leading customers in very attractive end markets.

We have created a far more competitive and agile organization by eliminating layers and reducing SG&A expenses in fiscal 2019. Ashland adjusted EBITDA margins have improved from 17.6 percent in fiscal 2014 to 21.3 percent in fiscal 2019. Similar gains have been realized in Ashland's Specialty Ingredients business, where operating income margins have improved from 10.1 percent in fiscal 2014 to 11.4 percent in fiscal 2019. Specialty Ingredients adjusted EBITDA margins have improved from 21.2 percent in fiscal 2014 to 23.4 percent in fiscal 2019.

We have returned \$1.3 billion to shareholders in the form of share repurchase and dividends. At the same time, we have substantially improved Ashland's financial strength and financial flexibility. With the spin off of Valvoline, we transferred the large majority of Ashland's pension obligations. We also established an asbestos trust which, along with anticipated insurance proceeds, is well positioned to help fund future asbestos claim indemnity and

legal costs. And finally, we have lowered gross debt from \$3.3 billion as of Dec. 31, 2014, to \$1.7 billion at the end of fiscal year 2019.

We have transformed the corporation from a portfolio-management orientation to an operating company and have set the foundation to be the premier specialty materials company. We have established a new blueprint which outlines our core operational priorities, the Ashland Way which defines our culture and our new "always solving™" brand which communicates internally and externally the core strength and value we deliver to the marketplace.

And finally, as a result of these actions we delivered 40 percent total shareholder returns since January 2015

We have
created a far
more competitive
and agile
organization by
eliminating layers
and reducing
SG&A expenses
in fiscal 2019.

versus 26 percent for the S&P 400* Chemicals index over the same period.

Today we are a stronger, more focused Ashland with the foundation required to achieve our vision of becoming the premier specialty materials company. At the same time, our journey is not complete. We have many opportunities and challenges as we work to achieve our full potential by delivering greater revenue growth, margin expansion and cash generation.

With that in mind, this is the right time for new leadership as we move from portfolio transformation to take the additional and essential steps required to reach our full potential. I am excited by the naming of Guillermo Novo as Ashland's next chairman and CEO. Guillermo is a proven leader who has the right experience, skills and leadership abilities to accelerate Ashland's operational, strategic and financial performance.

Sincerely,

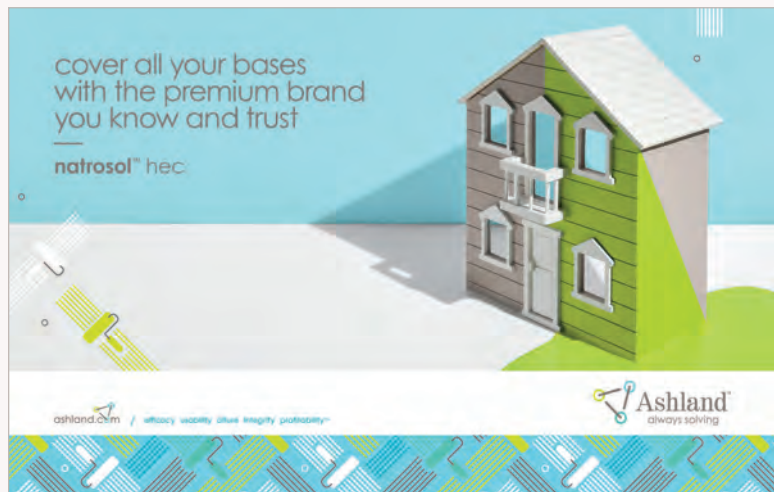
William A. Wulfsohn

Chairman and
Chief Executive Officer

November 25, 2019

Recognition and product highlights

At Ashland, we are passionate about creating technologies and solutions to improve our customers' products and processes, reduce our environmental impact, preserve the world's natural resources and enhance the quality of life within our communities. The following pages highlight market-leading products and some of our new innovations.



Ashland's solvers are experts in rheology modification. We enable paint formulators to meet market demands with groundbreaking innovation, a global product line, and personal attention. From a wall, to a room, to the overall painting experience, Ashland is transforming the way our industry thinks about paint.

* third-party registered



The Antaron™ trade name has long represented best in class water-resistance.

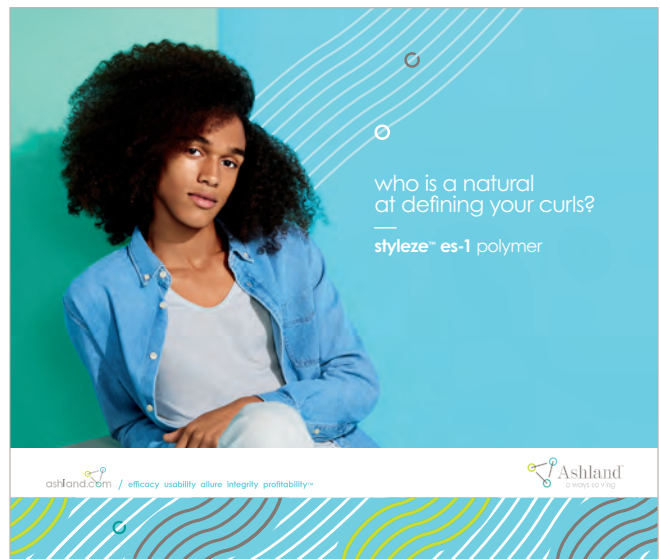
Antaron™ Eco ethylcellulose meets this performance standard while using natural, sustainably sourced raw materials: designed for sustainability, cost-effective water-resistant broad formula capability.



Ashland won the "Best Sustainable Ingredient" award for cb2 skin™ biofunctional at the Sustainable Beauty Awards during the European Sustainable Cosmetics Summit.



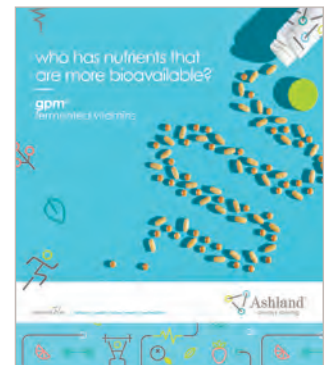
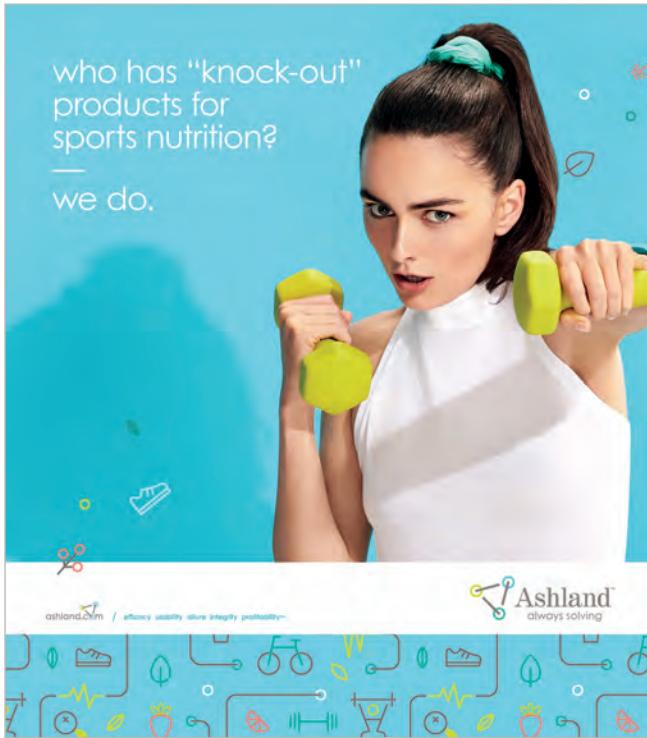
Ashland cb2-skin™ and Rosaliss™ biofunctional were Personal Care Magazine cover stories in April and May 2019.



Styleze™ ES-1 polymer is a naturally-derived polymer that delivers voluminous style for bouncy, defined waves and curls.

This COSMOS* validated, biodegradable solution provides improved style durability and 48-hour humidity-resistance.

Ashland revealed three new ingredients for the self-directed, sports-minded consumer, two distribution collaborations and rebooted two on-trend solutions in October 2019. These new products expand Ashland's ever growing portfolio of health and wellness specialty ingredients.



Ashland solves customers' stickiest packaging challenges with a wide range of laminating adhesives, coatings and digital printing innovations. Many of our solutions are solvent-free and water-based.



Ashland structural adhesives create strong bonds for multilayered wood products so customers can construct with integrity. Many solutions are water-based and formaldehyde-free.



Ashland's new Rad-Sure™ ChromicVue™ blood irradiation indicator provides the dependable positive visual verification of irradiation in a smaller version of the traditional indicator for gamma and X-ray irradiation. This new indicator is ideal for syringe irradiation and aliquot bags for pediatric and neonatal blood irradiation.

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

FORM 10-K

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

For the fiscal year ended September 30, 2019

OR

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

For the transition period from _____ to _____

Commission file number 333-211719

ASHLAND GLOBAL HOLDINGS INC.

Delaware
(State or other jurisdiction of incorporation or organization)

81-2587835
(I.R.S. Employer Identification No.)

50 E. RiverCenter Boulevard
Covington, Kentucky 41011
Telephone Number (859) 815-3333

Securities Registered Pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Trading Symbol</u>	<u>Name of each exchange on which registered</u>
Common Stock, par value \$.01 per share	ASH	New York Stock Exchange

Securities Registered Pursuant to Section 12(g) of the Act: None

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

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

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

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

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

Large Accelerated Filer

Accelerated Filer

Non-Accelerated Filer

Smaller Reporting Company

Emerging Growth Company

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

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

At March 31, 2019, the aggregate market value of voting stock held by non-affiliates of the Registrant was approximately \$4,880,568,000. In determining this amount, the Registrant has assumed that its directors and executive officers are affiliates. Such assumption shall not be deemed conclusive for any other purpose.

At October 31, 2019, there were 60,183,754 shares of Registrant's common stock outstanding.

Documents Incorporated by Reference

Portions of Registrant's Proxy Statement (Proxy Statement) for its Annual Meeting of Stockholders are incorporated by reference into Part III of this annual report on Form 10-K to the extent described herein.

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PART I

ITEM 1. BUSINESS

GENERAL

Ashland Global Holdings Inc. is a Delaware corporation, with its principal executive offices located at 50 E. RiverCenter Boulevard, Covington, Kentucky 41011 (Telephone: (859) 815-3333). Ashland Global Holdings Inc. was incorporated in 2016 as the successor to a Kentucky corporation named Ashland Inc. organized in 2004 (now known as Ashland LLC), which was itself organized as the successor to a Kentucky corporation of the same name organized in 1936. The new holding company structure was put in place to allow Ashland Inc. to reincorporate in Delaware and to help facilitate the separation of the Valvoline business from the specialty chemicals businesses, creating two independent, publicly held companies (the Reorganization). As a result of the Reorganization, Ashland Global Holdings Inc. replaced Ashland Inc. as the publicly held corporation, and Ashland Inc. was converted to a Kentucky limited liability company and is now an indirect, wholly owned subsidiary of Ashland Global Holdings Inc. The terms “Ashland” and the “Company” as used herein include Ashland Global Holdings Inc., its predecessors and its consolidated subsidiaries, except where the context indicates otherwise. As a result of the Reorganization, Ashland is the successor issuer to Ashland Inc. pursuant to Rule 12g-3(a) under the Securities Exchange Act of 1934, as amended (the Exchange Act) and files periodic and other reports required by the Exchange Act. Effective January 1, 2020, Ashland will move its headquarters and principal executive offices to 8145 Blazer Drive, Wilmington, Delaware 19808.

Ashland is a global leader in providing specialty chemical solutions to customers in a wide range of consumer and industrial markets, including adhesives, architectural coatings, construction, energy, food and beverage, nutraceuticals, personal care and pharmaceutical. With approximately 4,700 employees worldwide, Ashland serves customers in more than 100 countries.

On August 30, 2019, Ashland closed the sale of its Composites segment (excluding the Maleic business) and its Intermediates and Solvents facility in Marl, Germany to INEOS Enterprises in a transaction valued at \$1.015 billion. Subsequent to completing the Composites disposition during the current year, Ashland’s operations are now managed in the following two reportable segments: Specialty Ingredients and Intermediates and Solvents.

Specialty Ingredients is a global leader in cellulose ethers, vinyl pyrrolidones and biofunctionals. It offers industry-leading products, technologies and resources for solving formulation and product-performance challenges. Specialty Ingredients uses natural, synthetic and semisynthetic polymers derived from cellulose ethers, vinyl pyrrolidones, acrylic polymers, polyester and polyurethane-based adhesives, and plant and seed extract. Specialty Ingredients’ end markets offer comprehensive and innovative solutions for today’s demanding consumer and industrial applications. Key customers include: pharmaceutical companies; makers of personal care products; food and beverage manufacturers; makers of nutraceuticals and supplements; manufacturers of paint, coatings and construction materials; packaging and converting companies; and oilfield service companies.

Intermediates and Solvents is a leading producer of 1,4 butanediol (BDO) and related derivatives, including n-methylpyrrolidone. These products are used as chemical intermediates in the production of engineering polymers and polyurethanes, and as specialty process solvents in a wide array of applications including electronics, pharmaceuticals, water filtration membranes and more. Butanediol is also supplied to Ashland’s Specialty Ingredients business for use as a raw material.

Unallocated and Other generally includes items such as certain significant company-wide restructuring activities, including internal separation costs, and legacy costs or adjustments that relate to divested businesses that are no longer operated by Ashland.

Available Information - Ashland's Internet address is <http://www.ashland.com>. On this website, Ashland makes available, free of charge, its annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports, as well as any beneficial ownership reports of officers and directors filed on Forms 3, 4 and 5. All such reports are available as soon as reasonably practicable after they are electronically filed with, or electronically furnished to, the Securities and Exchange Commission (SEC). Ashland also makes available, free of charge on its website, its Corporate Governance Guidelines, Board Committee Charters, Director Independence Standards and global code of conduct that applies to Ashland's directors, officers and employees. These documents are also available in print to any stockholder who requests them. Information contained on Ashland's website is not part of this annual report on Form 10-K and is not incorporated by reference in this document. The SEC maintains an Internet site (<http://www.sec.gov>) that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC.

SPECIALTY INGREDIENTS

Specialty Ingredients offers industry-leading products, technologies and resources for solving formulation and product-performance challenges. Using natural, synthetic and semisynthetic polymers derived from cellulose ethers, vinyl pyrrolidones, acrylic polymers, polyester and polyurethane-based adhesives, and plant and seed extract, Specialty Ingredients offers comprehensive and innovative solutions for consumer and industrial applications.

Key customers include pharmaceutical companies; makers of personal care products; food and beverage manufacturers; makers of nutraceuticals and supplements; manufacturers of paint, coatings and construction materials; packaging and converting companies; and oilfield service companies. Certain customer relationships are significant, and the loss of any one of those customers could have a material adverse effect on the Specialty Ingredients reportable segment.

Specialty Ingredients' areas of expertise include: organic and synthetic chemistry, polymer chemistry, surface and colloid science, rheology, structural analysis and microbiology.

Specialty Ingredients' solutions provide an array of properties, including: thickening and rheology control, water retention, adhesive strength, binding power, film formation, conditioning and deposition, colloid stabilization and suspension.

Specialty Ingredients is composed of various end use markets. Many of the products of the end markets are produced in shared manufacturing facilities, to better manage capacity and achieve desired returns.

Oral Care - Specialty Ingredients' portfolio of oral care products delivers active ingredients in toothpaste and mouthwashes; provides bioadhesive functionality for dentures; delivers flavor, texture and other functional properties; and provides product binding to ensure form and function throughout product lifecycle.

Hair Care - Specialty Ingredients' portfolio of hair care products includes advanced styling polymers, fixatives, conditioning polymers, emulsifiers, preservatives and rheology modifiers.

Skin Care - Specialty Ingredients' portfolio of ingredients and solutions for skin care, sun care, and cosmetics, with a focus on natural and sustainable solutions. Ashland Skin Care is a leader in organic UV filters, biofunctional actives, preservatives, and specialty polymers to provide functionality such as water resistance and rheology. Our natural ingredients include a wide range of cellulose, guar, and cassia derivatives; unique active ingredients derived from botanical sources using exclusive Ashland technologies such as Zeta Fraction and PSR technology; emollients based on natural chemistries; encapsulation technology derived from alginates; and efficacious preservative blends inspired by nature.

Home Care - Specialty Ingredients' portfolio of products and technologies is used in many types of cleaning and fragrance applications, including fabric care, home care and dishwashing. Specialty Ingredients' products are used in a variety of applications for viscosity enhancement, particle suspension, rheology modification, stabilization and fragrance enhancement.

Health and Wellness - Specialty Ingredients is a leading supplier of excipients and tablet coating systems to the pharmaceutical and nutraceutical industries. Excipients include a comprehensive range of polymers for use as tablet binders, superdisintegrants, sustained-release agents and drug solubilizers, as well as a variety of coating formulations for immediate, delayed, and sustained release applications. The portfolio also includes branded and proprietary nutraceutical ingredients and expertise in nutraceutical formulation, particle engineering and contract manufacturing. Its nutrition portfolio provides functional benefits in areas such as thickening, texture control, thermal gelation, structure enhancement, water binding, clarification and stabilization. Its core products include cellulose gums and vinyl pyrrolidone polymers which are used in a wide range of offerings for bakery, beverage, dairy, desserts, meat products, pet food, prepared foods, sauces and savory products.

Adhesives - Specialty Ingredients manufactures and sells adhesive solutions to the packaging and converting, building and construction, and transportation markets and manufactures and markets specialty coatings and adhesive solutions for use across multiple industries. Key technologies and markets include: acrylic polymers for pressure-sensitive adhesives; urethane adhesive for flexible packaging applications; aqueous and radiation-curable adhesives and specialty coatings for printing and converting applications; emulsion polymer isocyanate adhesives for structural wood bonding; elastomeric polymer adhesives for commercial roofing applications; acrylic, polyurethane and epoxy structural adhesives for bonding fiberglass reinforced plastics, composites, thermoplastics and metals in automotive, marine, recreational and industrial applications; specialty phenolic resins for paper impregnation and friction material bonding. Adhesive's products provide an array of functional properties including high-strength bonding, ease and speed of product assembly, heat and moisture resistance and design flexibility.

Coatings - Specialty Ingredients is a recognized leader in rheology solutions for waterborne architectural paint and coatings. Products include hydroxyethylcellulose (HEC), which provides thickening and application properties for interior and exterior paints, and nonionic synthetic associative thickeners (NSATs), which are APEO-free liquid synthetics for high-performance paint and industrial coatings. The Coatings Specialties market complements its rheology offering with a broad portfolio of performance foam-control agents, surfactants and wetting agents, dispersants and pH neutralizers.

Construction - Specialty Ingredients is a major producer and supplier of cellulose ethers and companion products for the construction industry. These products control properties such as water retention, open time, workability, adhesion, stabilization, pumping, sag resistance, rheology, strength, appearance and performance in dry-mortar formulations.

Energy - Specialty Ingredients is a leading global manufacturer of synthetic- and cellulosic-based products for drilling fluids, oil-well cement slurries, completion and workover fluids, fracturing fluids and production chemicals. Energy Specialties offers the oil and gas industry solutions for drilling, stimulation, completion, cementing and production applications.

Performance - Specialty Ingredients provides products and services to over 30 industries. Ashland offers a broad spectrum of organo- and water-soluble polymers that are derived from both natural and synthetic resources. Product lines include derivatized cellulose polymers, synthetics, and vinyl pyrrolidone polymers that impart effective functionalities to serve a variety of industrial markets and specialized applications. Many of the products within Performance Specialties function as performance additives that deliver high levels of end-user value in formulated products. In other areas, such as plastics and textiles, Performance Specialties' products function as a processing aid, improving the quality of end products and reducing manufacturing costs.

For fiscal 2019, the following Specialty Ingredients products were 10% or greater of Ashland's total consolidated sales:

Product	% of Specialty Ingredients sales	% of Ashland total consolidated sales
Cellulosics	35%	34%
Polyvinylpyrrolidones (PVP)	17%	17%

Specialty Ingredients operates throughout the Americas, Europe and Asia Pacific. It has 45 manufacturing and lab facilities in ten countries which serve its various end markets and participates in one joint venture. Specialty Ingredients has manufacturing facilities in Huntsville, Alabama; Anaheim, California; Wilmington, Delaware; Calumet City, Illinois; Calvert City, Kentucky; Freetown, Massachusetts; Chatham, Kearny, Parlin, Paterson, S. Hackensack (two facilities) and Totowa, New Jersey; Monroe and Ossining, New York; Merry Hill, North Carolina; Ashland, Columbus, Dublin and Hilliard, Ohio; White City, Oregon; Piedmont and Summerville, South Carolina; Kenedy and Texas City, Texas; Hopewell, Virginia; and Menomonee Falls, Wisconsin within the United States and Doel-Beveren, Belgium; Cabreuva and Sao Paolo, Brazil; Nanjing and Shanghai, China; Alizay and Sophia Antipolis, France; Dusseldorf, Germany; Dublin, Ireland; Hyderabad and Mumbai, India; Mexico City and Tamaulipas, Mexico (two locations); Zwijndrecht, the Netherlands and Bradford, Kidderminster, Newton Aycliffe and Poole, United Kingdom.

Specialty Ingredients markets and distributes its products and services directly and through third-party distributors in the Americas, Europe, the Middle East, Africa and Asia Pacific.

INTERMEDIATES AND SOLVENTS

Intermediates and Solvents is a leading producer of 1,4 butanediol and related derivatives, including n-methylpyrrolidone. These products are used as chemical intermediates in the production of engineering polymers and polyurethanes, and as specialty process solvents in a wide array of applications including electronics, pharmaceuticals, water filtration membranes and more. Butanediol is also supplied to Ashland's Specialty Ingredients business for use as a raw material. On August 30, 2019, Ashland closed the sale of its Composites segment and the Intermediates and Solvents manufacturing facility in Marl, Germany.

Key customers include Ashland's Specialty Ingredients business, general industrial manufacturers, plastics and polymers producers, pharmaceutical companies, agricultural firms and producers of electronic components and systems.

Intermediates and Solvents has a manufacturing facility in Lima, Ohio, while some derivatives are produced at Specialties Ingredients facilities in Texas City, Texas and Calvert City, Kentucky. Intermediates and Solvents' markets and distributes its products directly and through third-party distributors in the Americas, Europe, and Asia Pacific.

MISCELLANEOUS

Environmental Matters

Ashland maintains a companywide environmental policy overseen by the Environmental, Health, Safety and Quality Committee of Ashland's Board of Directors. Ashland's Environmental, Health, Safety, Quality and Regulatory Affairs (EHSQ&RA) department has the responsibility to ensure that Ashland's businesses worldwide maintain environmental compliance in accordance with applicable laws and regulations. This responsibility is carried out via training; widespread communication of EHSQ&RA policies; information and regulatory updates; formulation of relevant policies, procedures and work practices; design and implementation of EHSQ&RA management systems; internal auditing; monitoring of legislative and regulatory developments that may affect Ashland's operations; assistance to the businesses in identifying compliance issues and opportunities for voluntary actions that go beyond compliance; and incident response planning and implementation.

Federal, state and local laws and regulations relating to the protection of the environment have a significant impact on how Ashland conducts its businesses. In addition, Ashland's operations outside the United States are subject to the environmental laws of the countries in which they are located. These laws include regulation of air emissions and water discharges, waste handling, remediation and product inventory, registration and regulation. New laws and regulations may be enacted or adopted by various regulatory agencies globally. The costs of compliance with any new laws or regulations cannot be estimated until the manner in which they will be implemented has been more precisely defined.

At September 30, 2019, Ashland's reserves for environmental remediation and related environmental litigation amounted to \$186 million, reflecting Ashland's best estimates of the most likely costs that will be incurred over an extended period to remediate identified conditions for which the costs are reasonably estimable, without regard to any third-party recoveries. Engineering studies, historical experience and other factors are used to identify and evaluate remediation alternatives and their related costs in determining the estimated reserves for environmental remediation. Environmental remediation reserves are subject to numerous inherent uncertainties that affect Ashland's ability to estimate its share of the costs. Such uncertainties involve the nature and extent of contamination at each site, the extent of required cleanup efforts under existing environmental regulations, widely varying costs of alternate cleanup methods, changes in environmental regulations, the potential effect of continuing improvements in remediation technology and the number and financial strength of other potentially responsible parties at multiparty sites. Although it is not possible to predict with certainty the ultimate costs of environmental remediation, Ashland currently estimates that the upper end of the reasonably possible range of future costs for identified sites could be as high as approximately \$440 million. No individual remediation location is significant, as the largest reserve for any site is 14% of the remediation reserve. Ashland regularly adjusts its reserves as environmental remediation continues. Environmental remediation expense, net of insurance receivables, amounted to \$34 million in 2019, compared to \$65 million in 2018 and \$24 million in 2017.

Product Control, Registration and Inventory - Many of Ashland's products and operations are subject to chemical control laws of the countries in which they are located. These laws include regulation of chemical substances and inventories under the Toxic Substances Control Act (TSCA) in the United States and the Registration, Evaluation and Authorization of Chemicals (REACH) regulation in Europe. Under REACH, additional testing requirements, documentation, risk assessments and registrations are occurring and will continue to occur and may adversely affect Ashland's costs of products produced in or imported into the European Union. Examples of other product control regulations include right to know laws under the Global Harmonized System (GHS) for hazard communication, regulation of chemicals used in the manufacture of pharmaceuticals and personal care products and that contact food under the Food, Drug and Cosmetics Act in the United States, the Framework Regulation in Europe and other product control requirements for chemical weapons, drug precursors and import/export. New laws and regulations may be enacted or adopted by various regulatory agencies globally. The costs of compliance with any new laws or regulations cannot be estimated until the manner in which they will be implemented has been more precisely defined.

Remediation - Ashland currently operates, and in the past has operated, various facilities at which, during the normal course of business, releases of hazardous substances have occurred. Additionally, Ashland has known or alleged potential environmental liabilities at a number of third-party sites. Federal and state laws, including but not limited to the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and various other remediation laws, require that contamination caused by hazardous substance releases be assessed and, if necessary, remediated to meet applicable standards. Some of these laws also provide for liability for related damage to natural resources, and claims for alleged property and personal injury damage can also arise related to contaminated sites. Laws in other jurisdictions in which Ashland operates require that contamination caused by such releases at these sites be assessed and, if necessary, remediated to meet applicable standards.

Air - In the United States, the Clean Air Act (CAA) imposes stringent limits on facility air emissions, establishes a federally mandated operating permit program, allows for civil and criminal enforcement actions and sets limits on the volatile or toxic content of many types of industrial materials and consumer products. The CAA establishes national ambient air quality standards (NAAQS) with attainment deadlines and control requirements based on the severity of air pollution in a given geographical area. Various state clean air acts implement, complement and, in many instances, add to the requirements of the federal CAA. The requirements of the CAA and its state counterparts have a significant impact on the daily operation of Ashland's businesses and, in many cases, on product formulation and other long-term business decisions. Other countries where Ashland operates also have laws and regulations relating to air quality. Ashland's businesses maintain numerous permits and emission control devices pursuant to these clean air laws.

The United States Environmental Protection Agency (USEPA) has increased its frequency in reviewing the NAAQS. The USEPA has stringent standards for particulate matter, ozone and sulfur dioxide. Throughout 2019, state and local agencies continued to implement options for meeting the newest standards. Particulate matter strategies include dust control measures for construction sites and reductions in emission rates allowed for industrial operations. Options for ozone include emission controls for certain types of sources, reduced limits on the volatile organic compound content of industrial materials and consumer products, and requirements on the transportation sector. Most options for sulfur dioxide focus on coal and diesel fuel combustion sources. It is not possible at this time to estimate the potential financial impact that these newest standards may have on Ashland's operations or products. Ashland will continue to monitor and evaluate these standards to meet these and all air quality requirements.

Solid Waste - Ashland's businesses are subject to various laws relating to and establishing standards for the management of hazardous and solid waste. In the United States, Ashland's facilities are subject to RCRA and its regulations governing generators of hazardous waste. Ashland has implemented systems to oversee compliance with the RCRA regulations. In addition to regulating current waste disposal practices, RCRA also addresses the environmental effects of certain past waste disposal operations, the recycling of wastes and the storage of regulated substances in underground tanks. Ashland has the remediation liability for certain facilities subject to these regulations. Other countries where Ashland operates also have laws and regulations relating to hazardous and solid waste, and Ashland has systems in place to oversee compliance.

Water - Ashland's businesses maintain numerous discharge permits. In the United States, such permits may be required by the National Pollutant Discharge Elimination System of the Clean Water Act and similar state programs. Other countries have similar laws and regulations requiring permits and controls relating to water discharge.

Climate Change and Related Regulatory Developments - Ashland has been collecting energy use data and calculating greenhouse gas (GHG) emissions for many years. Ashland evaluates the potential impacts from both climate change and the anticipated GHG regulations to facilities, products and other business interests, as well as the strategies commonly considered by the industrial sector to reduce the potential impact of these risks. These risks are generally grouped as impacts from legislative, regulatory and international developments, impacts from business and investment trends and impacts to company assets from the physical effects of climate change. Current North American, European and other regional regulatory developments are not expected to have a material effect on Ashland's operations, although some facilities are subject to promulgated rules. Business and investment trends are expected to drive an increase in the demand for products that improve energy efficiency, reduce energy use and increase the use of renewable resources. At this time, Ashland cannot estimate the impact of this expected demand increase to its businesses. Physical effects from climate change have the potential to affect Ashland's assets in areas prone to sea level rise or extreme weather events much as they do the general public and other businesses. Due to the uncertainty of these matters, Ashland cannot estimate the impact at this time of GHG-related developments on its operations or financial condition.

Competition

Ashland competes in the highly fragmented specialty chemicals industry. The participants in the industry offer a varied and broad array of product lines designed to meet specific customer requirements. Participants compete with service and product offerings on a global, regional and/or local level subject to the nature of the businesses and products, as well as the end-markets and customers served. Competition is based on several key criteria, including product performance and quality, product price, product availability and security of supply, responsiveness of product development in cooperation with customers, customer service, industry knowledge and technical capability. Certain key competitors are significantly larger than Ashland and have greater financial resources, leading to greater operating and financial flexibility. The industry has become increasingly global as participants have focused on establishing and maintaining leadership positions outside of their home markets. Many of these segments' product lines face domestic and international competition, because of industry consolidation, pricing pressures and competing technologies. To improve its competitive position, as Ashland narrows its focus on specialty chemicals, the company is building and more strongly leveraging the Ashland corporate brand as a differentiator to create value and better communicate the capabilities, promise and scale of the company, making it easier to introduce new product lines and applications.

Intellectual Property

Ashland has a broad intellectual property portfolio which is an important component of all of Ashland's reportable segments. Ashland's Specialty Ingredients and Intermediates and Solvents reportable segments rely on patents, trade secrets, formulae and know-how to protect and differentiate their products and technologies. In addition, these reportable segments own valuable trademarks which identify and differentiate Ashland's products from its competitors. Ashland also uses licensed intellectual property rights from third-parties.

Raw Materials

Ashland purchases its raw materials from multiple sources of supply in the United States and other countries and believes that raw material supplies will be available in quantities sufficient to meet demand in fiscal 2020. All of Ashland's reportable segments were impacted to varying degrees in fiscal 2019 by the volatility of raw materials costs, and these conditions may continue in fiscal 2020.

Research and Development

Ashland's program of research and development is focused on defining the needs of the marketplace and framing those needs into technology platforms. Ashland has the capability to deliver and develop the intellectual property required to grow and protect those platforms. Ashland is focused on developing new chemistries, market-changing technologies and customer driven solutions at numerous technology centers located in the Americas, Europe and the Asia Pacific region.

Seasonality

Ashland's business may vary due to seasonality. Ashland's business units typically experience stronger demand during warmer weather months.

Forward-Looking Statements

This annual report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). These forward-looking statements are not historical facts and generally are identified by words such as "anticipates," "believes," "estimates," "expects," "is likely," "predicts," "projects," "forecasts," "may," "will," "should," and "intends" and the negative of these words or other comparable terminology. Although Ashland believes that its expectations are based on reasonable assumptions, such expectations are subject to risks and uncertainties that are difficult to predict and may be beyond Ashland's control. As a result, Ashland cannot assure that the expectations contained in such statements will be achieved. Important factors that could cause actual results to differ materially from those contained in such statements are discussed under "Use of estimates, risks and uncertainties" in Note A of Notes to Consolidated Financial Statements in this annual report on Form 10-K. For a discussion of other factors and risks that could affect Ashland's expectations and operations, see "Item 1A. Risk Factors" in this annual report on Form 10-K.

ITEM 1A. RISK FACTORS

The following discussion of "risk factors" identifies the most significant factors that may adversely affect Ashland's business, operations, financial position or future financial performance. This information should be read in conjunction with Management's Discussion and Analysis and the consolidated financial statements and related notes incorporated by reference into this annual report on Form 10-K. The following discussion of risks is designed to highlight what Ashland believes are important factors to consider when evaluating its expectations. These factors could cause future results to differ from those in forward-looking statements and from historical trends.

Ashland has set aggressive growth goals for its businesses, including increasing sales, cash flow and margins, in order to achieve its long term strategic objectives. Ashland's successful execution of its growth strategies and business plans to facilitate that growth involves a number of risks.

Ashland has set aggressive growth goals for its businesses in order to meet long term strategic objectives and improve shareholder value. Ashland's failure to meet one or more of these goals or objectives would negatively impact Ashland's potential value and the businesses. One of the most important risks is that Ashland might fail to adequately execute its business and growth plans, by optimizing the efficient use of its physical and intangible assets. Aspects of that risk include changes to global economic environment, changes to the competitive landscape, attraction and retention of skilled employees, the potential failure of product innovation plans, failure to comply with existing or new regulatory schemes, failure to maintain a competitive cost structure and other risks outlined in greater detail in this Item 1A.

Ashland's success depends upon its ability to attract and retain key employees and the identification and development of talent to succeed senior management.

Ashland's success depends on its ability to attract and retain key personnel, and Ashland relies heavily on its management team. The inability to recruit and retain key personnel or the unexpected loss of key personnel may adversely affect Ashland's operations. Also, a substantial portion of Ashland's U.S.-based employees will be retirement-eligible within the next several years. That, combined with the relatively small number of middle tier managers with substantial experience in place to replace this group of retirement eligible employees, increases the potential negative impact of the risk that key employees could leave the Company. Additionally, the Company's redesign and cost reduction program may result in key employees departing who may not be replaced. This risk of unwanted employee turnover also is substantial in positions that require certain technical expertise and geographically in developing markets which Ashland has targeted for growth, especially in Asia, India, South America and Eastern Europe. In addition, because of its reliance on its management team, Ashland's future success depends, in part, on its ability to identify and develop talent to succeed its senior management and other key positions throughout the organization. If Ashland fails to identify and develop successors, the company is at risk of being harmed by the departures of these key employees.

Failure to develop and market new products and production technologies could impact Ashland's competitive position and have an adverse effect on its businesses and results of operations.

The specialty chemical industry is subject to periodic technological change and ongoing product improvements. In order to maintain margins and remain competitive, Ashland must successfully develop and introduce new products or improvements that appeal to its customers and ultimately to global consumers. Ashland plans to grow earnings, in part, by focusing on developing markets and solutions to meet increasing demand in those markets, including demand for personal care and pharmaceutical products which are subject to lengthy regulatory approval processes. The fast change in Ashland's industry and those of its customers necessitates that Ashland continue the development of new technologies to replace older technologies whose demand or market position may be fading. Ashland's efforts to respond to changes in customer demand in a timely and cost-efficient manner to drive growth could be adversely affected by difficulties or delays in product development, including the inability to identify viable new products, successfully complete research and development, obtain regulatory approvals, obtain intellectual property protection or gain market acceptance of new products. Due to the lengthy development process, technological challenges and intense competition, there can be no assurance that any of the products Ashland is currently developing, or could develop in the future, will achieve substantial commercial success.

Ashland faces competition from other companies, which places downward pressure on prices and margins and may adversely affect Ashland's businesses and results of operations.

Ashland operates in highly competitive markets, competing against a number of domestic and foreign companies. Competition is based on several key criteria, including product performance and quality, product price, product availability and security of supply, responsiveness of product development in cooperation with customers and customer service, as well as the ability to bring innovative products or services to the marketplace. Certain key competitors are significantly larger than Ashland and have greater financial resources, leading to greater operating and financial flexibility. As a result, these competitors may be better able to withstand changes in conditions within the relevant industry, changes in the prices of raw materials and energy and changes in general economic conditions. In addition, competitors' pricing decisions could compel Ashland to decrease its prices, which could negatively affect its margins and profitability. Additional competition in markets served by Ashland could adversely affect margins and profitability and could lead to a reduction in market share. Also, Ashland competes in certain markets that are declining and has targeted other markets for growth opportunities. Competitive and pricing pressures could also impact Ashland's production volumes, which can in turn reduce cost efficiency. If Ashland's strategies for dealing with declining markets and leveraging opportunity markets are not successful, its businesses and results of operations could be negatively affected.

Ashland's customers could change their products in way that reduces the demand for Ashland's products.

Ashland produces and sells specialty chemicals that are used by its customers for a broad range of applications. Many of these Ashland materials become part of end products that are sold to consumers. Changes in consumer preferences and demands can lead to certain Ashland customers making changes to their products. In other instances, Ashland's customers may change their products or production techniques to take advantage of newer technologies, alternative chemistries, more effective formulations, or improved processes, or in response to various market, technical, or regulatory changes.

Such changes in Ashland's customers' products or production techniques may cause these customers to reduce consumption of Ashland's products or eliminate their need entirely. Ashland may not be able to supply products that meet the customers' new requirements. Such lost sales opportunities may not be replaced by those offering equal revenue potential or margin. It is important for Ashland to continue developing new products, and new applications of existing products to replace such lost business. Otherwise Ashland faces the risk of a loss of market share, margins and cash flow if it is unable to manage a potential change in the demands of its products.

Ashland's business exposes it to potential product liability claims and recalls, which could adversely affect its financial condition and performance.

The development, manufacture and sale of specialty chemical and other products by Ashland, including products produced for the food, beverage, personal care, pharmaceutical and nutritional supplement industries, involve an inherent risk of exposure to product liability claims, product recalls, product seizures and related adverse publicity. Ashland also produces products that are subject to rigorous specifications and quality standards, with an expectation from its customers around these strict requirements. A product liability claim, recall or judgment against Ashland, or a customer complaint on product specifications, could also result in substantial and unexpected expenditures, affect consumer or customer confidence in its products, and divert management's attention from other responsibilities. Although Ashland maintains product liability insurance, there can be no assurance that this type or level of coverage is adequate or that Ashland will be able to continue to maintain its existing insurance or obtain comparable insurance at a reasonable cost, if at all. A product recall or a partially or completely uninsured product liability judgment against Ashland could have a material adverse effect on its reputation, results of operations and financial condition.

The competitive nature of Ashland's markets may delay or prevent the Company from passing increases in raw materials or energy costs on to its customers. In addition, certain of Ashland's suppliers may be unable to deliver products or raw materials or fulfill contractual requirements. The occurrence of either event could adversely affect Ashland's results of operations.

Rising and volatile raw material prices, especially those of hydrocarbon derivatives, cotton linters or wood pulp, may negatively impact Ashland's costs, results of operations and the valuation of its inventory. Similarly, energy costs are a significant component of certain of Ashland's product costs. Ashland is not always able to raise prices in response to such increased costs, and its ability to pass on the costs of such price increases is dependent upon market conditions. Likewise, reductions in the valuation of Ashland's inventory due to market volatility may not be recovered and could result in losses.

Ashland purchases certain products and raw materials from suppliers, often pursuant to written supply contracts. If those suppliers are unable to meet Ashland's orders in a timely manner or choose to terminate or not fulfill contractual arrangements, Ashland may not be able to make alternative supply arrangements. Also, domestic and global government regulations related to the manufacture, transport or import of certain raw materials may impede Ashland's ability to obtain those raw materials on commercially reasonable terms. Certain Ashland businesses rely on agricultural output of clary sage, aloe, guar, and cotton linters, and the availability of these materials can be severely impacted by crop yields, weather events, and other factors. If Ashland is unable to obtain and retain qualified suppliers under commercially acceptable terms, its ability to manufacture and deliver products in a timely, competitive and profitable manner or grow its business successfully could be adversely affected.

Ashland's substantial global operations subject it to risks of doing business in foreign countries, which could adversely affect its business, financial condition and results of operations.

Greater than half of Ashland's net sales for fiscal 2020 are expected to be to customers outside of North America. Ashland expects sales from international markets to continue to represent an even larger portion of the Company's sales in the future. Also, a significant portion of Ashland's manufacturing capacity is located outside of the United States. Accordingly, Ashland's business is subject to risks related to the differing legal, political, cultural, social and regulatory requirements and economic conditions of many jurisdictions.

The global nature of Ashland's business presents difficulties in hiring and maintaining a workforce in certain countries. Fluctuations in exchange rates may affect product demand and may adversely affect the profitability in U.S. dollars of products and services provided in foreign countries. In addition, foreign countries may impose additional withholding taxes or otherwise tax Ashland's foreign income, or adopt other restrictions on foreign trade or investment, including currency exchange controls. The imposition of new tariffs or trade quotas, or an impairment of existing trade agreements is also a risk that could impair Ashland's financial performance.

Certain legal and political risks are also inherent in the operation of a company with Ashland's global scope. For example, if the United States fails to implement the United States-Mexico-Canada Agreement (USMCA) to replace the North American Free Trade Agreement (NAFTA), or the United Kingdom's exit from the European Union (E.U.) moves forward in a manner that disrupts European supply chains or customs regimes, Ashland's ability to do business and execute its growth strategies could be adversely affected. Ashland could also be impacted negatively if the ongoing trade disputes between the United States and China, or those between the United States and the E.U. were to worsen. In addition, it may be more difficult for Ashland to enforce its agreements or collect receivables through foreign legal systems. There is a risk that foreign governments may nationalize private enterprises in certain countries where Ashland operates. In certain countries or regions, terrorist activities and the response to such activities may threaten Ashland's operations more than those in the United States. In Europe, the effect of economic sanctions imposed on Russia and/or Russia's reaction to the sanctions could adversely impact Ashland's performance and results of operations. The risks associated with localized or regional armed conflict in many parts of the world remain high and could disrupt and/or adversely impact Ashland's businesses. Social and cultural norms in certain countries may not support compliance with Ashland's corporate policies including those that require compliance with substantive laws and regulations. Also, changes in general economic and political conditions in countries where Ashland operates, particularly in Europe, the Middle East and emerging markets, are a risk to Ashland's financial performance.

As Ashland continues to operate its business globally, its success will depend, in part, on its ability to anticipate and effectively manage these and other related risks. There can be no assurance that the consequences of these and other factors relating to its multinational operations will not have an adverse effect on Ashland's business, financial condition or results of operations.

The impact of changing laws or regulations or the manner of interpretation or enforcement of existing rules could adversely impact Ashland's financial performance and restrict its ability to operate its business or execute its strategies.

New laws or regulations, or changes in existing laws or regulations or the manner of their interpretation or enforcement, could increase Ashland's cost of doing business and restrict its ability to operate its business or execute its strategies. This includes, among other things, the possible taxation under U.S. law of certain income from foreign operations, the possible taxation under foreign laws of certain income Ashland reports in other jurisdictions, tariffs or quotas levied on Ashland products, raw materials or key components by certain countries, regulations related to the protection of private information of Ashland's employees and customers, regulations issued by the U.S. Food and Drug Administration (and analogous non-U.S. agencies) affecting Ashland and its customers, compliance with The U.S. Foreign Corrupt Practices Act (and analogous non-U.S. laws) and the European Union's Registration, Authorisation and Restriction of Chemicals (REACH) regulation (and analogous non-EU initiatives), and potential operational impacts of General Data Protection Regulation (GDPR). Uncertainty associated with the passage of new laws, application of executive authority beyond the legislative process, as well as changes in and enforcement of existing laws, can limit Ashland's ability to make and execute business plans effectively. In addition, compliance with laws and regulations is complicated by Ashland's substantial and growing global footprint, which will require significant and additional resources to comprehend and ensure compliance with applicable laws in the more than one hundred countries where Ashland conducts business. Compliance with current and future regulations is further complicated by uncertainty around the reevaluation of international agreements by various countries, including the United States, and the resulting impact on regulatory regimes, customs regulations, tariffs, sanctions, and other transnational protocols.

Imposition of new taxes, disagreements with tax authorities or additional tax liabilities could adversely affect Ashland's business, financial condition, reputation or results of operations.

Ashland's products are made, manufactured, distributed or sold in more than 100 countries and territories. A significant portion of Ashland's revenues are generated outside the United States. As such, Ashland is subject to taxes in the United States as well as numerous foreign countries. Ashland's future effective tax rates could be affected by changes in the mix of earnings in countries with differing tax rates, changes in the valuation of deferred tax assets and liabilities, changes in liabilities for uncertain tax positions, cost of repatriations or changes in tax laws, regulations, administrative practices or their interpretation. Moreover, because Ashland is subject to the regular examination of its income tax returns by various tax authorities, the economic and political pressure to increase tax revenues in these jurisdictions may make resolving tax disputes even more difficult, and the final resolution of tax audits and any related litigation may differ from our historical provisions and accruals resulting in an adverse impact on our business, financial condition, reputation or results of operations. The Tax Cuts and Jobs Act (the Tax Act), enacted in December 2017, made significant changes to US tax law; many other countries or organizations, including those where Ashland has significant operations, are actively considering or enacting changes to tax laws which could significantly impact our tax rate and cash flows. The increasingly complex global tax environment, including changes in how United States multinational corporations are taxed, could adversely affect Ashland's business, financial condition or results of operations.

Other than the one-time transition tax enacted by the Tax Act, Ashland will continue to be indefinitely reinvested in our foreign earnings. As such, Ashland has not accrued income taxes or foreign withholding taxes on undistributed earnings for most non-US subsidiaries because those earnings are intended to be indefinitely reinvested in the operations of those subsidiaries. If these earnings are needed for Ashland's operations in the United States, the repatriation of such earnings could adversely affect its business, results of operations or financial condition.

The IPO of Valvoline and final distribution of its shares could result in significant tax liability to Ashland and its stockholders.

Ashland believes that the Valvoline IPO and certain related internal transactions should be nontaxable transactions for U.S. federal income tax purposes and has obtained written opinions of counsel to that effect. Ashland also obtained a written opinion of counsel to the effect that the final distribution should qualify for non-recognition of gain and loss under Section 355 of the Internal Revenue Code of 1986, as amended (the “Code”). The opinions are based on certain assumptions and representations as to factual matters from Ashland and Valvoline, as well as certain covenants by those parties. The opinions cannot be relied upon if any of the assumptions, representations or covenants is incorrect, incomplete or inaccurate or is violated in any material respect, or if there are changes in law with retroactive effect. The opinions are not binding on the IRS or the courts, and it is possible that the IRS or a state or local taxing authority could take the position that the internal transactions, the final distribution or the receipt of proceeds from the Valvoline IPO resulted in the recognition of significant taxable gain by Ashland, in which case Ashland may be subject to material tax liabilities.

If the final distribution were determined not to qualify for non-recognition of gain and loss, Ashland stockholders that received Valvoline common stock in the final distribution could be subject to tax. If the final distribution were determined not to qualify for non-recognition of gain and loss, then Ashland would recognize gain as if it had sold Valvoline common stock in a taxable transaction in an amount up to the fair market value of the Valvoline common stock it distributed in the final distribution. The tax liability resulting from such gain could have a material impact on Ashland’s operations.

Business disruptions from natural, operational and other catastrophic risks could seriously harm Ashland’s operations and financial performance. In addition, a catastrophic event at one of Ashland’s facilities or involving its products or employees could lead to liabilities that could further impair its operations and financial performance.

Business disruptions, including those related to operating hazards inherent with the production of chemicals, natural disasters, severe weather conditions, supply or logistics disruptions, increasing costs for energy, temporary plant and/or power outages, information technology systems and network disruptions, cyber-security breach, terrorist attacks, armed conflict, war, pandemic diseases, fires, floods or other catastrophic events, could seriously harm Ashland’s operations, as well as the operations of its customers and suppliers, and may adversely impact Ashland’s financial performance. Although it is impossible to predict the occurrence or consequences of any such events, they could result in reduced demand for Ashland’s products, make it difficult or impossible for Ashland to manufacture its products or deliver products and services to its customers or to receive raw materials from suppliers, or create delays and inefficiencies in the supply chain. In addition to leading to a serious disruption of Ashland’s businesses, a catastrophic event at one of our facilities or involving our products or employees could lead to substantial legal liability to or claims by parties allegedly harmed by the event.

While Ashland maintains business continuity plans that are intended to allow it to continue operations or mitigate the effects of events that could disrupt its business, Ashland cannot provide assurances that its plans would fully protect it from all such events. In addition, insurance maintained by Ashland to protect against property damage, loss of business and other related consequences resulting from catastrophic events is subject to various deductibles and coverage limitations, depending on the nature of the risk insured. This insurance may not be sufficient to cover all of Ashland’s damages or damages to others in the event of a catastrophe. In addition, insurance related to these types of risks may not be available now or, if available, may not be available in the future at commercially reasonable rates.

Ashland uses information technology (IT) systems to conduct business and these IT systems are at risk of potential disruption and cyber security threats.

Ashland's businesses rely on their IT systems to operate efficiently and in some cases, at all. Ashland employs third parties to manage and maintain a significant portion of its IT systems, including, but not limited to data centers, IT infrastructure, network, client support and end user services, as well as the functions of backing up and securing those systems. A partial or complete failure of Ashland's IT systems or those of our third parties managing, providing or servicing them for any amount of time more than several hours could result in significant business disruption causing harm to Ashland's reputation, results of operations or financial condition. In addition, the nature of our businesses, the markets we serve, and geographic profile of our operations make Ashland a target of cyber security threats. Despite steps Ashland takes to mitigate or eliminate them, cyber security threats in general are increasing and becoming more advanced and could occur as a result of the activity of hackers, employee error or employee misconduct. A breach of our IT systems could lead to the loss and destruction of trade secrets, confidential information, proprietary data, intellectual property, customer and supplier data, and employee personal information, and could disrupt business operations which could adversely affect Ashland's relationships with business partners and harm our brands, reputation, and financial results.

Adverse developments in the global economy and potential disruptions of financial markets could negatively impact Ashland's customers and suppliers, and therefore have a negative impact on Ashland's results of operations.

A global or regional economic downturn may reduce customer demand or inhibit Ashland's ability to produce and sell products. Ashland's business and operating results are sensitive to global and regional economic downturns, credit market tightness, declining consumer and business confidence, fluctuating commodity prices, volatile exchange rates, changes in interest rates, sovereign debt defaults and other challenges, including those related to international sanctions and acts of aggression or threatened aggression that can affect the global economy. In the event of adverse developments or stagnation in the economy or financial markets, Ashland's customers may experience deterioration of their businesses, reduced demand for their products, cash flow shortages and difficulty obtaining financing. As a result, existing or potential customers might delay or cancel plans to purchase products and may not be able to fulfill their obligations to Ashland in a timely fashion. Further, suppliers may experience similar conditions, which could impact their ability to fulfill their obligations to Ashland. A weakening or reversal of the current economic conditions in the global economy or a substantial part of it could negatively impact Ashland's business, results of operations, financial condition and ability to grow.

Ashland may not be able to effectively protect or enforce its intellectual property rights.

Ashland relies on the patent, trademark, trade secret and copyright laws of the United States and other countries to protect its intellectual property rights. The laws of some countries may not protect Ashland's intellectual property rights to the same extent as the laws of the United States. Failure of foreign countries to have laws to protect Ashland's intellectual property rights or an inability to effectively enforce such rights in foreign countries could result in the loss of valuable proprietary information, which could have an adverse effect on Ashland's business and results of operations.

Even in circumstances where Ashland has a patent on certain technologies, such patents may not provide meaningful protection against competitors or against competing technologies. In addition, any patent applications submitted by Ashland may not result in an issued patent. There can be no assurance that Ashland's intellectual property rights will not be challenged, invalidated, circumvented or rendered unenforceable. Ashland could also face claims from third parties alleging that Ashland's products or processes infringe on their proprietary rights. If Ashland is found liable for infringement, it could be responsible for significant damages, prohibited from using certain products or processes or required to modify certain products and processes. Any such infringement liability could adversely affect Ashland's product and service offerings, profitability and results of operations.

Ashland also has substantial intellectual property associated with its know-how and trade secrets that are not protected by patent or copyright laws. Ashland protects these rights by entering into confidentiality and non-disclosure agreements with most of its employees and with third parties. There can be no assurance that such agreements will not be breached or that Ashland will be able to effectively enforce them. In addition, Ashland's trade secrets and know-how may be improperly obtained by other means, such as a breach of Ashland's information technologies security systems or direct theft. Any unauthorized disclosure of any of Ashland's material know-how or trade secrets could adversely affect Ashland's business and results of operations.

Ashland has incurred, and will continue to incur, substantial costs as a result of environmental, health and safety, and hazardous substances liabilities and related compliance requirements. These costs could adversely impact Ashland's cash flow, and, to the extent they exceed Ashland's established reserves for these liabilities, its results of operations.

Ashland is subject to extensive federal, state, local and foreign laws, regulations, rules and ordinances relating to pollution, protection of the environment and human health and safety, and the generation, storage, handling, treatment, disposal and remediation of hazardous substances and waste materials. Ashland has incurred, and will continue to incur, significant costs and capital expenditures to comply with these laws and regulations.

Environmental, health and safety regulations change frequently, and such regulations and their enforcement have tended to become more stringent over time. Accordingly, changes in environmental, health and safety laws and regulations and the enforcement of such laws and regulations could interrupt Ashland's operations, require modifications to its facilities or cause Ashland to incur significant liabilities, costs or losses that could adversely affect its profitability. Actual or alleged violations of environmental, health or safety laws and regulations could result in restrictions or prohibitions on plant operations as well as substantial damages, penalties, fines, civil or criminal sanctions and remediation costs. In addition, under some environmental laws, Ashland may be strictly liable and/or jointly and severally liable for environmental damages and penalties.

Ashland is also subject to various federal, state, local and foreign environmental laws and regulations that require environmental assessment or remediation efforts (collectively, environmental remediation) at multiple locations. Ashland uses engineering studies, historical experience and other factors to identify and evaluate remediation alternatives and their related costs in determining the estimated reserves for environmental remediation. Environmental remediation reserves are subject to numerous inherent uncertainties that affect Ashland's ability to estimate its share of the applicable costs. Such uncertainties involve the nature and extent of contamination at each site, the extent of required cleanup efforts under existing environmental regulations, widely varying costs of alternate cleanup methods, changes in environmental regulations, the potential effect of continuing improvements in remediation technology and the number and financial strength of other potentially responsible parties at multiparty sites. There may also be situations in which certain environmental liabilities are not known to Ashland or are not probable and estimable. As a result, Ashland's actual costs for environmental remediation could affect Ashland's cash flow and, to the extent costs exceed established reserves for those liabilities, its results of operations.

Ashland's substantial indebtedness may adversely affect its business, results of operations and financial condition.

Ashland maintains a substantial amount of debt. Ashland's substantial indebtedness could adversely affect its business, results of operations and financial condition by, among other things:

- requiring Ashland to dedicate a substantial portion of its cash flow from operations to pay principal and interest on its debt, which would reduce the availability of Ashland's cash flow to fund working capital, capital expenditures, acquisitions, execution of its growth strategy and other general corporate purposes;
- limiting Ashland's ability to borrow additional amounts to fund working capital, capital expenditures, acquisitions, debt service requirements, execution of its growth strategy and other purposes;
- making Ashland more vulnerable to adverse changes in general economic, industry and regulatory conditions and in its business by limiting Ashland's flexibility in planning for, and making it more difficult for Ashland to react quickly to, changing conditions;
- placing Ashland at a competitive disadvantage compared with those of its competitors that have less debt and lower debt service requirements;

- making Ashland more vulnerable to increases in interest rates since some of its indebtedness is subject to variable rates of interest; and
- making it more difficult for Ashland to satisfy its financial obligations.

In addition, Ashland may not be able to generate sufficient cash flow from its operations to repay its indebtedness when it becomes due and to meet its other cash needs. If Ashland is not able to pay its debts as they become due, it could be in default under its credit facility or other indebtedness. Ashland might also be required to pursue one or more alternative strategies to repay indebtedness, such as selling assets, refinancing or restructuring its indebtedness or selling additional debt or equity securities. Ashland may not be able to refinance its debt or sell additional debt or equity securities or its assets on favorable terms, if at all, and if Ashland must sell its assets, it may negatively affect its ability to generate revenues.

Ashland is responsible for, and has financial exposure to, liabilities from pending and threatened claims, including those alleging personal injury caused by exposure to asbestos, which could adversely impact Ashland's results of operations and cash flow.

There are various claims, lawsuits and administrative proceedings pending or threatened, including those alleging personal injury caused by exposure to asbestos, against Ashland and its current and former subsidiaries. Such actions are with respect to commercial matters, product liability, toxic tort liability and other matters that seek remedies or damages, some of which are for substantial amounts. While these actions are being contested, their outcome is not predictable. Ashland's results could be adversely affected by financial exposure to these liabilities. Insurance maintained by Ashland to protect against claims for damages alleged by third parties is subject to coverage limitations, depending on the nature of the risk insured. This insurance may not be sufficient to cover all of Ashland's liabilities to others. In addition, insurance related to these types of risks may not be available now or, if available, may not be available in the future at commercially reasonable rates. Ashland's ability to recover from its insurers for asbestos liabilities could also have an adverse impact on its results of operations. Projecting future asbestos costs is subject to numerous variables that are extremely difficult to predict. In addition to the significant uncertainties surrounding the number of claims that might be received, other variables include the type and severity of the disease alleged by each claimant, the long latency period associated with asbestos exposure, dismissal rates, costs of medical treatment, the impact of bankruptcies of other companies that are co-defendants in claims, uncertainties surrounding the litigation process from jurisdiction to jurisdiction and from case to case, and the impact of potential changes in legislative or judicial standards. Furthermore, any predictions with respect to these variables are subject to even greater uncertainty as the projection period lengthens. In light of these inherent uncertainties, Ashland believes that its asbestos reserves represent the best estimate within a range of possible outcomes. As a part of the process to develop these estimates of future asbestos costs, a range of long-term cost models was developed. These models are based on national studies that predict the number of people likely to develop asbestos-related diseases and are heavily influenced by assumptions regarding long-term inflation rates for indemnity payments and legal defense costs, as well as other variables mentioned previously. Because of the inherent uncertainties in projecting future asbestos liabilities and establishing appropriate reserves, Ashland's actual asbestos costs could adversely affect its results of operations and, to the extent they exceed its reserves, could adversely affect its results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Ashland's corporate headquarters is located in Covington, Kentucky and will move to Wilmington, Delaware by December 2019. Principal offices of other major operations are located in Wilmington, Delaware (Specialty Ingredients and Corporate); Bridgewater, New Jersey (Specialty Ingredients and Corporate); Dublin, Ohio (Specialty Ingredients and Corporate); Covington, Kentucky (Corporate); and Shanghai, China; Hyderabad, India; Warsaw, Poland; and Schaffhausen, Switzerland (all of which are shared service centers of Ashland's and house Corporate and direct business unit personnel). All of these locations are leased, except for the Wilmington, Delaware site which is owned. Principal manufacturing, marketing and other materially important physical properties of Ashland and its subsidiaries are described within the applicable business units under "Item 1" in this annual report on Form 10-K. All of Ashland's physical properties are owned or leased. Ashland believes its physical properties are suitable and adequate for the Company's business. Additional information concerning leases may be found in Note L of Notes to Consolidated Financial Statements in this annual report on Form 10-K.

ITEM 3. LEGAL PROCEEDINGS

The following is a description of Ashland's material legal proceedings.

Asbestos-Related Litigation

Ashland is subject to liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims result primarily from indemnification obligations undertaken in 1990 in connection with the sale of Riley Stoker Corporation (Riley), a former subsidiary. Although Riley was neither a producer nor a manufacturer of asbestos, its industrial boilers contained some asbestos containing components provided by other companies.

Hercules LLC (formerly Hercules Incorporated), an indirect wholly-owned subsidiary of Ashland, is also subject to liabilities from asbestos-related personal injury lawsuits involving claims which typically arise from alleged exposure to asbestos fibers from resin encapsulated pipe and tank products which were sold by one of Hercules' former subsidiaries to a limited industrial market.

Ashland and Hercules are also defendants in lawsuits alleging exposure to asbestos at facilities formerly or presently owned or operated by Ashland or Hercules.

For additional detailed information regarding liabilities arising from asbestos-related litigation, see "Management's Discussion and Analysis - Critical Accounting Policies - Asbestos Litigation" and Note O of Notes to Consolidated Financial Statements in this annual report on Form 10-K.

Environmental Proceedings

(a) *CERCLA and Similar State Law Sites* - Under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and similar state laws, Ashland and its subsidiaries may be subject to joint and several liability for cleanup costs in connection with alleged releases of hazardous substances at sites where it has been identified as a "potentially responsible party" (PRP). As of September 30, 2019, Ashland and its subsidiaries have been identified as a PRP by U.S. federal and state authorities, or by private parties seeking contribution, for the cost of environmental investigation and/or cleanup at 80 waste treatment or disposal sites. These sites are currently subject to ongoing investigation and remedial activities, overseen by the United States Environmental Protection Agency (USEPA) or a state agency, in which Ashland or its subsidiaries are typically participating as a member of a PRP group. Generally, the types of relief sought include remediation of contaminated soil and/or groundwater, reimbursement for past costs of site cleanup and administrative oversight and/or long-term monitoring of environmental conditions at the sites. The ultimate costs are not predictable with assurance.

(b) *Hattiesburg, Mississippi Resource Conservation and Recovery Act (RCRA) Matter* - In November 2008, the Mississippi Department of Environmental Quality (MDEQ) issued a Notice of Violation to Hercules' now-closed Hattiesburg, Mississippi manufacturing facility alleging that a process water impoundment basin at the facility had been operated as a hazardous waste storage and treatment facility without a permit in violation of the Resource Conservation and Recovery Act. In May 2011, the USEPA issued an inspection report from a September 2010 inspection with allegations similar to those of the MDEQ and promulgated an information request. Ashland has been working with the MDEQ and USEPA to settle this matter in the context of the shutdown and ongoing remediation of the Hattiesburg facility. The USEPA proposed a settlement penalty in excess of \$100,000. While it is reasonable to believe that this matter will involve a penalty from the MDEQ and/or the USEPA exceeding \$100,000, the potential penalty with respect to this enforcement matter should not be material to Ashland.

(c) *Lower Passaic River, New Jersey Matters* - Ashland, through two formerly owned facilities, and ISP, through a now-closed facility, have been identified as PRPs, along with approximately 70 other companies (the Cooperating Parties Group or the CPG), in a May 2007 Administrative Order of Consent (AOC) with the USEPA. The parties are required to perform a remedial investigation and feasibility study (RI/FS) of the entire 17 miles of the Passaic River. In June 2007, the USEPA separately commenced a Focused Feasibility Study (FFS) as an interim measure. In accordance with the 2007 AOC, in June 2012 the CPG voluntarily entered into another AOC for an interim removal action focused solely at mile 10.9 of the Passaic River. The allocations for the 2007 AOC and the 2012 removal action are based on interim allocations, are immaterial and have been accrued. In April 2014, the USEPA released the FFS. The CPG submitted the Draft RI/FS Report on April 30, 2015. The USEPA has released the FFS Record of Decision for the lower 8 miles and reached an agreement with another chemical company to conduct and pay for the remedial design. This chemical company has sued Ashland, ISP and numerous other defendants to recover past and future costs pursuant to the CERCLA. Ashland's motion to dismiss was partially granted, and the surviving claims are in the early stages of discovery. Ashland and ISP are participating in an USEPA allocation process. The release of the FFS Record of Decision, the current allocations proceedings and the lawsuit are not expected to be material to Ashland.

(d) *Freetown, MA Resource Conservation and Recovery Act (RCRA) Matter*—On September 27, 2018, the USEPA issued a Complaint, Compliance Order and Opportunity for Hearing to ISP Freetown Fine Chemicals, Inc.'s facility in Assonet, Massachusetts alleging various violations of the RCRA relating to certain distillation tanks at the facility and seeking a penalty of \$203,792. Ashland disputes USEPA's stated interpretation of the RCRA regulations and their applicability to these tanks. While this matter could result in a penalty from USEPA in excess of \$100,000, the potential penalty is not expected to be material to Ashland.

For additional information regarding environmental matters and reserves, see Note O of Notes to Consolidated Financial Statements in this annual report on Form 10-K.

Other Pending Legal Proceedings

In addition to the matters described above, there are other various claims, lawsuits and administrative proceedings pending or threatened against Ashland and its current and former subsidiaries. Such actions are with respect to commercial matters, product liability, toxic tort liability, employment matters and other environmental matters which seek remedies or damages, some of which are for substantial amounts. While Ashland cannot predict with certainty the outcome of such actions, it believes that adequate reserves have been recorded and losses already recognized with respect to such actions were immaterial as of September 30, 2019. There is a reasonable possibility that a loss exceeding amounts already recognized may be incurred related to these actions; however, Ashland believes that such potential losses were immaterial as of September 30, 2019.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM X. INFORMATION ABOUT OUR EXECUTIVE OFFICERS

The following is a list of Ashland's current executive officers, their ages and their positions and offices during the last five years. On October 8, 2019, Ashland announced that Mr. Guillermo Novo would succeed Mr. Wulfsohn as Chairman and Chief Executive Officer effective December 31, 2019.

WILLIAM A. WULFSOHN (age 57) is Chairman and Chief Executive Officer of Ashland Global Holdings Inc. since September 2016 and held the same positions at Ashland Inc. since January 1, 2015. Prior to joining Ashland, Mr. Wulfsohn served as President and Chief Executive Officer of Carpenter Technology Corp., a manufacturer of stainless steel, titanium, and other specialty metals and engineered products, from July 2010 to November 2014. Mr. Wulfsohn also served as a Director for Carpenter Technology Corp. from April 2009 to November 2014 and of Valvoline Inc. from September 2016 to January 2018. Mr. Wulfsohn serves as a director of PolyOne Corporation.

GUILLERMO NOVO (age 57) is the incoming Chairman and Chief Executive Officer of Ashland Global Holdings Inc. Mr. Novo has served as a director of Ashland's Board since May 22, 2019. Most recently, Mr. Novo served as the President and CEO of Versum Materials, Inc., a premier specialty materials company, and was a member of the board of directors. Previously, Mr. Novo served as Executive Vice President, Materials Technologies of Air Products and Chemicals, Inc. ("Air Products"), an industrial gases and related equipment company, since October 2014. He joined Air Products in September 2012 as Senior Vice President Electronics, Performance Materials, Strategy and Technology. Mr. Novo also served as a director of Bemis Company until May 2019.

J. KEVIN WILLIS (age 54) is Senior Vice President and Chief Financial Officer of Ashland Global Holdings Inc. since September 2016. Mr. Willis held the same positions at Ashland Inc. and served in such capacities since May 2013.

PETER J. GANZ (age 57) is Senior Vice President, General Counsel and Secretary; Chief Legal and Compliance Officer of Ashland Global Holdings Inc. and has served as Senior Vice President and General Counsel of Ashland Inc. since July 2011 and Secretary since November 2012. From July 2011 to August 2016, Mr. Ganz served as Chief Compliance Officer, a role he assumed again in February 2019.

ANNE T. SCHUMANN (age 59) is Senior Vice President, Chief Human Resources and Information Technology Officer of Ashland Global Holdings Inc. since March 2017. Prior to this role, Ms. Schumann served as the Vice President and Chief Information and Administrative Services Officer of Ashland Global Holdings Inc. and served in the same capacities with Ashland Inc. since 2008 and 2009, respectively.

VITO J. CONSIGLIO (age 55) is Senior Vice President and Chief Commercial Officer of Ashland Global Holdings Inc. since November 2018 and Group Vice President, Ashland Specialty Ingredients since July 2016. Prior to joining Ashland, Mr. Consiglio served as Vice President at Carpenter Technology, leading the transportation business unit for the specialty steel manufacturer from 2013 to 2016.

OSAMA M. MUSA (age 51) is Senior Vice President and Chief Technology Officer of Ashland Global Holdings Inc. since November 2018. Previously, Mr. Musa served as Vice President, ASI Technology from November 2014 to November 2018 and Vice President, Technology and Innovation of Ashland from August 2012 until November 2014.

KEITH C. SILVERMAN (age 52) is Senior Vice President, Global Operations, Quality and Environmental Health and Safety of Ashland Global Holdings Inc. since November 2018. Previously, Mr. Silverman served as Vice President, Global Operations, Quality and Environmental Health and Safety of Ashland Global Holdings Inc. and served in similar capacities at Ashland Inc. since June 2012.

J. WILLIAM HEITMAN (age 65) is Vice President and Controller of Ashland Global Holdings Inc. and has served in such capacities with Ashland Inc. since 2008. On November 12, 2019, Ashland announced that Mr. Heitman will be retiring on December 31, 2019.

Each executive officer is elected by the Board of Directors of Ashland to a term of one year, or until a successor is duly elected, at the annual meeting of the Board of Directors, except in those instances where the officer is elected other than at an annual meeting of the Board of Directors, in which case his or her tenure will expire at the next annual meeting of the Board of Directors unless the officer is re-elected.

PART II

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

On September 20, 2016, Ashland Inc. became an indirect wholly owned subsidiary of Ashland Global Holdings Inc., and Ashland Inc.’s common stock ceased trading on the New York Stock Exchange (NYSE). Ashland Global Holdings Inc.’s common stock began trading on NYSE under the symbol “ASH” on September 20, 2016.

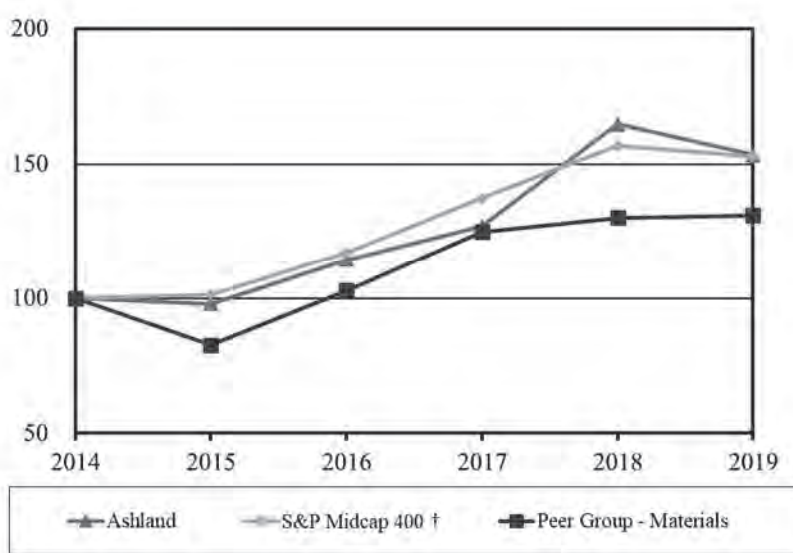
At October 31, 2019, there were approximately 10,500 holders of record of Ashland’s Common Stock. Ashland Common Stock is listed on the NYSE (ticker symbol ASH) and has trading privileges on Nasdaq.

There were no sales of unregistered securities required to be reported under Item 5 of Form 10-K.

FIVE-YEAR TOTAL RETURN PERFORMANCE GRAPH

The following graph compares Ashland’s five-year cumulative total shareholder return with the cumulative total return of the S&P MidCap 400[†] index and one peer group of companies. Ashland is listed in the S&P MidCap 400[†] index. The cumulative total shareholder return assumes the reinvestment of dividends. On May 12, 2017, Ashland completed the final separation of Valvoline Inc. with the pro rata distribution of 2.745338 shares of Valvoline Inc. common stock for every share of Ashland Common Stock to Ashland stockholders. The effect of the final separation of Valvoline Inc. is reflected in the cumulative total return of Ashland Common Stock as a reinvested dividend.

COMPARISON OF FIVE-YEAR CUMULATIVE TOTAL RETURN ASHLAND, S&P MIDCAP 400[†] INDEX AND PEER GROUP



	2014	2015	2016	2017	2018	2019
Ashland	100	98	114	127	165	153
S&P MidCap 400[†]	100	101	117	137	157	153
Peer Group - Materials	100	83	103	125	130	131

The peer group consists of the following industry indices:

- *Peer Group – Materials*: S&P 500[†] Materials (large-cap) and S&P MidCap 400[†] Materials. As of September 30, 2019, this peer group consisted of 57 companies.

Purchase of Company Common Stock

Share repurchase activity during the three months ended September 30, 2019 was as follows:

Q4 Fiscal Periods	Total Number of Shares Purchased	Average Price Paid per Share, including commission	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Dollar Value of Shares That May Yet Be Purchased Under the Plans or Programs (in millions) (a)
July 1, 2019 to July 31, 2019	—	\$ —	—	\$ 800
August 1, 2019 to August 31, 2019:				
2019 ASR (b)	400,508	75.84	400,508	800
September 1, 2019 to September 30, 2019	—	—	—	800
Total	<u>400,508</u>		<u>400,508</u>	\$ 800

(a) During March 2018, Ashland's Board of Directors approved a new \$1 billion stock repurchase program, which replaced the previous stock repurchase program. The Company's stock repurchase program does not obligate it to acquire any specific number of shares. Under the program, shares may be repurchased in privately negotiated and/or open market transactions, including under plans complying with Rule 10b5-1 of the Exchange Act. As of September 30, 2019, \$800 million remains available for repurchase under this authorization.

(b) In May 2019, the Company entered into an accelerated share repurchase program (ASR) to purchase \$200 million of the Company's common stock. In exchange for upfront payments totaling \$200 million, the financial institution committed to deliver shares during the ASR's purchase period, which would end no later than August 2019. In August 2019, the bank exercised its early termination option and the pricing period closed. The settlement price, which represents the weighted average price of Ashland's common stock over the pricing period less a discount, was \$75.84 per share. Based on this settlement price, the final number of shares repurchased by Ashland that were delivered to the financial institution under the ASR was 2.6 million shares, approximately 2.2 million of which were delivered in the third quarter of 2019. Ashland received the additional 400,508 shares in the fourth quarter of 2019 to settle the difference between the initial share delivery and the total number of shares repurchased.

ITEM 6. SELECTED FINANCIAL DATA

See Five-Year Selected Financial Information on page F-69.

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

See Management's Discussion and Analysis of Financial Condition and Results of Operations on pages M-1 through M-41.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

See Quantitative and Qualitative Disclosures about Market Risk on page M-41.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The consolidated financial statements of Ashland presented in this annual report on Form 10-K are listed in the index on page F-1.

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures – As of September 30, 2019, Ashland, under the supervision and with the participation of Ashland’s management, including Ashland’s Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of Ashland’s disclosure controls and procedures as defined in Exchange Act Rules 13a-15(e) and 15d-15(e). Based upon that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that the disclosure controls and procedures were effective as of September 30, 2019.

Internal Control over Financial Reporting - See Management’s Report on Internal Control Over Financial Reporting on page F-2 and the Reports of the Independent Registered Public Accounting Firm on pages F-3 and F-4.

Changes in Internal Control over Financial Reporting – There have been no changes in Ashland’s internal control over financial reporting that occurred during the quarter ended September 30, 2019 that have materially affected, or are reasonably likely to materially affect, Ashland’s internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

There is hereby incorporated by reference the information to appear under the caption “Proposal One - Election of Directors” in Ashland’s Proxy Statement, which will be filed with the SEC within 120 days after September 30, 2019. See also the list of Ashland’s executive officers and related information under “Information About Our Executive Officers” in Part I - Item X in this annual report on Form 10-K.

There is hereby incorporated by reference the information to appear under the caption “Corporate Governance - Governance Principles” in Ashland’s Proxy Statement.

There is hereby incorporated by reference the information to appear under the caption “Corporate Governance - Stockholder Nominations of Directors” in Ashland’s Proxy Statement.

There is hereby incorporated by reference the information to appear under the caption “Audit Committee Report” regarding Ashland’s audit committee and audit committee financial experts, as defined under Item 407(d)(4) and (5) of Regulation S-K in Ashland’s Proxy Statement.

There is hereby incorporated by reference the information to appear under the caption “Corporate Governance – Delinquent Section 16(a) Reports” in Ashland’s Proxy Statement.

ITEM 11. EXECUTIVE COMPENSATION

There is hereby incorporated by reference the information to appear under the captions “Compensation of Directors,” “Corporate Governance - Compensation Committee Interlocks and Insider Participation,” and “Executive Compensation,” in Ashland’s Proxy Statement.

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

There is hereby incorporated by reference the information to appear under the captions “Ashland Common Stock Ownership of Certain Beneficial Owners,” and “Ashland Common Stock Ownership of Directors and Executive Officers of Ashland” in Ashland’s Proxy Statement.

The following table summarizes the equity compensation plans under which Ashland Common Stock may be issued as of September 30, 2019.

Equity Compensation Plan Information

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
	(a)	(b)	(c)
Equity compensation plans approved by security holders	951,008 (1)	\$ 57.94 (2)	6,721,999 (3)
Equity compensation plans not approved by security holders	243,278 (4)	—	1,321,738 (5)
Total	1,194,286	\$ 57.94 (2)	8,043,737

- (1) This figure includes 47,087 net shares that could be issued under stock-settled SARs under the 2006 Ashland Inc. Incentive Plan (“2006 Incentive Plan”), 275,177 net shares that could be issued under stock-settled SARs under the Amended and Restated 2011 Ashland Inc. Incentive Plan (“2011 Incentive Plan”), 216,871 net shares that could be issued under stock-settled SARs, 98,413 shares that could be issued under stock-settled restricted stock units under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (“2015 Incentive Plan”), 109,564 shares that could be issued under stock settled restricted stock units under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (the “2018 Omnibus Plan”), based upon the closing price of Ashland Common Stock on the NYSE as of September 30, 2019 of \$77.05. Additionally, this figure includes 18,750 restricted shares granted under the Amended and Restated Ashland Inc. Incentive Plan (“Amended Plan”) and deferred, and 89,781 performance units for the fiscal 2018-2020 performance period payable in Ashland Common Stock under the 2015 Incentive Plan and 71,861 performance units for the fiscal 2019-2021 performance period payable in Ashland Common Stock under the 2018 Omnibus Plan, estimated assuming target performance is achieved. Also included in the figure are 23,504 shares to be issued under the pre-2005 Deferred Compensation Plan for Employees payable in Ashland Common Stock upon termination of employment or service with Ashland. The fiscal 2017-2019 LTIPP is cash-settled and therefore not included in the table above.
- (2) The weighted-average exercise price excludes shares in Ashland Common Stock which may be distributed under the deferred compensation plans and the deferred restricted stock, and performance share units and restricted stock units which may be distributed under the 2011 Incentive Plan, the 2015 Incentive Plan and the 2018 Omnibus Plan, as described in footnotes (1) and (4) in this table.
- (3) This figure includes 3,089,398 shares available for issuance under the Ashland Global Holdings Inc. 2018 Omnibus Plan, 114,653 shares available for issuance under the pre-2005 Deferred Compensation Plan for Employees (closed) and 375,653 shares available for issuance under the pre-2005 Deferred Compensation Plan for Non-Employee Directors (closed). Under the 2018 Incentive Plan, full-value awards, which include all awards other than stock options and SARs, reduce the share reserve on a 2-to-1 basis. The remaining balance of shares available for grant under the 2015 Incentive Plan are now available for grant under the 2018 Omnibus Plan and are included in the numbers of shares available for issuance under the 2018 Omnibus Plan. This figure also includes 71,150 shares available for issuance under the 2006 Incentive Plan, 2,565,652 shares available for issuance under the 2011 Incentive Plan and 505,493 shares available for issuance under the 2015 Incentive Plan; however, these plans are closed for new issuances and the only shares remaining to be issued are shares paid in lieu of dividends and for the 2015 Incentive Plan, shares to be issued for unvested performance units and restricted stock units.
- (4) This figure includes 45,760 shares to be issued under the Deferred Compensation Plan for Employees (2005), which is described in the “Non-Qualified Deferred Compensation-Ashland Employees’ Deferral Plan” section of Ashland’s proxy statement, and 197,518 shares to be issued under the Deferred Compensation Plan for Non-Employee Directors (2005), which is described in the “Compensation of Directors” section of Ashland’s proxy statement, payable in Ashland Common Stock upon termination of employment or service with Ashland. Because these plans are not equity compensation plans as defined by the rules of the NYSE, neither plan required approval by Ashland’s stockholders.
- (5) This figure includes 625,395 shares available for issuance under the Deferred Compensation Plan for Employees (2005) and 696,343 shares available for issuance under the Deferred Compensation Plan for Non-Employee Directors (2005). Because these plans are not equity compensation plans as defined by the rules of the NYSE, neither plan required approval by Ashland’s stockholders.

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

There is hereby incorporated by reference the information to appear under the captions “Corporate Governance - Director Independence and Certain Relationships,” “Corporate Governance - Related Person Transaction Policy,” and “Audit Committee Report” in Ashland’s Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

There is hereby incorporated by reference the information with respect to principal accounting fees and services to appear under the captions “Audit Committee Report” and “Proposal Two - Ratification of Independent Registered Public Accountants” in Ashland’s Proxy Statement.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Documents filed as part of this Report

- (1) Financial Statements; and
- (2) See Item 15(b) in this annual report on Form 10-K

The consolidated financial statements of Ashland presented in this annual report on Form 10-K are listed in the index on page F-1.

Schedules other than that listed above have been omitted because of the absence of the conditions under which they are required or because the information required is shown in the consolidated financial statements or the notes thereto. Separate financial statements of unconsolidated affiliates are omitted because each company does not constitute a significant subsidiary using the 20% tests when considered individually.

(b) Documents required by Item 601 of Regulation S-K

- 2.1 – Stock and Asset Purchase Agreement, dated as of February 18, 2014, between Ashland Inc. and CD&R Seahawk Bidco, LLC (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on February 24, 2014 (SEC File No. 001-32532), and incorporated herein by reference).
- 2.2 – Sale and Purchase Agreement related to the ASK Chemicals Group, dated April 8, 2014, among Ashland Inc., Ashland International Holdings, Inc., Clariant Produkte (Deutschland) GmbH, Clariant Corp., mertus 158. GmbH, Ascot US Bidco Inc. and Ascot UK Bidco Limited (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on April 14, 2014 (SEC File No. 001-32532), and incorporated herein by reference).
- 2.3 – Agreement and Plan of Merger dated May 31, 2016, by and among Ashland Inc., Ashland Global Holdings Inc. and Ashland Merger Sub Corp. (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on May 31, 2016 (SEC File No. 001-32532), and incorporated herein by reference).
- 2.4 – Stock and Asset Purchase Agreement, dated November 14, 2018, between Ashland Global Holdings Inc. and INEOS Enterprises Holdings Limited (pursuant to Item 601(b)(2) of Regulation S-K, exhibits, schedules and certain annexes to the Stock and Asset Purchase Agreement have been omitted; exhibits, schedules and annexes will be supplementally provided to the SEC upon request) (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on November 20, 2018 (SEC File No. 333-211719), and incorporated herein by reference.)
- 2.5 – First Amendment to Stock and Asset Purchase Agreement, dated July 1, 2019, between Ashland Global Holdings Inc. and INEOS Enterprises Holdings Limited (pursuant to Item 601(b)(2) of Regulation S-K, exhibits, schedules and certain annexes to the Stock and Asset Purchase Agreement have been omitted; exhibits, schedules and annexes will be supplementally provided to the SEC upon request) (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on July 8, 2019 (SEC File No. 333-211719) and incorporated herein by reference).
- 2.6 – Second Amendment to Stock and Asset Purchase Agreement, dated July 30, 2019, between Ashland Global Holdings Inc. and INEOS Enterprises Holdings Limited (pursuant to Item 601(b)(2) of Regulation S-K, exhibits, schedules and certain annexes to the Stock and Asset Purchase Agreement have been omitted; exhibits, schedules and annexes will be supplementally provided to the SEC upon request (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on August 2, 2019 (SEC File No. 333-211719) and incorporated herein by reference).
- 3.1 – Amended and Restated Articles of Incorporation of Ashland Global Holdings Inc. (filed as Exhibit 3.1 to Ashland’s Form 8-K filed on September 20, 2016 (SEC File No. 001-32532), and incorporated by reference herein).
- 3.2 – Amended and Restated By-laws of Ashland Global Holdings Inc. (filed as Exhibit 3.1 to Ashland’s Form 8-K filed November 17, 2017 (SEC File No. 333-211719), and incorporated by reference herein).
- 4.1 – Ashland agrees to provide the SEC, upon request, copies of instruments defining the rights of holders of long-term debt of Ashland and all of its subsidiaries for which consolidated or unconsolidated financial statements are required to be filed with the SEC.

- 4.2 – Warrant Agreement dated July 27, 1999 between Hercules and The Chase Manhattan Bank, as warrant agent (filed as Exhibit 4.4 to Hercules’ Form 8-K filed on July 28, 1999 (SEC File No. 001-00496), and incorporated herein by reference).
- 4.3 – Form of Series A Junior Subordinated Deferrable Interest Debentures (filed as Exhibit 4.5 to Hercules’ Form 8-K filed on July 28, 1999 (SEC File No. 001-00496), and incorporated herein by reference).
- 4.4 – Form of CRESTSM Unit (filed as Exhibit 4.7 to Hercules’ Form 8-K filed on July 28, 1999 (SEC File No. 001-00496), and incorporated herein by reference).
- 4.5 – Form of Warrant (filed as Exhibit 4.8 to Hercules’ Form 8-K filed on July 28, 1999 (SEC File No. 001-00496), and incorporated herein by reference).
- 4.6 – Form of \$100,000,000 6.6% Debenture due August 27, 2027 (filed as Exhibit 4.2 to Hercules’ Form 8-K filed on July 30, 1997 (SEC File No. 001-00496), and incorporated herein by reference).
- 4.7 – Indenture, dated as of August 7, 2012, between Ashland Inc. and U.S. Bank N.A., as Trustee (filed as Exhibit 4.1 to Ashland’s Form 8-K filed on September 21, 2012 (SEC File No. 001-32532), and incorporated herein by reference).
- 4.8 – First Supplemental Indenture, dated as of February 26, 2013, between Ashland Inc. and U.S. Bank National Association, as Trustee, in respect of the senior notes due 2022 (filed as Exhibit 4.11 to Ashland’s Form 10-K for the fiscal year ended September 30, 2013 (SEC File No. 001-32532), and incorporated herein by reference).
- 4.9 – Indenture, dated as of February 26, 2013, between Ashland Inc. and U.S. Bank National Association, as Trustee (filed as Exhibit 4.3 to Ashland’s Form 8-K filed on February 27, 2013 (SEC File No. 001-32532), and incorporated herein by reference).
- 4.10 – First Supplemental Indenture, dated as of February 26, 2013, between Ashland Inc. and U.S. Bank National Association, as Trustee, in respect of the senior notes due 2016, 2018 and 2043 (filed as Exhibit 4.4 to Ashland’s Form 8-K filed on February 27, 2013 (SEC File No. 001-32532), and incorporated herein by reference).
- 4.11 – Second Supplemental Indenture, dated as of March 14, 2013, between Ashland Inc. and U.S. Bank National Association, as Trustee, in respect of the senior notes due 2043 (filed as Exhibit 4.2 to Ashland’s Form 8-K filed on March 18, 2013 (SEC File No. 001-32532), and incorporated herein by reference).
- 4.12 – Second Supplemental Indenture dated October 19, 2016, among Ashland LLC, Ashland Global Holdings Inc. and US Bank National Association, to the Indenture dated as of August 7, 2012 between Ashland LLC and US Bank National Association (filed as Exhibit 4.1 to Ashland’s Form 8-K filed on October 20, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 4.13 – Third Supplemental Indenture dated October 19, 2016, among Ashland LLC, Ashland Global Holdings Inc. and US Bank National Association, to the Indenture dated as of February 27, 2013 between Ashland LLC and US Bank National Association (filed as Exhibit 4.2 to Ashland’s Form 8-K filed on October 20, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 4.14(a)** – Description of Capital Stock.
- 4.14(b)** – Description of 6.875% Senior Notes due 2043.
- 4.14(c)** – Description of 4.750% Senior Notes due 2022.

The following Exhibits 10.1 through 10.45 are contracts or compensatory plans or arrangements or management contracts required to be filed as exhibits pursuant to Items 601(b)(10)(ii)(A) and 601(b)(10)(iii)(A) and (B) of Regulation S-K.

- 10.1 – Ashland Inc. Deferred Compensation Plan for Non-Employee Directors and Amendment No. 1 (filed as Exhibit 10.5 to Ashland’s Form 10-Q for the quarter ended December 31, 2004 (SEC File No. 001-02918), and incorporated herein by reference).
- 10.2 – Ashland Inc. Deferred Compensation Plan and Amendment No. 1 (filed as Exhibit 10.3 to Ashland’s Form 10-Q for the quarter ended December 31, 2004 (SEC File No. 001-02918), and incorporated herein by reference).
- 10.3 – Amended and Restated Ashland Global Holdings Inc. Deferred Compensation Plan for Employees (2005) effective as of January 1, 2017 (filed as Exhibit 10.3 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.4 – Amended and Restated Ashland Inc. Deferred Compensation Plan for Non-Employee Directors (2005) (filed as Exhibit 10.4 to Ashland’s Form 10-K for the fiscal year ended September 30, 2008 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.5 – Amendment to the Amended and Restated Ashland Inc. Deferred Compensation Plan for Non-Employee Directors (2005) (filed as Exhibit 10.4 to Ashland’s Form 10-Q for the quarter ended March 31, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.6 – Amended and Restated Ashland Global Holdings Inc. Deferred Compensation Plan for Non-Employee Directors (2005) effective as of January 1, 2017 (filed as Exhibit 10.4 to Ashland’s Form 10-Q for the quarter ended December 31, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.7 – Amended and Restated Ashland Inc. Deferred Compensation Plan for Employees (2005) (filed as Exhibit 10.3 to Ashland’s Form 10-K for the fiscal year ended September 30, 2008 (SEC File No. 001-32532) and incorporated herein by reference).
- 10.8 Ashland Global Holdings Inc. Deferred Compensation Plan for Employees (Amended and Restated Effective as of May 22, 2019) (filed as Exhibit 10.1 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-211719), and incorporated herein by reference).
- 10.9 Ashland Global Holdings Inc. Deferred Compensation Plan for Non-Employee Directors (Amended and Restated as of May 22, 2019) (filed as Exhibit 10.2 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-21179), and incorporated herein by reference).
- 10.10 – Ashland Supplemental Defined Contribution Plan for Certain Employees (filed as Exhibit 10.3 to Ashland’s Form 10-Q for the quarter ended March 31, 2011 (SEC File No. 001-32532), and incorporated herein by reference) (Frozen).
- 10.11 – Form of Chief Executive Officer Change in Control Agreement (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on October 9, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.12 – Form of Executive Officer Change in Control Agreement (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on October 9, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.13 – Amended and Restated Ashland Inc. Incentive Plan (filed as Exhibit 10.17 to Ashland’s Form 10-K for the fiscal year ended September 30, 2009 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.14 – 2006 Ashland Inc. Incentive Plan (filed as Exhibit 10 to Ashland’s Form 10-Q for the quarter ended December 31, 2005 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.15 – Amended and Restated 2011 Ashland Inc. Incentive Plan (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on February 1, 2013 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.16 – Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (filed as Exhibit 10.21 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.17 – Form of Stock Appreciation Rights Award Agreement under the Amended and Restated 2011 Ashland Inc. Incentive Plan (filed as Exhibit 10.16 to Ashland’s Form 10-K for the fiscal year ended September 30, 2014 (SEC File No. 001-32532), and incorporated herein by reference).

- 10.18 – Form of Restricted Stock Award Agreement under the Amended and Restated 2011 Ashland Inc. Incentive Plan (filed as Exhibit 10.18 to Ashland’s Form 10-K for the fiscal year ended September 30, 2014 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.19 – Form of Restricted Stock Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (filed as Exhibit 10.5 to Ashland’s Form 10-Q for the quarter ended March 31, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.20 – Form of Stock Appreciation Rights Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (filed as Exhibit 10.7 to Ashland’s Form 10-Q for the quarter ended March 31, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.21 – Form of Restricted Stock Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on July 20, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.22 – Form of Performance-Based Restricted Stock Award Agreement (filed as Exhibit 10.3 to Ashland’s Form 8-K filed on October 9, 2015 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.23 – Form of Restricted Stock Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.37 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.24 – Form of Restricted Stock Unit Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.38 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.25 – Form of Stock Appreciation Rights Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.39 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.26 – Form of Performance Unit (LTIP) Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.40 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.27 – Form of Indemnification Agreement between Ashland and members of its Board of Directors (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on September 20, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.28 – Ashland Severance Pay Plan effective as of January 1, 2017 (filed as Exhibit 10.49 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.29 – Form of Cash-Settled Performance Unit (LTIP) Award Agreement under the Amended and Restated 2015 Ashland Global Holdings Inc. Incentive Plan (Double-Trigger Form) (filed as Exhibit 10.59 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.30 – Amended and Restated Hercules Deferred Compensation Plan effective January 1, 2008 (filed as Exhibit 10.8 to Ashland’s Form 10-K for the fiscal year ended on September 30, 2010 (SEC File No. 001-32532), and incorporated herein by reference).
- 10.31 – Amendment to the Amended and Restated Hercules Deferred Compensation Plan dated September 30, 2016 (annuity cash-out) (filed as Exhibit 10.61 to Ashland’s Form 10-K for the fiscal year ended September 30, 2016 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.32 – Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.33 – Form of Stock-Settled Restricted Stock Unit Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on

January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).

- 10.34 – Form of Restricted Stock Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.3 to Ashland’s Form 8-K filed on January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.35 – Form of Stock Appreciation Rights Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.4 to Ashland’s Form 8-K filed on January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.36 – Form of Performance Unit Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.5 to Ashland’s Form 8-K filed on January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.37 – Form of Cash-Settled Restricted Stock Unit Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (filed as Exhibit 10.6 to Ashland’s Form 8-K filed on January 26, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.38 – Ashland Global Holdings Inc. NonQualified Defined Contribution Plan (Amended and Restated as of May 22, 2019) (filed as Exhibit 10.3 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-21179), and incorporated herein by reference).
- 10.39** – Ashland Global Holdings Inc. Supplemental Defined Contribution Plan for Certain Employees (Amended and Restated as of May 22, 2019).
- 10.40 – Form of Restricted Stock Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (with pro-rata vesting upon death, disability and retirement) (filed as Exhibit 10.5 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-211719), and incorporated herein by reference).
- 10.41 – Form of Stock Appreciation Rights Award Agreement (Stock Settled) under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (with pro-rata vesting upon death, disability and retirement) (filed as Exhibit 10.6 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-211719), and incorporated herein by reference).
- 10.42 – Form of Restricted Stock Unit Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (with pro-rata vesting upon death, disability and retirement) (filed as Exhibit 10.7 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-211719), and incorporated herein by reference).
- 10.43 – Form of Stock-Settled Performance Unit Award Agreement under the Ashland Global Holdings Inc. 2018 Omnibus Incentive Compensation Plan (with pro-rata vesting upon death, disability and retirement) (filed as Exhibit 10.8 to Ashland’s Form 10-Q for the quarter ended June 30, 2019 (SEC File No. 33-211719), and incorporated herein by reference).
- 10.44 – Offer Letter dated as of October 8, 2019, entered into by Guillermo Novo and Ashland Global Holdings Inc. (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on October 8, 2019 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.45 – Letter Agreement dated as of October 8, 2019, entered into by William A. Wulfsohn and Ashland Global Holdings Inc. (filed as Exhibit 10.2 to Ashland’s Form 8-K filed on October 8, 2019 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.46 – Stock Purchase Agreement dated as of May 30, 2011, entered into by and among The Samuel J. Heyman 1981 Continuing Trust for Lazarus S. Heyman, The Samuel J. Heyman 1981 Continuing Trust for Eleanor S. Heyman, The Samuel J. Heyman 1981 Continuing Trust for Jennifer L. Heyman, The Samuel J. Heyman 1981 Continuing Trust for Elizabeth D. Heyman, The Lazarus S. Heyman Age 50 Trust for Assets Appointed Under Will of Lazarus S. Heyman, The Eleanor S. Heyman Age 50 Trust for Assets Appointed Under Will of Lazarus S. Heyman, The Jennifer L. Heyman Age 50 Trust for Assets Appointed Under Will of Lazarus S. Heyman, The Elizabeth D. Heyman Age 50 Trust for Assets Appointed Under Will of Lazarus S. Heyman, The Horizon Holdings Residual Trust, RFH Investment Holdings LLC, Ashland and Ronnie F. Heyman, as representative of the Seller Parties (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on May 31, 2011 (SEC File No. 001-32532), and incorporated herein by reference).

- 10.47 – Credit Agreement, dated as of May 17, 2017, among Ashland LLC, as Borrower, The Bank of Nova Scotia, as Administrative Agent, Swing Line Lender and an L/C Issuer, each Lender and L/C Issuer party thereto and the other agents party thereto (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on May 18, 2017 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.48 – Amendment No. 1 dated as of May 19, 2017, among Ashland LLC, as Borrower (the “Borrower”), certain subsidiaries of the Borrower, The Bank of Nova Scotia, as Administrative Agent (the “Administrative Agent”), and Citibank, N.A., as the Incremental Revolving Credit Lender, to the Credit Agreement dated as of May 17, 2017, among the Borrower, the Administrative Agent, each lender and letter of credit issuer party thereto and the other agents party thereto (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on May 22, 2017 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.49 – Amendment No. 2 dated as of June 14, 2017, among Ashland LLC, as Borrower (the “Borrower”), certain subsidiaries of the Borrower, The Bank of Nova Scotia, as Administrative Agent (the “Administrative Agent”), and Citibank, N.A., as the Term B Lender, to the Credit Agreement dated as of May 17, 2017, among the Borrower, the Administrative Agent, each lender and letter of credit issuer party thereto and the other agents party thereto (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on June 14, 2017 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.50 – Amendment No. 3 to the Credit Agreement dated as of May 17, 2017, dated as of May 22, 2018, among Ashland LLC, as Borrower, the Lenders from time to time party thereto, The Bank of Nova Scotia, as Administrative Agent, Swing Line Lender and an L/C Issuer, each other L/C Issuer from time to time party thereto and Citibank, N.A., as Syndication Agent, and the various other parties thereto (as amended by Amendment No. 1 to the Credit Agreement, dated as of May 19, 2017, as further amended by Amendment No. 2 to the Credit Agreement, dated as of June 14, 2017, and as further amended, restated, modified and supplemented from time to time) (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on May 23, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.51 – Amendment No. 4 to the Credit Agreement dated as of May 17, 2017, dated as of June 29, 2018, among Ashland LLC, as Borrower, The Lenders from time to time party thereto, The Bank of Nova Scotia, as Administrative Agent (the “Administrative Agent”), Swing Line Lender and an L/C Issuer, each other L/C Issuer from time to time party thereto and Citibank, N.A., as Syndication Agent, and the various other parties thereto (as amended by Amendment No. 1 to the Credit Agreement, dated as of May 19, 2017, as further amended by Amendment No. 2 to the Credit Agreement, dated as of June 14, 2017 and Amendment No. 3 to the Credit Agreement, dated as of May 22, 2018, and as further amended, restated, modified and supplemented from time to time) (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on July 2, 2018 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.52 – Assumption Agreement dated September 20, 2016, by and between Ashland Global Holdings Inc. and Ashland Inc. (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on September 20, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.53 – Separation Agreement dated as of September 22, 2016, between and among Ashland Global Holdings Inc. and Valvoline Inc. (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on September 28, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.54 – Tax Matters Agreement dated as of September 22, 2016, between and among Ashland Global Holdings Inc. and Valvoline Inc. (filed as Exhibit 10.4 to Ashland’s Form 8-K filed on September 28, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.55 – Employee Matters Agreement dated as of September 22, 2016, between and among Ashland Global Holdings Inc. and Valvoline Inc. (filed as Exhibit 10.5 to Ashland’s Form 8-K filed on September 28, 2016 (SEC File No. 333-211719), and incorporated herein by reference).
- 10.56 – Stock Purchase Agreement, dated April 14, 2017, by and among Ashland LLC, Pharmachem Laboratories, Inc., the holders of common stock of Pharmachem Laboratories, Inc., Dr. David Peele, and Photon SH Representative LLC, solely as the shareholders’ representative (filed as Exhibit 2.1 to Ashland’s Form 8-K filed on May 18, 2017 (SEC File No. 333-211719) and incorporated herein by reference).

- 10.57 – Amendment No. 1 to the Stock Purchase Agreement, dated May 16, 2017, by and among Ashland LLC, Pharmachem Laboratories, Inc., the holders of common stock of Pharmachem Laboratories, Inc., Dr. David Peele, and Photon SH Representative LLC, solely as the shareholders’ representative (filed as Exhibit 2.2 to Ashland’s Form 8-K filed on May 18, 2017 (SEC File No. 333-211719) and incorporated herein by reference).
- 10.58 – Amendment No. 2 to the Stock Purchase Agreement, dated August 23, 2017, by and among Ashland LLC, Pharmachem Laboratories, Inc., the holders of common stock of Pharmachem Laboratories, Inc., Dr. David Peele, and Photon SH Representative LLC, solely as the shareholders’ representative (filed as Exhibit 10.84 to Ashland’s Form 10-K for the fiscal year ended September 30, 2017 (SEC File No. 333-211719), and incorporated by reference herein).
- 10.59 – Agreement, dated January 22, 2019, by and amount Ashland Global Holdings Inc., Cruiser Capital Advisors, LLC, Keith M. Rosenbloom, Cruiser Capital Master Fund LP, Metamorphosis IV LLC, William H. Joyce, Metamorphosis Master Fund LP, Cruiser Capital Metamorphosis Advisors, LLC, Cruiser Capital, LLC, Cruiser Capital, Ltd., the William H. Joyce Revocable Trust and the Joyce Family Irrevocable Trust (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on January 22, 2019 (SEC File No. 333-211719), and incorporated herein by reference.)
- 10.60 – Master Confirmation – Uncollared Accelerated Share Repurchase, dated May 6, 2019, between Ashland Global Holdings Inc. and Goldman Sachs (filed as Exhibit 10.1 to Ashland’s Form 8-K filed on May 7, 2019 (SEC File No. 333-211719) and incorporated herein by reference).
- 21** – List of Subsidiaries.
- 23.1** – Consent of Ernst & Young LLP.
- 23.2** – Consent of Hamilton, Rabinovitz & Associates, Inc.
- 23.3** – Consent of Nathan Associates, Inc.
- 24** – Power of Attorney.
- 31.1** – Certification of William A. Wulfsohn, Chief Executive Officer of Ashland, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
- 31.2** – Certification of J. Kevin Willis, Chief Financial Officer of Ashland, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
- 32** – Certification of William A. Wulfsohn, Chief Executive Officer of Ashland, and J. Kevin Willis, Chief Financial Officer of Ashland, pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
- 101.INS* Inline XBRL Instance Document.
- 101.SCH* Inline XBRL Taxonomy Extension Schema Document.
- 101.CAL* Inline XBRL Taxonomy Extension Calculation Linkbase Document.
- 101.DEF* Inline XBRL Taxonomy Extension Definition Linkbase Document.
- 101.LAB* Inline XBRL Taxonomy Extension Label Linkbase Document.
- 101.PRE* Inline XBRL Taxonomy Extension Presentation Linkbase Document.
- 104 Cover Page Interactive Data File (formatted as inline XBRL and contained in Exhibit 101).

* Attached as Exhibit 101 to this report are the following documents formatted in XBRL (Extensible Business Reporting Language): (i) Statements of Consolidated Comprehensive Income (Loss) for years ended September 30, 2019, 2018 and 2017; (ii) Consolidated Balance Sheets at September 30, 2019 and 2018; (iii) Statements of Consolidated Equity at

September 30, 2019, 2018 and 2017; (iv) Statements of Consolidated Cash Flows for years ended September 30, 2019, 2018 and 2017; and (v) Notes to Consolidated Financial Statements.

** Filed herewith.

SM Service mark, Ashland or its subsidiaries, registered in various countries.

TM Trademark, Ashland or its subsidiaries, registered in various countries.

† Trademark owned by a third party.

Upon written or oral request, a copy of the above exhibits will be furnished at cost.

ITEM 16. FORM 10-K SUMMARY

None.

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.

ASHLAND GLOBAL HOLDINGS INC.

(Registrant)

By:

/s/ J. Kevin Willis

J. Kevin Willis

Senior Vice President and Chief Financial Officer

Date: November 25, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant, in the capacities indicated, on November 25, 2019.

<u>Signatures</u>	<u>Capacity</u>
<u>/s/ William A. Wulfsohn</u> William A. Wulfsohn	Chairman of the Board, Chief Executive Officer and Director (Principal Executive Officer)
<u>/s/ J. Kevin Willis</u> J. Kevin Willis	Senior Vice President and Chief Financial Officer (Principal Financial Officer)
<u>/s/ J. William Heitman</u> J. William Heitman	Vice President and Controller (Principal Accounting Officer)
<u>*</u>	Director
<u>Brendan M. Cummins</u> <u>*</u>	Director
<u>William G. Dempsey</u> <u>*</u>	Director
<u>Jay V. Ihlenfeld</u> <u>*</u>	Director
<u>Susan L. Main</u> <u>*</u>	Director
<u>Guillermo Novo</u> <u>*</u>	Director
<u>Jerome A. Peribere</u> <u>*</u>	Director
<u>Craig A. Rogerson</u> <u>*</u>	Director
<u>Mark C. Rohr</u> <u>*</u>	Director
<u>Janice J. Teal</u> <u>*</u>	Director
<u>Kathleen Wilson-Thompson</u>	

*By: /s/ Peter J. Ganz
Peter J. Ganz
Attorney-in-Fact

Date: November 25, 2019

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

The following discussion should be read in conjunction with the Consolidated Financial Statements and the accompanying Notes to Consolidated Financial Statements for the years ended September 30, 2019, 2018 and 2017.

BUSINESS OVERVIEW

Ashland profile

Ashland is a premier global leader in providing specialty chemical solutions to customers in a wide range of consumer and industrial markets, including adhesives, architectural coatings, construction, energy, food and beverage, nutraceuticals, personal care and pharmaceutical. With approximately 4,700 employees worldwide, Ashland serves customers in more than 100 countries.

Ashland's sales generated outside of North America were 60% in 2019, 2018 and 2017. Sales by region expressed as a percentage of total consolidated sales were as follows:

Sales by Geography	2019	2018	2017
North America (a)	40%	40%	40%
Europe	33%	32%	30%
Asia Pacific	19%	19%	20%
Latin America & other	8%	9%	10%
	<u>100%</u>	<u>100%</u>	<u>100%</u>

(a) Ashland includes only U.S. and Canada in its North American designation.

Reportable segments

Ashland's reporting structure is composed of two reportable segments: Specialty Ingredients and Intermediates and Solvents. For further descriptions of each reportable segment, see "Results of Operations – Reportable Segment Review" beginning on page M-17.

Sales by each reportable segment expressed as a percentage of total consolidated sales were as follows:

Sales by Reportable Segment	2019	2018	2017
Specialty Ingredients	96%	95%	96%
Intermediates and Solvents	4%	5%	4%
	<u>100%</u>	<u>100%</u>	<u>100%</u>

KEY DEVELOPMENTS

During 2019, the following operational decisions and economic developments had an impact on Ashland's current and future cash flows, results of operations and financial position.

Business Results

Ashland's net income was \$505 million (\$24 million from continuing operations and \$481 million from discontinued operations) in 2019 compared to \$114 million (\$19 million from continuing operations and \$95 million from discontinued operations) in 2018. Results for Ashland's continuing operations were primarily driven by the performance of Specialty Ingredients and the Intermediates and Solvents operating results, as well as reduced Corporate costs, between periods. Discontinued operations were primarily driven by the results of the Composites segment (including Ashland's maleic anhydride business (Maleic business)) and Marl facility including the gain on sale of \$372 million and adjustments for retained liabilities associated with divested discontinued operations businesses such as Distribution. Ashland's Adjusted EBITDA increased by \$17 million to \$532 million during 2019 compared to 2018 (see U.S. GAAP reconciliation on page M-8). The increase in Adjusted EBITDA was mainly due to lower selling, general and administrative costs for Specialty Ingredients and Corporate attributable to company-wide restructuring program savings and lower incentive compensation. Business results for both

Specialty Ingredients and Intermediates and Solvents were lower than the prior year primarily driven by lower volume and mix and unfavorable foreign currency exchange partially offset by lower selling, general and administrative expense.

The following discussion outlines significant transactions announced or executed during 2019.

Composites Segment and Marl Facility

On November 15, 2018, Ashland announced that it had signed a definitive agreement to sell its Composites segment and Intermediates and Solvents Marl facility to INEOS Enterprises (INEOS) in a transaction valued at \$1.1 billion. Ashland retained the remaining Intermediates and Solvents facility in Lima, Ohio primarily for its own internal business use.

In late July of 2019, Ashland and INEOS agreed to certain additional changes to the sale agreement. As part of the proposed changes, the purchase price was adjusted to \$1.015 billion while Ashland retained the right to the Maleic business, including the retention of any subsequent sale proceeds.

On August 30, 2019 Ashland completed the previously announced sale of its Composites business (excluding the Maleic business) and butanediol manufacturing facility in Marl, Germany to INEOS. Net proceeds from the sale were approximately \$1 billion and were used primarily for debt reductions. Approximately \$0.9 billion of debt was retired by September 30, 2019.

As a result of the sale, Ashland recognized a \$372 million after-tax gain within the Statement of Consolidated Comprehensive Income (Loss) within the income from discontinued operations caption.

Since this disposal group signifies a strategic shift in Ashland's business and had a major effect on Ashland's operations and financial results, the operating results and cash flows related to Composites and the Marl facility, including the Maleic business, have been reflected as discontinued operations in the Statements of Consolidated Comprehensive Income (Loss) and Statements of Consolidated Cash Flows. See Note E of the Notes to Condensed Consolidated Financial Statements for the results of operations for Composites and the Marl facility, including the Maleic business, for all periods presented.

Certain indirect corporate costs included within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss) that were previously allocated to the Composites segment and Marl facility, including the Maleic business, do not qualify for classification within discontinued operations and are now reported as selling, general and administrative expense within continuing operations on a consolidated basis and within the Unallocated and other segment. These costs were \$41 million, \$46 million and \$36 million during the twelve months ended September 30, 2019, 2018, and 2017, respectively. Ashland is currently implementing plans to eliminate these costs as part of the global restructuring program.

Subsequent to the completion of the sale, Ashland is providing certain transition services to INEOS for a fee. While the transition services are expected to vary in duration depending upon the type of service provided, Ashland expects to reduce certain costs as the transition services are completed. Ashland recognized transition service fees of \$1 million during 2019 for the one month period since the completion of the divestiture.

Restructuring Plans

In early May 2018, Ashland announced a company-wide restructuring program to accelerate EBITDA margin growth by creating a leaner, more cost competitive company with improved operating efficiency, faster decision making and a stronger customer focus. Under this program, Ashland intends to eliminate a total of \$120 million of existing allocated costs, direct expenses within Specialty Ingredients SG&A, and facility-related costs as follows:

- Approximately \$70 million of costs allocated to the Composites business and to the butanediol manufacturing facility in Marl, Germany, are expected to be offset or eliminated through transfers and reductions. This reduction is intended to eliminate stranded costs.
- Approximately \$50 million of additional costs are expected to be eliminated to drive improved profitability in Specialty Ingredients and accelerate achievement of its adjusted EBITDA margin target of 25-27 percent.

Ashland continues to expect to achieve the full \$120 million in run-rate savings by the end of calendar year 2019. Ashland captured \$115 million in annualized run-rate savings under this program by the end of the September 2019 quarter. Ashland expects the remaining cost savings from this program to be achieved by December 31, 2019.

Tax Law Changes

The Tax Cuts and Jobs Act (Tax Act) was enacted on December 22, 2017. The Tax Act reduced the U.S. federal corporate tax rate from 35% to 21%, required companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and created new taxes on certain foreign sourced earnings. Through September 30, 2018 Ashland recorded provisional amounts for certain enactment date effects of the Tax Act by applying the guidance in SAB 118 because Ashland had not yet completed its enactment date accounting for these effects. During 2019, Ashland completed its internal accounting assessment for the tax effects from the enactment of the Tax Act and recorded adjustments to provisional amounts previously recorded. Ashland's final assessment resulted in net unfavorable tax adjustments of \$29 million during the twelve months ended September 30, 2019. These adjustments are primarily related to the one-time transition tax assessed on foreign cash and unremitted earnings. There could be additional guidance issued subsequent to September 30, 2019 that could impact Ashland's interpretation of the Tax Act and such changes could affect the amounts recorded. The impact, if any, of further transitional tax guidance that may be issued by the U.S. Treasury would be reflected in the Company's provision for income tax in the period such guidance is effective.

Share Repurchase Program

On April 30, 2019, Ashland announced an intention to commence a \$200 million share repurchase program under Ashland's Board of Directors approved \$1 billion stock repurchase program in fiscal 2018.

In May 2019, under the 2018 stock repurchase program, Ashland announced that it entered into an accelerated share repurchase agreement (2019 ASR Agreement). Under the 2019 ASR Agreement, Ashland paid an initial purchase price of \$200 million and received an initial delivery of 2.2 million shares of common stock during May 2019. The bank exercised its early termination option under the 2019 ASR Agreement in August 2019, and an additional 400 thousand shares were repurchased, bringing the total shares repurchased upon settlement to 2.6 million. This was the first stock repurchase under the 2018 stock repurchase program.

As of September 30, 2019, \$800 million remained available for repurchase under the \$1 billion stock repurchase program.

Stockholder Dividends

In May 2019, the Board of Directors of Ashland announced a quarterly cash dividend of 27.5 cents per share, which represents an increase from the previous quarterly cash dividend of 25.0 cents per share. This dividend was paid in the third and fourth quarters of fiscal 2019.

Debt Repayments and Ashland Credit Ratings

During fiscal 2019, Ashland reduced outstanding debt by approximately \$0.9 billion. This debt reduction was primarily funded through the proceeds received from the Composites segment (excluding the Maleic business) and the Marl facility sale. As a result of these debt reductions, in September and October 2019 Ashland's corporate credit ratings with both Standard & Poor's and Moody's Investor Services were upgraded as follows: Standard & Poor's from BB to BB+; and Moody's Investor Services from Ba2 to Ba1.

RESULTS OF OPERATIONS – CONSOLIDATED REVIEW

Use of non-GAAP measures

Ashland has included within this document the following non-GAAP measures, on both a consolidated and reportable segment basis, which are not defined within U.S. GAAP and do not purport to be alternatives to net income or cash flows from operating activities as a measure of operating performance or cash flows:

- EBITDA - net income (loss), plus income tax expense (benefit), net interest and other financing expenses, and depreciation and amortization.
- Adjusted EBITDA - EBITDA adjusted for noncontrolling interests, discontinued operations, net gain (loss) on acquisitions and divestitures, other income and (expense) and key items (including the remeasurement gains and losses related to pension and other postretirement plans).

- Adjusted EBITDA margin - Adjusted EBITDA, which can include pro forma adjustments, divided by sales.
- Adjusted diluted earnings per share (EPS) - income (loss) from continuing operations, adjusted for key items, net of tax, divided by the average outstanding diluted shares for the applicable period.
- Free cash flow - operating cash flows less capital expenditures and certain other adjustments as applicable.

Management believes the use of EBITDA and Adjusted EBITDA measures on a consolidated and reportable segment basis assists investors in understanding the ongoing operating performance by presenting comparable financial results between periods. Ashland believes that by removing the impact of depreciation and amortization and excluding certain non-cash charges, amounts spent on interest and taxes and certain other charges that are highly variable from year to year, EBITDA and Adjusted EBITDA provide Ashland's investors with performance measures that reflect the impact to operations from trends in changes in sales, margin and operating expenses, providing a perspective not immediately apparent from net income and operating income. The adjustments Ashland makes to derive the non-GAAP measures of EBITDA and Adjusted EBITDA exclude items which may cause short-term fluctuations in net income and operating income and which Ashland does not consider to be the fundamental attributes or primary drivers of its business. EBITDA and Adjusted EBITDA provide disclosure on the same basis as that used by Ashland's management to evaluate financial performance on a consolidated and reportable segment basis and provide consistency in our financial reporting, facilitate internal and external comparisons of Ashland's historical operating performance and its business units and provide continuity to investors for comparability purposes.

The Adjusted diluted EPS metric enables Ashland to demonstrate what effect key items have on an earnings per diluted share basis by taking income (loss) from continuing operations, adjusted for key items after tax that have been identified in the Adjusted EBITDA table, and dividing by the average outstanding diluted shares for the applicable period. Ashland's management believes this presentation is helpful to illustrate how the key items have impacted this metric during the applicable period.

The free cash flow metric enables Ashland to provide a better indication of the ongoing cash being generated that is ultimately available for both debt and equity holders as well as other investment opportunities. Unlike cash flow provided by operating activities, free cash flow includes the impact of capital expenditures from continuing operations, providing a more complete picture of cash generation. Free cash flow has certain limitations, including that it does not reflect adjustment for certain non-discretionary cash flows such as mandatory debt repayments. The amount of mandatory versus discretionary expenditures can vary significantly between periods.

Although Ashland may provide forward-looking guidance for Adjusted EBITDA, Adjusted diluted EPS and free cash flow, Ashland is not reaffirming or providing forward-looking guidance for U.S. GAAP-reported financial measures or a reconciliation of forward-looking non-GAAP financial measures to the most directly comparable U.S. GAAP measure because it is unable to predict with reasonable certainty the ultimate outcome of certain significant items that affect these metrics such as domestic and international economic, political, legislative, regulatory and legal actions. In addition, certain economic conditions, such as recessionary trends, inflation, interest and monetary exchange rates, government fiscal policies and changes in the prices of certain key raw materials, can have a significant effect on operations and are difficult to predict with certainty.

These non-GAAP measures should be considered supplemental in nature and should not be construed as more significant than comparable measures defined by U.S. GAAP. Limitations associated with the use of these non-GAAP measures include that these measures do not present all of the amounts associated with our results as determined in accordance with U.S. GAAP. The non-GAAP measures provided are used by Ashland management and may not be determined in a manner consistent with the methodologies used by other companies. EBITDA and Adjusted EBITDA provide a supplemental presentation of Ashland's operating performance on a consolidated and reportable segment basis. Adjusted EBITDA generally includes adjustments for items that impact comparability between periods. In addition, certain financial covenants related to Ashland's 2017 Credit Agreement are based on similar non-GAAP measures and are defined further in the sections that reference this metric.

In accordance with U.S. GAAP, Ashland recognizes actuarial gains and losses for defined benefit pension and other postretirement benefit plans annually in the fourth quarter of each fiscal year and whenever a plan is determined to qualify for a remeasurement during a fiscal year. Actuarial gains and losses occur when actual experience differs from the estimates used to allocate the change in value of pension and other postretirement benefit plans to expense throughout the year or when assumptions change, as they may each year. Significant factors that can contribute to the recognition of actuarial gains and losses include changes in discount rates used to remeasure pension and other postretirement obligations on an annual basis or upon a qualifying remeasurement, differences between actual and expected returns on plan assets and other changes in actuarial assumptions, for example, the life expectancy of plan participants. Management believes Adjusted EBITDA, which includes the expected return on pension plan assets yet excludes both the actual return on pension plan assets and the impact of actuarial gains and losses, provides investors with a meaningful supplemental presentation of Ashland's operating performance (see the Adjusted EBITDA reconciliation table on page M-8 for additional details on exact amounts included within this non-GAAP measure related to pension and other postretirement plans). Management believes these actuarial gains and losses are primarily financing activities that are more reflective of changes in current conditions in global financial markets (and in particular interest rates) that are not directly related to the underlying business. For further information on the actuarial assumptions and plan assets referenced above, see Note N of the Notes to Consolidated Financial Statements.

Consolidated review

Net income

Ashland's net income is primarily affected by results within operating income, net interest and other financing expense, net loss on acquisitions and divestitures, income taxes, discontinued operations and other significant events or transactions that are unusual or nonrecurring. Net income also includes Ashland's adjustment for the immediate recognition of the change in the fair value of the plan assets and net actuarial gains and losses for defined benefit pension plans and other postretirement benefit plans for each fiscal year.

Key financial results for 2019, 2018 and 2017 included the following:

- Ashland's net income attributable to Ashland amounted to income of \$505 million in 2019, \$114 million in 2018, and \$1 million in 2017, or \$8.03, \$1.79 and \$0.01 diluted earnings per share, respectively.
- Ashland's net income attributable to noncontrolling interest amounted to \$27 million during 2017 and reflects the noncontrolling interest of Valvoline Inc. for the period after the IPO close on September 28, 2016 and before the final separation occurred on May 12, 2017.
- Discontinued operations, which are reported net of taxes, resulted in income of \$481 million, \$95 million and \$208 million during 2019, 2018 and 2017, respectively. The activity within discontinued operations includes the gain on the disposal of the Composites segment (excluding the Maleic business) and the Intermediates and Solvents Marl facility in 2019, the operating results of the Composites segment (including the Maleic business) and the Intermediates and Solvents Marl facility for all periods reported, and Valvoline Inc. for the period in fiscal year 2017 prior to the final separation on May 12, 2017. Discontinued operations also includes adjustments related to other retained liabilities for previously divested businesses within discontinued operations.
- Results from continuing operations, which excludes results from discontinued operations, amounted to income of \$24 million in 2019, \$19 million in 2018 and a loss of \$180 million in 2017.
- The effective income tax expense rate of 66% for 2019, income tax benefit rate of 73% for 2018, and income tax benefit rate of 8% for 2017, were significantly impacted by certain tax specific key items and tax discrete items.
- Ashland incurred pretax net interest and other financing expense of \$99 million, \$102 million and \$229 million during 2019, 2018 and 2017, respectively, and was impacted by debt principal payments and certain charges associated with debt financing activity during each year.
- Other net periodic benefit income (costs) totaled income of \$5 million and \$15 million during 2019 and 2018, respectively, and costs of \$6 million during 2017.

- Net loss on acquisitions and divestitures totaled \$2 million, \$4 million and \$10 million during 2019, 2018 and 2017, respectively.
- Operating income amounted to income of \$166 million, \$102 million and \$49 million in 2019, 2018 and 2017, respectively.

For further information on the items reported above, see the discussion in the comparative Statements of Consolidated Comprehensive Income (Loss) caption review analysis.

Operating income

Operating income amounted to income of \$166 million, \$102 million and \$49 million in 2019, 2018 and 2017, respectively. The current and prior years' operating income included certain key items that were excluded to arrive at Adjusted EBITDA and are quantified in the table on page M-8. These operating key items for the applicable periods are summarized as follows:

- Restructuring, separation and other costs - Ashland periodically implements company-wide restructuring programs related to acquisitions, divestitures and other cost reduction programs in order to enhance profitability through streamlined operations and an improved overall cost structure. Ashland often incurs severance, facility and integration costs associated with these programs. See Notes C, D and F in the Notes to Consolidated Financial Statements for further information. Also included within this key item category are separation costs incurred as a result of the separation from Valvoline, which primarily related to transaction, consulting and legal fees. See Note B of the Notes to Consolidated Financial Statements for more information on the separation of Valvoline.
- Accelerated depreciation – As a result of various restructuring activities at certain office facilities and manufacturing plants, Ashland recorded accelerated depreciation due to changes in the expected useful life of certain property, plant and equipment. See Note H of the Notes to Consolidated Financial Statements for more information.
- Proxy costs – Ashland incurred significant consulting and other costs associated with the 2019 Annual Meeting of Stockholders and agreement with the Cruiser Group (as defined in the agreement).
- Environmental reserve adjustments – Ashland is subject to various federal, state and local environmental laws and regulations that require environmental assessment or remediation efforts (collectively environmental remediation) at multiple locations. As a result of these activities, Ashland recorded non-cash adjustments during each year to its environmental liabilities and receivables related to previously divested businesses or non-operational sites. See Note O of the Notes to Consolidated Financial Statements for more information.
- Asset impairments – Consistent with historical policies and U.S. GAAP provisions, Ashland recognizes assets at fair value less cost to sell which resulted in impairment charges to certain assets during 2019 and 2018. The charges during 2018 primarily related to the impairment of an office facility as a result of a company-wide restructuring program. See Note F of the Notes to Consolidated Financial Statements for more information.
- Tax indemnity expense – During 2019 and 2018, Ashland recorded an adjustment to a tax indemnity receivable that was associated with the acquisition of Pharmachem.
- Legal settlement/reserve – Ashland recorded adjustments related to settlements and/or reserves for certain legal matters.
- Unplanned plant shutdowns – During 2019 and 2017, Ashland incurred costs related to temporary shutdowns as follows: (a) for the Specialty Ingredients Parlin facility as a result of force majeure contract issues in 2019 and (b) from a Specialty Ingredients manufacturing plant due to a hurricane in 2017.
- Inventory fair value adjustment – During 2017, Ashland recorded non-cash charges related to the fair value adjustment of inventory acquired from Pharmachem at the date of acquisition. See Note C for more information on the acquisition of Pharmachem.

Operating income for 2019, 2018 and 2017 included depreciation and amortization of \$289 million, \$277 million and \$265 million, respectively (which includes accelerated depreciation of \$39 million, \$14 million, and \$19 million, respectively, for each year).

Non-operating key items affecting EBITDA

During the current and prior years, there were certain key items that were not included in operating income but were excluded to arrive at Adjusted EBITDA. These non-operating key items for the applicable periods are summarized as follows:

- Net loss on acquisitions and divestitures – Ashland recorded a loss on certain divestitures during each year and incurred certain transaction costs associated with the acquisition of Pharmachem during 2017. See Notes C and D of the Notes to Consolidated Financial Statements for more information on these acquisitions and divestitures.
- Loss (gain) on pension and other postretirement plan remeasurements - Ashland recognized actuarial gains and losses for defined benefit pension and other postretirement benefit plans annually in the fourth quarter of each fiscal year and whenever a plan is determined to qualify for a remeasurement during a fiscal year. See Note N of the Notes to Consolidated Financial Statements for more information.

EBITDA and Adjusted EBITDA

EBITDA totaled \$900 million, \$471 million and \$487 million for 2019, 2018 and 2017, respectively. EBITDA and Adjusted EBITDA results in the following table have been prepared to illustrate the ongoing effects of Ashland's operations, which exclude certain key items previously described. Management believes the use of such non-GAAP measures on a consolidated and reportable segment basis assists investors in understanding the ongoing operating performance by presenting the financial results between periods on a more comparable basis.

(In millions)	2019	2018	2017
Net income (loss)	\$ 505	\$ 114	\$ 28
Income tax expense (benefit)	46	(8)	(16)
Net interest and other financing expense	99	102	229
Depreciation and amortization (a)	250	263	246
EBITDA	900	471	487
Income from discontinued operations (net of taxes)	(481)	(95)	(208)
Key items included in EBITDA:			
Restructuring, separation and other costs (b)	51	77	88
Proxy costs	4	—	—
Accelerated depreciation	39	14	19
Environmental reserve adjustments	15	44	9
Asset impairments	—	16	—
Tax indemnity expense	6	5	—
Net loss on acquisitions and divestitures (c)	3	2	9
Loss (gain) on pension and other postretirement plan remeasurements	(7)	(14)	8
Legal settlement/reserve	—	(5)	5
Unplanned plant shutdowns	2	—	6
Inventory fair value adjustment	—	—	7
Total key items included in EBITDA	113	139	151
Adjusted EBITDA (d)	\$ 532	\$ 515	\$ 430
Total key items included in EBITDA	\$ 113	\$ 139	\$ 151
Unrealized gain on securities (e)	(7)	—	—
Debt refinancing costs (f)	6	1	112
Total key items, before tax	\$ 112	\$ 140	\$ 263

(a) Excludes \$39 million, \$14 million and \$19 million of accelerated depreciation during 2019, 2018 and 2017, respectively.

(b) Includes impairments of \$8 million during 2019.

(c) Excludes expense of \$3 million, \$2 million and \$9 million during 2019, 2018 and 2017, respectively, related to ongoing adjustments of previous divestiture transactions.

(d) Includes \$9 million, \$8 million and \$7 million during 2019, 2018 and 2017, respectively, of net periodic pension and other postretirement costs (income) recognized ratably through the fiscal year. These costs (income) are comprised of service cost, interest cost, expected return on plan assets, and amortization of prior service credit and are disclosed in further detail in Note N of the Notes to Consolidated Financial Statements.

(e) Due to the adoption of new accounting guidance in 2019, the unrealized (gains) losses on certain investment securities directly impact earnings and are recorded within the net interest and other expense caption on the Statements of Consolidated Comprehensive Income (Loss). See Note A of the Notes to Consolidated Financial Statements for more information.

(f) Debt refinancing costs during 2019 included a \$6 million debt issuance costs amortization charge for the early repayment of term loans A and B. Debt refinancing costs during 2018 primarily included a \$1 million charge for new debt issuance costs incurred with the re-pricing of the term loan B facility. Debt refinancing costs during 2017 included \$92 million of accelerated accretion from the tender offer of the 2029 notes, a \$16 million charge for early redemption premium payments and bondholder consent fees for senior notes due 2018 and 2022, a \$9 million charge for debt issuance costs resulting from financing activity for the 2017 Credit Agreement and a net gain of \$5 million related to the repayment of notes due 2029. All debt refinancing costs were recorded within the net interest and other financing expense caption on the Statements of Consolidated Comprehensive Income (Loss). See Note J of the Notes to Consolidated Financial Statements for more information.

Diluted EPS and Adjusted Diluted EPS

The following table reflects the U.S. GAAP calculation for the income (loss) from continuing operations adjusted for the cumulative diluted EPS effect for key items after tax that have been identified in the Adjusted EBITDA table in the previous section. Key items are defined as the financial effects from significant transactions that may have caused short-term fluctuations in net income and/or operating income which Ashland believes do not accurately reflect Ashland's underlying business performance and trends. The Adjusted Diluted EPS for the income (loss) from continuing operations in the following table has been prepared to illustrate the ongoing effects of Ashland's operations. Management believes investors and analysts use this financial measure in assessing Ashland's business performance and that presenting this non-GAAP measure on a consolidated basis assists investors in better understanding Ashland's ongoing business performance and enhancing their ability to compare period-to-period financial results.

	2019	2018	2017
Diluted EPS from continuing operations (as reported)	\$ 0.39	\$ 0.29	\$ (2.90)
Key items, before tax:			
Restructuring, separation and other costs (including accelerated depreciation)	1.42	1.43	1.70
Proxy costs	0.07	—	—
Environmental reserve adjustments	0.24	0.68	0.15
Asset impairments	—	0.25	—
Loss (gain) on pension and other postretirement plan remeasurements	(0.11)	(0.22)	0.13
Tax indemnity expense	0.10	0.08	—
Net loss on acquisitions and divestitures	0.05	0.04	0.16
Legal settlement/reserve	—	(0.07)	0.07
Unplanned plant shutdowns	0.03	—	0.10
Unrealized (gain) loss on securities	(0.11)	—	—
Inventory fair value adjustment	—	—	0.11
Debt refinancing costs	0.09	0.02	1.78
Key items, before tax	1.78	2.21	4.20
Tax effect of key items (a)	(0.22)	(0.47)	(1.39)
Key items, after tax	1.56	1.74	2.81
Tax specific key items:			
Deferred tax rate changes	0.03	(2.18)	—
One-time transition tax	0.44	2.00	—
Uncertain tax positions	(0.09)	(0.39)	—
Restructuring and separation activity	0.19	0.56	0.28
Other tax reform related activity	(0.02)	0.17	—
Valuation allowances	—	—	(0.33)
Foreign dividends	—	—	1.38
Tax specific key items (b)	0.55	0.16	1.33
Total key items	2.11	1.90	4.14
Adjusted diluted EPS from continuing operations (non-GAAP)	<u>\$ 2.50</u>	<u>\$ 2.19</u>	<u>\$ 1.24</u>

(a) Represents the diluted EPS impact from the tax effect of the key items that are previously identified above.

(b) Represents the diluted EPS impact from tax specific financial transactions, tax law changes or other matters that fall within the definition of tax specific key items. For additional explanation of these tax specific key items, see the income tax expense (benefit) discussion within the following caption review section.

Statements of Consolidated Comprehensive Income (Loss) – caption review

A comparative analysis of the Statements of Consolidated Comprehensive Income (Loss) by caption is provided as follows for the years ended September 30, 2019, 2018 and 2017.

(In millions)	2019	2018	2017	2019 change	2018 change
Sales	\$ 2,493	\$ 2,589	\$ 2,309	\$ (96)	\$ 280

The following table provides a reconciliation of the change in sales between fiscal years 2019 and 2018 and between fiscal years 2018 and 2017.

(In millions)	2019 change	2018 change
Volume/product mix	\$ (58)	\$ 88
Currency exchange	(45)	45
Acquisitions and Divestitures (including plant realignment)	(11)	107
Pricing	18	40
Change in sales	<u>\$ (96)</u>	<u>\$ 280</u>

Sales for 2019 decreased \$96 million, or 4%, compared to 2018. Unfavorable volume/product mix, foreign currency exchange and acquisitions and divestitures decreased sales by \$58 million, \$45 million and \$11 million, respectively. These decreases were partially offset by product pricing which increased sales by \$18 million.

Sales for 2018 increased \$280 million, or 12%, compared to 2017. The acquisition of Pharmachem within the Specialty Ingredients reportable segment increased sales by \$140 million while the net impact of other acquisitions and divestitures decreased sales by \$33 million. Improved volume, higher pricing and favorable foreign currency increased sales by \$88 million, \$40 million and \$45 million, respectively.

(In millions)	2019	2018	2017	2019 change	2018 change
Cost of sales	\$ 1,726	\$ 1,726	\$ 1,580	\$ —	\$ 146
Gross profit as a percent of sales	30.8%	33.3%	31.6%		

Fluctuations in cost of sales are driven primarily by raw material prices, volume and changes in product mix, currency exchange, acquisitions and divestitures and other certain charges incurred as a result of changes or events within the businesses or restructuring activities.

The following table provides a reconciliation of the changes in cost of sales between fiscal years 2019 and 2018 and between fiscal years 2018 and 2017.

(In millions)	2019 change	2018 change
Volume/product mix	\$ (27)	\$ 54
Currency exchange	(23)	24
Acquisitions and divestitures (including plant realignment)	(11)	72
Accelerated depreciation	39	(13)
Production costs	14	20
Unplanned plant shutdowns	8	(4)
Inventory fair value adjustment	—	(7)
Change in cost of sales	<u>\$ —</u>	<u>\$ 146</u>

Cost of sales for 2019 was flat compared to 2018. Accelerated depreciation, higher production costs and charges for unplanned plant shutdowns increased cost of sales by \$39 million, \$14 million and \$8 million, respectively. Those increases were offset by declines in volume and product mix, currency exchange and the net impact of acquisitions and divestitures which decreased cost of sales by \$27 million, \$23 million and \$11 million, respectively.

Cost of sales for 2018 increased \$146 million, or 9%, compared to 2017. The Pharmachem acquisition increased cost of sales by \$101 million, while the net impact of other acquisitions and divestitures decreased cost of sales by \$29 million. Changes in volume and product mix and higher production costs increased cost of sales by \$54 million and \$20 million, respectively. Unfavorable currency exchange increased cost of sales by \$24 million. Charges for accelerated depreciation, unplanned plant shutdowns and inventory fair value adjustments decreased cost of sales by \$13 million, \$4 million and \$7 million, respectively.

(In millions)	2019	2018	2017	2019 change	2018 change
Selling, general and administrative expense	\$ 539	\$ 692	\$ 610	\$ (153)	\$ 82
As a percent of sales	21.6%	26.7%	26.4%		

Selling, general and administrative expense for 2019 decreased \$153 million compared to 2018, with expenses as a percent of sales decreasing 5.1 percentage points. Key drivers of the fluctuation in selling, general and administrative expense compared to 2018 were:

- \$27 million and \$60 million in net environmental-related expenses during 2019 and 2018, respectively (see Note O for more information);
- \$43 million and \$83 million of key items for restructuring, separation and other costs during the current and prior year, respectively, comprised of the following:
 - \$43 million and \$56 million of severance, lease abandonment and other restructuring costs related to company-wide cost-savings initiatives during 2019 and 2018, respectively;
 - \$10 million of costs related to the separation of Valvoline during 2018;
 - \$8 million of accelerated depreciation related to the planned closure of an office building during 2018; and
 - \$9 million of Pharmachem integration costs during 2018;
- \$16 million of asset impairment charges during 2018;
- \$4 million of consulting and other costs associated with the proxy contest during 2019;
- Lower variable compensation of \$21 million during 2019;
- Favorable currency exchange of \$9 million as well as achieved cost savings during 2019.

Selling, general and administrative expense for 2018 increased \$82 million compared to 2017, while expenses as a percent of sales increased 0.3 percentage points. Key drivers of the fluctuation in selling, general and administrative expense compared to 2017 were:

- \$75 million and \$86 million of restructuring, separation and other costs during 2018 and 2017, respectively, comprised of the following:
 - \$56 million of severance, lease abandonment and other restructuring costs related to company-wide cost-savings initiatives during 2018;
 - \$10 million of costs related to the separation of Valvoline during 2018 compared to \$82 million during 2017; and
 - \$9 million of Pharmachem integration costs during 2018 compared to \$4 million during 2017;
- \$60 million and \$21 million in net environmental-related expenses during 2018 and 2017, respectively;
- \$23 million of incremental costs related to Pharmachem's operations in 2018;
- \$16 million of asset impairment charges during 2018;

- \$8 million increase during 2018 due to foreign currency exchange; and
- \$8 million of accelerated depreciation related to the closure of an office building during 2018 compared to \$3 million during 2017.

(In millions)	2019	2018	2017	2019 change	2018 change
Research and development expense	\$ 66	\$ 73	\$ 73	\$ (7)	\$ —

Research and development expense decreased \$7 million in 2019 compared to 2018 primarily due to the overall company-wide cost reduction program. The 2018 expense remained relatively consistent compared to 2017.

(In millions)	2019	2018	2017	2019 change	2018 change
Equity and other income					
Equity income	\$ —	\$ —	\$ —	\$ —	\$ —
Other income	4	4	3	—	1
	<u>\$ 4</u>	<u>\$ 4</u>	<u>\$ 3</u>	<u>\$ —</u>	<u>\$ 1</u>

Total equity and other income remained relatively consistent during each year.

(In millions)	2019	2018	2017	2019 change	2018 change
Net interest and other expense (income)					
Interest expense	\$ 114	\$ 116	\$ 227	\$ (2)	\$ (111)
Interest income	(2)	(4)	(4)	2	—
Loss (income) from restricted investments	(17)	(14)	(11)	(3)	(3)
Other financing costs	4	4	17	—	(13)
	<u>\$ 99</u>	<u>\$ 102</u>	<u>\$ 229</u>	<u>\$ (3)</u>	<u>\$ (127)</u>

Net interest and other financing expense decreased \$3 million in 2019 compared to 2018. The current year decrease in interest expense was primarily due to lower debt levels during 2019 compared to 2018. This decrease was partially offset by \$6 million of accelerated debt issuance costs related to the early repayments of term loans. The investment securities income of \$17 million compared to \$14 million in 2018 represents investment income related to restricted investments discussed in Note G of the Notes to Consolidated Financial Statements. Interest income and other financing costs were relatively consistent.

Net interest and other financing expense decreased \$127 million in 2018 compared to 2017. The decrease in interest expense from 2017 to 2018 was primarily due to 2017 including \$92 million of accelerated accretion related to the December 2016 tender offer of the 2029 notes. In addition, there was also interest expense of \$9 million in 2018 related to accelerated debt issuance costs associated with 2017 financing activity, which was comprised of \$7 million of accelerated amortization of previously capitalized debt issuance costs and \$2 million of new debt issuance costs immediately recognized. Interest expense in 2018 included \$1 million of charges for new debt issuance costs incurred with the re-pricing of the 2017 term loan B facility. The investment securities income of \$14 million in 2018 compared to \$11 million in 2017 represents investment income related to restricted investments discussed in Note G of the Notes to Consolidated Financial Statements. The 2018 decrease in other financing costs was primarily due to a net \$11 million charge during 2017 related to early redemption premium payments and bondholder consent fees for senior notes due 2018 and 2022, partially offset by a net gain related to the repayment of notes due 2029.

(In millions)	2019	2018	2017	2019 change	2018 change
Other net periodic benefit income (costs)	\$ 5	\$ 15	\$ (6)	\$ (10)	\$ 21

Other net periodic benefit income (costs) during 2019 primarily included an \$11 million loss on pension and other postretirement plan remeasurements, offset by a curtailment gain of \$18 million due to the settlement of a non-U.S. pension plan in 2019. 2019 also included an \$12 million charge for interest cost, partially offset by a \$10 million expected return on plan assets.

Other net periodic benefit income (costs) during 2018 primarily included a gain on pension and other postretirement plan remeasurements of \$14 million and an expected return on plan assets of \$12 million, offset by interest cost of \$11 million.

Other net periodic benefit income (costs) during 2017 primarily included interest cost of \$10 million and a loss on pension and other postretirement plan remeasurements of \$8 million, partially offset by an expected return on plan assets of \$12 million.

(In millions)	2019	2018	2017	2019 change	2018 change
Net loss on acquisitions and divestitures	\$ (2)	\$ (4)	\$ (10)	\$ 2	\$ 6

Net loss on acquisitions and divestitures during 2019 primarily included a loss of \$2 million related to the impairment of an investment offset by a gain on sale of a manufacturing facility, along with post-closing adjustments related to other previous divestitures.

Net loss on acquisitions and divestitures during 2018 primarily included a loss of \$2 million related to the sale of a manufacturing facility, along with post-closing adjustments related to other previous divestitures.

Net loss on acquisitions and divestitures during 2017 included a net loss of \$5 million from the acquisition of Pharmachem, a loss of \$4 million recognized for the Specialty Ingredients joint venture divestiture in China and a loss of \$1 million due to post-closing adjustments related to other previous divestitures.

(In millions)	2019	2018	2017	2019 change	2018 change
Income tax expense (benefit)	\$ 46	\$ (8)	\$ (16)	\$ 54	\$ 8
Effective tax rate	66%	(73)%	8%		

The 2019 effective tax rate was impacted by jurisdictional income mix, restructuring activities, and the U.S. tax reform.

The 2018 effective tax rate was impacted by jurisdictional income mix and restructuring activities, while the impact of U.S. tax reform and other items netted together to have an insignificant impact.

The 2017 effective tax rate was impacted by jurisdictional income mix, tax expense related to deemed dividend inclusions and a tax benefit for the reversal of a valuation allowance related to the utilization of foreign tax credits.

Adjusted income tax expense (benefit)

Key items are defined as the financial effects from significant transactions that may have caused short-term fluctuations in net income and/or operating income which Ashland believes do not accurately reflect Ashland's underlying business performance and trends. Tax specific key items are defined as the financial effects from tax specific financial transactions, tax law changes or other matters that fall within the definition of key items as previously described. The effective tax rate, excluding key items, which is a non-GAAP measure, has been prepared to illustrate the ongoing tax effects of Ashland's operations. Management believes investors and analysts use this financial measure in assessing Ashland's business performance and that presenting this non-GAAP measure on a consolidated basis assists investors in better understanding Ashland's ongoing business performance and enhancing their ability to compare period-to-period financial results.

The effective tax rates during 2019, 2018 and 2017 were significantly impacted by the following tax specific key items:

- Deferred tax rate changes - Includes the impact from the remeasurement of Ashland's domestic deferred tax balances resulting from the enactment of the Tax Act as well as the impact from deferred rate changes for other jurisdictions during 2019 and 2018;
- One-time transition tax - Includes the one-time transition tax resulting from the enactment of the Tax Act during 2019 and 2018;
- Uncertain tax position - Includes the impact from the settlement of uncertain tax positions with various tax authorities during 2019 and 2018;
- Restructuring and separation activity - Includes the impact from company-wide restructuring activities during 2018 and the separation of Valvoline during 2017. These adjustments related to various tax impacts including state tax costs, foreign tax costs and other tax account adjustments;
- Other tax reform - Includes the impact from other tax law changes resulting from the enactment of the Tax Act during 2019 and 2018. These adjustments include the impact from the deductibility of compensation items and miscellaneous state tax items;
- Valuation allowances - Includes the impact from net operating loss and foreign tax credit valuation allowances during 2019, 2018 and 2017; and
- Foreign dividends - Includes the impact from a significant deemed dividend inclusion in the U.S. during 2017. This deemed dividend transaction allowed Ashland to utilize foreign tax credit carryforwards which may have otherwise expired. This transaction was driven in part by projected changes to Ashland's business and tax profile as a result of the Valvoline separation.

The following table is a calculation of the effective tax rate, excluding the impact of these key items:

(In millions)	2019	2018	2017
Income (loss) from continuing operations			
before income taxes	\$ 70	\$ 11	\$ (196)
Key items (pre-tax) (a)	112	140	263
Adjusted income from continuing operations before income taxes	\$ 182	\$ 151	\$ 67
Income tax expense (benefit)	46	(8)	(16)
Income tax rate adjustments:			
Tax effect of key items (b)	14	30	88
Tax specific key items: (c)			
Deferred tax rate changes	(2)	139	—
One-time transition tax	(28)	(128)	—
Uncertain tax positions	6	26	—
Restructuring and separation activity	(12)	(36)	(17)
Other tax reform related activity	1	(11)	—
Valuation allowances	—	—	21
Foreign dividends	—	—	(87)
Total income tax rate adjustments	(21)	20	5
Adjusted income tax expense (benefit)	\$ 25	\$ 12	\$ (11)
Effective tax rate, excluding key items (Non-GAAP)	14%	8%	(16)%

(a) See Adjusted EBITDA reconciliation table previously disclosed in this Management, Discussion and Analysis for a summary of the key items, before tax.

(b) The tax rate specific to the jurisdiction in which the key item originates is used to calculate the tax effect of key items.

(c) For additional information on the effect that these tax specific key items had on EPS, see the Adjusted Diluted EPS table previously disclosed in this Management Discussion and Analysis.

The following table provides a reconciliation of tax specific key items within the statutory federal income tax with the provision for income taxes summary disclosed in Note M of the Notes to Consolidated Financial Statements.

(In millions)	2019	2018	2017
Tax effect of key items computed at applicable statutory rate	\$ 14	\$ 30	\$ 88
Tax reform	(30)	44	—
Uncertain tax positions	(9)	22	(1)
Foreign dividend, deemed inclusions and other restructuring	—	(10)	(87)
Foreign tax credits	—	(44)	—
Valuation allowance changes (a)	1	1	7
State taxes	(3)	—	7
Other items	6	(23)	(9)
	<u>\$ (21)</u>	<u>\$ 20</u>	<u>\$ 5</u>

(a) Includes \$14 million of charges during 2017 that were included in the “Restructuring and separation activity” line in previous table, which is an activity-based reconciliation.

(In millions)	2019	2018	2017	2019 change	2018 change
Income (loss) from discontinued operations (net of taxes)					
Composites and Marl Facility	\$ 94	\$ 86	\$ 75	\$ 8	\$ 11
Asbestos-related litigation	—	13	(25)	(13)	38
Water Technologies	1	3	2	(2)	1
Distribution	14	(6)	(3)	20	(3)
Valvoline	—	(1)	159	1	(160)
Gain on disposal of discontinued operations					
Composites/Marl facility	372	—	—	372	—
	<u>\$ 481</u>	<u>\$ 95</u>	<u>\$ 208</u>	<u>\$ 386</u>	<u>\$ (113)</u>

As a result of the divestiture of the Composites segment (including the Maleic business) and Marl facility, the related operating results have been reflected as discontinued operations (net of tax) within the Statements of Consolidated Comprehensive Income (Loss). See Note E for more information on this divestiture. In 2019, the sales and pre-tax operating income included in discontinued operations were \$1,012 million and \$145 million, respectively. In 2018, the sales and pre-tax operating income included in discontinued operations were \$1,154 million and \$125 million, respectively. In 2017, the sales and pre-tax operating income included in discontinued operations were \$951 million and \$97 million, respectively. A \$372 million gain on disposal was recorded in the fourth quarter associated with the August 30, 2019 closing of the Composites business (excluding the Maleic business) and the Marl facility with INEOS.

Asbestos-related activity during 2019, 2018 and 2017 included after-tax net adjustments to the asbestos reserves and receivables of zero, \$13 million of income and \$25 million of expense, respectively, including the adjustments for the annual update.

The activity for Water Technologies and Distribution during 2019, 2018 and 2017 was related to post-closing adjustments.

The Valvoline activity within 2019 and 2018 primarily represents subsequent adjustments that were made in conjunction with the Tax Matters Agreement. Prior to the full separation of Valvoline Inc. on May 12, 2017, the operating results related to Valvoline Inc., including the operating results of the former Valvoline reportable segment, have been reflected as discontinued operations (net of tax) within the Statements of Consolidated Comprehensive Income (Loss) for 2017. Valvoline’s sales included in discontinued operations during 2017 were \$1,237 million (reflective of sales until the full separation on May 12, 2017). Valvoline’s pre-tax income of discontinued operations during 2017 totaled \$240 million.

(In millions)	2019	2018	2017	2019 change	2018 change
Net income attributable to noncontrolling interest	\$ —	\$ —	\$ 27	\$ —	\$ (27)

Since Ashland's ownership interest in Valvoline Inc. was approximately 83% after completing the IPO on September 28, 2016 and before the distribution of its remaining shares of Valvoline on May 12, 2017, the amount of net income attributable to the outside stockholders' approximately 17% noncontrolling interest in Valvoline Inc. was presented within this caption in the Statements of Consolidated Comprehensive Income (Loss) for 2017.

Other comprehensive income (loss)

A comparative analysis of the components of other comprehensive income (loss) is provided below for the last three fiscal years ended September 30.

(In millions)	2019	2018	2017	2019 change	2018 change
Other comprehensive income (loss) (net of taxes)					
Unrealized translation gain (loss)	\$ (80)	\$ (82)	\$ 81	\$ 2	\$ (163)
Pension and postretirement obligation adjustment	(5)	—	(4)	(5)	4
Net change in investment securities	—	13	15	(13)	(2)
	<u>\$ (85)</u>	<u>\$ (69)</u>	<u>\$ 92</u>	<u>\$ (16)</u>	<u>\$ (161)</u>

Total other comprehensive income (loss), net of tax, decreased \$16 million in 2019 as compared to 2018 as a result of the following components.

- In 2019, the change in unrealized gain (loss) from foreign currency translation adjustments resulted in a loss of \$80 million, compared to a loss of \$82 million during 2018. The fluctuations in unrealized translation gains and losses were primarily due to translating foreign subsidiary financial statements from local currencies to U.S. Dollars.
- The pension and postretirement obligation adjustment was \$5 million during 2019 compared to zero during 2018. The adjustment during 2019 related to amortization of unrecognized prior services credits for pension and other postretirement benefit plans, net of tax, and were reclassified into net income.
- Due to the adoption of new accounting guidance in 2019, unrealized gains and losses on Ashland's equity securities are now recognized in net income rather than AOCI. See Notes A and G for more information. A \$13 million gain on investment securities, net of tax, related to restricted investments, were recognized within other comprehensive income (loss) during 2018.

Total other comprehensive income (loss), net of tax, decreased \$161 million in 2018 as compared to 2017 as a result of the following components.

- In 2018, the change in unrealized gain (loss) from foreign currency translation adjustments resulted in a loss of \$82 million, compared to a gain of \$81 million during 2017. The fluctuations in unrealized translation gains and losses are primarily due to translating foreign subsidiary financial statements from local currencies to U.S. Dollars.
- The pension and postretirement obligation adjustment was zero during 2018 compared to a loss of \$4 million during 2017 due to unrecognized prior service credits, net of tax, relating to pension and other postretirement benefit plans were amortized and reclassified into net income.
- Gains of \$13 million and \$15 million on restricted investments, net of tax, were recognized within other comprehensive income (loss) during 2018 and 2017, respectively.

RESULTS OF OPERATIONS – REPORTABLE SEGMENT REVIEW

Ashland's operations are managed within the following two reportable segments: Specialty Ingredients and Intermediates and Solvents. Results of Ashland's reportable segments are presented based on its management and internal accounting structure. The structure is specific to Ashland; therefore, the financial results of Ashland's reportable segments are not necessarily comparable with similar information for other comparable companies. Ashland allocates all costs to its reportable segments except for certain significant company-wide restructuring activities and other costs or adjustments that relate to former businesses that Ashland no longer operates. The service cost component of pension and other postretirement benefits costs is allocated to each reportable segment on a ratable basis; while the remaining components of pension and other postretirement benefits costs are recorded within the other net periodic benefit income (costs) caption on the Statements of Consolidated Comprehensive Income (Loss). Ashland refines its expense allocation methodologies to the reportable segments from time to time as internal accounting practices are improved, more refined information becomes available and the industry or market changes. Significant revisions to Ashland's methodologies are adjusted for all segments on a retrospective basis.

The EBITDA and Adjusted EBITDA amounts presented within this business section are provided as a means to enhance the understanding of financial measurements that Ashland has internally determined to be relevant measures of comparison for each segment. Each of these non-GAAP measures is defined as follows: EBITDA (operating income plus depreciation and amortization), Adjusted EBITDA (EBITDA adjusted for key items, which may include pro forma effects for significant acquisitions or divestitures, as applicable), and Adjusted EBITDA margin (Adjusted EBITDA, which may include pro forma adjustments, divided by sales or sales adjusted for pro forma results). Ashland does not allocate items to each reportable segment below operating income, such as interest expense and income taxes. As a result, reportable segment EBITDA and Adjusted EBITDA are reconciled directly to operating income since it is the most directly comparable Statements of Consolidated Comprehensive Income (Loss) caption.

The following table shows sales, operating income, depreciation and amortization and statistical operating information by reportable segment for each of the last three years ended September 30.

(In millions)	2019	2018	2017
Sales			
Specialty Ingredients	\$ 2,382	\$ 2,470	\$ 2,216
Intermediates and Solvents	111	119	93
	<u>\$ 2,493</u>	<u>\$ 2,589</u>	<u>\$ 2,309</u>
Operating income (loss)			
Specialty Ingredients	\$ 272	\$ 314	\$ 233
Intermediates and Solvents	16	17	(6)
Unallocated and Other	(122)	(229)	(178)
	<u>\$ 166</u>	<u>\$ 102</u>	<u>\$ 49</u>
Depreciation and amortization			
Specialty Ingredients	\$ 273	\$ 252	\$ 243
Intermediates and Solvents	13	14	14
Unallocated and Other	3	11	8
	<u>\$ 289</u>	<u>\$ 277</u>	<u>\$ 265</u>
Operating information			
Specialty Ingredients (a)			
Sales per shipping day	\$ 9.4	\$ 9.8	\$ 8.8
Metric tons sold (thousands)	317.2	324.7	317.2
Gross profit as a percent of sales	31.1%	33.8%	32.7%
Intermediates and Solvents (a)			
Sales per shipping day	\$ 0.4	\$ 0.5	\$ 0.4
Metric tons sold (thousands)	35.3	37.5	34.9
Gross profit as a percent of sales	23.1%	23.0%	4.1%

(a) Sales are defined as sales and operating revenues. Gross profit is defined as sales, less cost of sales.

Sales by region expressed as a percentage of reportable segment sales for each of the last three fiscal years ended September 30 were as follows. Ashland includes only U.S. and Canada in its North American designation.

Sales by Geography	2019	
	Specialty Ingredients	Intermediates and Solvents
North America	40%	52%
Europe	33%	21%
Asia Pacific	19%	22%
Latin America & other	8%	5%
	<u>100%</u>	<u>100%</u>

Sales by Geography	2018	
	Specialty Ingredients	Intermediates and Solvents
North America	40%	49%
Europe	33%	20%
Asia Pacific	18%	26%
Latin America & other	9%	5%
	<u>100%</u>	<u>100%</u>

Sales by Geography	2017	
	Specialty Ingredients	Intermediates and Solvents
North America	40%	37%
Europe	31%	22%
Asia Pacific	19%	35%
Latin America & other	10%	6%
	<u>100%</u>	<u>100%</u>

Specialty Ingredients

Specialty Ingredients offers industry-leading products, technologies and resources for solving formulation and product-performance challenges. Using natural, synthetic and semisynthetic polymers derived from cellulose ethers, vinyl pyrrolidones, acrylic polymers, polyester and polyurethane-based adhesives, and plant and seed extract, Specialty Ingredients offers comprehensive and innovative solutions for consumer and industrial applications.

Key customers include pharmaceutical companies; makers of personal care products, food and beverages manufacturers; makers of nutraceuticals and supplements; manufacturers of paint, coatings and construction materials; packaging and converting; and oilfield service companies.

On May 17, 2017, Ashland completed its acquisition of the stock of Pharmachem, a leading provider of quality ingredients to the global health and wellness industries and high-value differentiated products to fragrance and flavor houses. At the acquisition date, Pharmachem had approximately \$300 million in annual revenues and 14 manufacturing facilities located in the United States and Mexico. New Jersey-based Pharmachem develops, manufactures and supplies custom and branded nutritional and fragrance products. See Note C of the Notes to Consolidated Financial Statements for more information.

Ashland completed the transfer of its ownership interest in a consolidated joint venture during 2017. See Note D of the Notes to Consolidated Financial Statements for information on this divestiture.

2019 compared to 2018

Specialty Ingredients' sales decreased \$88 million, or 4%, to \$2,382 million in 2019. Volume/mix, unfavorable foreign currency exchange and the closures of a manufacturing plant decreased sales by \$49 million, \$44 million and \$11 million, respectively. Improved product pricing increased sales by \$16 million.

Gross profit during 2019 decreased \$95 million compared to 2018. Unfavorable foreign currency exchange and the net impact of volume and mix decreased gross profit by \$21 million and \$28 million, respectively. The net impact of pricing and costs decreased gross profit by \$46 million, which included a \$42 million net impact from the following key items during 2019 and 2018:

- \$45 million and \$3 million of costs related to restructuring activity related to certain manufacturing plants during 2019 and 2018, respectively (including \$38 million of accelerated depreciation for 2019);
- \$2 million of unplanned plant shutdown costs for a manufacturing facility during 2019; and
- \$2 million of impairment of an asset during 2018.

In total, gross profit margin during 2019 decreased 2.7 percentage points to 31.1% as compared to 2018.

Selling, general and administrative expenses (which includes research and development expenses throughout the reportable segment discussion and analysis) decreased \$50 million during 2019 as compared to 2018, largely due to the company-wide cost reduction program, lower employee incentive program costs and favorable foreign currency exchange. Equity and other income increased \$3 million compared to 2018.

Operating income totaled \$272 million for 2019 compared to \$314 million in 2018. EBITDA decreased \$53 million to \$507 million in 2019, while Adjusted EBITDA decreased \$16 million to \$558 million. Operating income margin decreased 1.3 percentage points in 2019 to 11.4%. Adjusted EBITDA margin increased 0.2 percentage points in 2019 to 23.4%.

2018 compared to 2017

Specialty Ingredients' sales increased \$254 million, or 11%, to \$2,470 million in 2018. The acquisition of Pharmachem increased sales by \$140 million, or 6%. Volume and mix combined to increase sales by \$87 million while favorable foreign currency exchange increased sales by \$42 million. In addition, improved product pricing increased sales by \$18 million. These increases were partially offset by a decrease of \$33 million primarily related to the transfer of ownership interest in a consolidated joint venture.

Gross profit during 2018 increased \$110 million compared to 2017. The acquisition of Pharmachem and improved volume and mix increased gross profit by \$39 million each, while favorable foreign currency exchange increased gross profit by \$18 million. Additionally, the net impact of pricing and costs increased gross profit by \$18 million, which included a \$24 million net impact from the following key items during 2018 and 2017:

- \$3 million of costs related to restructuring activity at certain manufacturing plants during 2018;
- \$7 million of non-cash charges related to the fair value assessment of inventory acquired from Pharmachem at the date of acquisition during 2017; and
- \$6 million of costs related to the temporary shutdown of a manufacturing plant due to a hurricane during 2017.

These increases to gross profit were partially offset by a decrease of \$4 million related to the joint venture divestiture. In total, gross profit margin during 2018 increased 1.1 percentage points to 33.8% as compared to 2017.

Selling, general and administrative expenses increased \$27 million during 2018 as compared to 2017, largely due to incremental costs of \$23 million related to the acquisition of Pharmachem's operations. The remaining increase to selling, general and administrative expense was primarily attributable to unfavorable foreign currency exchange. Equity and other income (loss) decreased \$2 million compared to 2017.

Operating income totaled \$314 million for 2018 compared to \$233 million in 2017. EBITDA increased \$98 million to \$560 million in 2018, while Adjusted EBITDA increased \$81 million to \$574 million. Operating income margin increased 2.2 percentage points in 2018 to 12.7%. Adjusted EBITDA margin increased 1.0 percentage point in 2018 to 23.2%.

EBITDA and Adjusted EBITDA reconciliation

The following EBITDA and Adjusted EBITDA presentation for the three annual periods is provided as a means to enhance the understanding of financial measurements that Ashland has internally determined to be relevant measures of comparison for the results of Specialty Ingredients. Adjusted EBITDA results have been prepared to illustrate the ongoing effects of Ashland's operations, which exclude certain key items.

The key items during 2019 included \$38 million of accelerated depreciation related to a planned facility closure, \$10 million of costs related to restructuring activity at certain manufacturing plants, \$2 million of an unplanned plant shutdown and \$1 million of environmental reserve adjustments.

The key items during 2018 included \$6 million of accelerated depreciation related to the termination of a contract at a manufacturing facility, \$2 million of integration costs related to the acquisition of Pharmachem and \$3 million of costs related to restructuring activity at certain manufacturing plants. Additional key items during 2018 included \$2 million of asset impairment charges and \$1 million of environmental reserve adjustments.

The key items during 2017 included \$18 million of restructuring charges for the closure of a manufacturing plant and the termination of a contract at a manufacturing facility (which included \$14 million of accelerated depreciation and \$4 million of severance and other restructuring costs), \$7 million for the revaluation of Pharmachem inventory and \$6 million of charges related to an unplanned plant shutdown.

(In millions)	September 30		
	2019	2018	2017
Operating income	\$ 272	\$ 314	\$ 233
Depreciation and amortization (a)	235	246	229
EBITDA	507	560	462
Accelerated depreciation	38	6	14
Severance and other costs	10	5	4
Asset impairment	—	2	—
Environmental reserve adjustment	1	1	—
Inventory fair value adjustment	—	—	7
Unplanned plant shutdown	2	—	6
Adjusted EBITDA	<u>\$ 558</u>	<u>\$ 574</u>	<u>\$ 493</u>

(a) Excludes \$38 million, \$6 million and \$14 million of accelerated depreciation during 2019, 2018 and 2017, respectively.

Intermediates and Solvents

Intermediates and Solvents is a leading producer of 1,4 butanediol and related derivatives, including n-methylpyrrolidone. These products are used as chemical intermediates in the production of engineering polymers and polyurethanes, and as specialty process solvents in a wide array of applications including electronics, pharmaceuticals, water filtration membranes and more. Butanediol is also supplied to Ashland's Specialty Ingredients business for use as a raw material at cost.

2019 compared to 2018

Intermediates and Solvents sales decreased \$8 million, or 7%, to \$111 million in 2019. Volume and mix combined to decrease sales by \$8 million and unfavorable foreign currency exchange decreased sales by another \$1 million. Lower product pricing increased sales by \$1 million.

Gross profit during 2019 decreased \$2 million compared to 2018. Unfavorable foreign currency exchange decreased gross profit by \$1 million, while the net impact of pricing and costs decreased gross profit by an additional \$1 million.

In total, gross profit margin during 2019 increased 0.1 percentage points to 23.1% as compared to 2018.

Selling, general and administrative expenses decreased \$1 million during 2019 as compared to 2018.

Operating income totaled \$16 million for 2019 compared to \$17 million in 2018. EBITDA decreased \$2 million to \$29 million in 2019. Operating income margin increased 0.1 percentage point in 2019 to 14.4%. EBITDA margin of 26.1% in 2019 was flat compared to 2018.

2018 compared to 2017

Intermediates and Solvents' sales increased \$26 million, or 28%, to \$119 million in 2018. Improved product pricing increased sales by \$22 million, while volume and favorable foreign currency exchange added an additional \$2 million each.

Gross profit during 2018 increased \$23 million compared to 2017. Pricing and higher costs combined to increase gross profit by \$19 million, while volume and mix combined to increase gross profit by \$2 million. Additionally, favorable foreign currency exchange increased gross profit by \$2 million. In total, gross profit margin during 2018 increased 18.9 percentage points to 23.0% as compared to 2017.

Selling, general and administrative expenses and equity and other income (loss) remained consistent as compared to 2017.

Operating income totaled \$17 million for 2018 compared to a loss of \$6 million in 2017. EBITDA increased \$23 million to \$31 million in 2018. Operating income margin increased 20.8 percentage points in 2018 to 14.3%. Adjusted EBITDA margin increased 17.5 percentage points in 2018 to 26.1%.

EBITDA and Adjusted EBITDA reconciliation

The following EBITDA presentation for the three annual periods is provided as a means to enhance the understanding of financial measurements that Ashland has internally determined to be relevant measures of comparison for the results of Intermediates and Solvents. There were no unusual or key items that affected comparability for EBITDA during 2019, 2018 or 2017.

(In millions)	September 30		
	2019	2018	2017
Operating income	\$ 16	\$ 17	\$ (6)
Depreciation and amortization	13	14	14
EBITDA	<u>29</u>	<u>31</u>	<u>8</u>

Unallocated and other

The following table summarizes the key components of the Unallocated and other segment's operating income (loss) for each of the last three years ended September 30.

(In millions)	September 30		
	2019	2018	2017
Restructuring activities	\$ (87)	\$ (139)	\$ (136)
Environmental expenses	(25)	(58)	(20)
Asset impairment charges	—	(14)	—
Legal settlement/reserve	—	5	(5)
Tax indemnity expense	(6)	(5)	—
Proxy costs	(4)	—	—
Other income (expense)	—	(18)	(17)
Total unallocated expense	<u>\$ (122)</u>	<u>\$ (229)</u>	<u>\$ (178)</u>

Unallocated and other recorded expense of \$122 million, \$229 million and \$178 million for 2019, 2018, and 2017, respectively. The charges for restructuring activities of \$87 million, \$139 million and \$136 million during 2019, 2018 and 2017, respectively, were primarily comprised of the following items:

- \$42 million and \$49 million of severance, lease abandonment and other restructuring costs related to company-wide cost-savings initiatives during 2019 and 2018, respectively;
- \$4 million of impairment related to the planned sale of an office building during 2019;

- \$41 million, \$59 million and \$50 million of stranded divestiture costs during 2019, 2018 and 2017, respectively;
- \$10 million and \$82 million of costs related to the separation of Valvoline during 2018 and 2017 respectively;
- \$14 million of accelerated depreciation related to the closure of an office building during 2018; and
- \$7 million and \$4 million of integration costs related to the acquisition of Pharmachem during 2018 and 2017, respectively.

FINANCIAL POSITION

Liquidity

Ashland had \$232 million in cash and cash equivalents as of September 30, 2019, of which \$157 million was held by foreign subsidiaries and had no significant limitations that would prohibit remitting the funds to satisfy corporate obligations. In certain circumstances, if such amounts were repatriated to the United States, additional taxes might need to be accrued and paid depending on the source of the earnings remitted. Ashland currently has no plans to repatriate any amounts for which additional taxes would need to be accrued. However, due to the Tax Act enacted in the prior year, Ashland may reassess this position as it pertains to future earnings.

Ashland's cash flows from operating, investing and financing activities, as reflected in the Statements of Consolidated Cash Flows, are summarized as follows.

(In millions)	2019	2018	2017
Cash provided (used) by:			
Operating activities from continuing operations	\$ 228	\$ 241	\$ 174
Investing activities from continuing operations	(118)	(174)	(798)
Financing activities from continuing operations	(1,149)	(368)	136
Discontinued operations	980	28	(129)
Effect of currency exchange rate changes on cash and cash equivalents	(3)	1	(5)
Net decrease in cash and cash equivalents	<u>\$ (62)</u>	<u>\$ (272)</u>	<u>\$ (622)</u>

Ashland paid income taxes of \$67 million during 2019 compared to \$77 million in 2018 and \$79 million in 2017. Cash receipts for interest income were \$3 million in 2019, \$4 million in 2018 and \$4 million in 2017, while cash payments for interest expense amounted to \$124 million in 2019, \$126 million in 2018 and \$132 million in 2017.

Operating activities

The following discloses the cash flows associated with Ashland's operating activities for 2019, 2018 and 2017, respectively.

(In millions)	2019	2018	2017
Cash flows provided (used) by operating activities from continuing operations			
Net income	\$ 505	\$ 114	\$ 28
Income from discontinued operations (net of tax)	(481)	(95)	(208)
Adjustments to reconcile income from continuing operations to cash flows from operating activities			
Depreciation and amortization	289	277	265
Original issue discount and debt issuance cost amortization	13	8	109
Deferred income taxes	20	(100)	(26)
Distributions from equity affiliates	—	1	—
Stock based compensation expense - Note Q	21	27	20
Excess tax benefits on stock based compensation	11	4	3
Loss on early retirement of debt	—	—	9
Loss (income) from restricted investments	(17)	(14)	(11)
Net (income) loss on acquisitions and divestitures - Notes C and D	—	1	4
Impairments	8	16	—
Pension contributions	(5)	(9)	(7)
Loss (gain) on pension and other postretirement plan remeasurements	(7)	(14)	8
Change in operating assets and liabilities (a)	(129)	25	(20)
Total cash flows provided by operating activities from continuing operations	\$ 228	\$ 241	\$ 174

(a) Excludes changes resulting from operations acquired or sold.

Cash flows provided by operating activities from continuing operations, a major source of Ashland's liquidity, amounted to \$228 million in 2019, \$241 million in 2018 and \$174 million in 2017.

Operating Activities - Operating Assets and Liabilities

The cash results during each year were primarily driven by net income, excluding discontinued operation results, adjusted for certain non-cash items including depreciation and amortization (including debt issuance cost amortization), losses on acquisitions and divestitures as well as changes in working capital, which are fluctuations within accounts receivable, inventory, trade payables and accrued expenses. Ashland continues to emphasize working capital management as a high priority and focus.

The following details certain changes in key operating assets and liabilities for 2019, 2018 and 2017, respectively.

(In millions)	2019	2018	2017
Cash flows from assets and liabilities (a)			
Accounts receivable	\$ 38	\$ (42)	\$ (29)
Inventories	(4)	(24)	(12)
Trade and other payables	(79)	48	33
Other assets and liabilities	(84)	43	(12)
Change in operating assets and liabilities	\$ (129)	\$ 25	\$ (20)

(a) Excludes changes resulting from operations acquired or sold.

Changes in net working capital accounted for outflows of \$45 million in 2019, \$18 million in 2018 and \$8 million in 2017, and were driven by the following:

- Accounts receivable - Changes in accounts receivable resulted in a \$38 million inflow of cash in 2019 compared to cash outflows of \$42 million in 2018 and \$29 million in 2017, respectively and were primarily related to sales volumes in each period.
- Inventory – Changes in inventory resulted in a cash outflow of \$4 million in 2019 compared to cash outflows of \$24 million in 2018 and \$12 million in 2017, and were primarily driven by sales volumes and inventory management.
- Trade and other payables - Changes in trade and other payables resulted in a cash outflow of \$79 million in 2019 compared to cash inflows of \$48 million in 2018 and \$33 million in 2017, respectively and primarily related to the timing of certain payments.

The remaining cash outflows of \$84 million and \$12 million for 2019 and 2017, respectively, and inflows of \$43 million during 2018, respectively, were primarily due to income taxes paid or income tax refunds, interest paid, and adjustments to certain accruals and other long-term assets and liabilities.

Operating Activities - Summary

Operating cash flows for 2019 included income from continuing operations of \$24 million, non-cash adjustments of \$289 million for depreciation and amortization and \$20 million for deferred income taxes. The adjustment for deferred income taxes during 2019 included the final adjustment related to the enactment of the Tax Act during the prior year. Operating cash flows for 2019 also included non-cash adjustments of \$8 million related to asset impairment charges, \$7 million of net gains on pension and other postretirement plan remeasurements and \$13 million for debt issuance cost amortization.

Operating cash flows for 2018 included income from continuing operations of \$19 million, non-cash adjustments of \$277 million for depreciation and amortization and \$100 million for deferred income taxes. The adjustment for deferred income taxes during 2018 was significantly higher compared to prior years due to the impact from the enactment of the Tax Act during the current year. Operating cash flows for 2018 also included non-cash adjustments of \$16 million related to asset impairment charges, \$14 million of net gains on pension and other postretirement plan remeasurements and \$8 million for debt issuance cost amortization.

Operating cash flows for 2017 included a loss from continuing operations of \$180 million, non-cash adjustments of \$265 million for depreciation and amortization and \$109 million for original issue discount and debt issuance cost amortization, including \$92 million of accelerated accretion related to the tender offer of the 2029 notes. Operating cash flows for 2017 also included non-cash adjustments of \$26 million for deferred income taxes and \$8 million of net losses on pension and other postretirement plan remeasurements.

Investing activities

The following discloses the cash flows associated with Ashland's investing activities for 2019, 2018 and 2017.

(In millions)	2019	2018	2017
Cash flows provided (used) by investing activities from continuing operations			
Additions to property, plant and equipment	\$ (154)	\$ (157)	\$ (168)
Proceeds from disposal of property, plant and equipment	9	4	5
Purchase of operations - net of cash acquired	(2)	(11)	(680)
Proceeds from sale or restructuring of operations	—	6	18
Life insurance payments	—	(37)	—
Net purchases of funds restricted for specific transactions	(7)	(10)	(2)
Reimbursement from restricted investments	32	33	27
Proceeds from sale of securities	348	26	19
Purchase of securities	(348)	(26)	(19)
Proceeds from the settlement of derivative instruments	6	1	5
Payments for the settlement of derivative instruments	(2)	(3)	(3)
Total cash flows used by investing activities from continuing operations	\$ (118)	\$ (174)	\$ (798)

Cash used by investing activities was \$118 million in 2019 compared to \$174 million and \$798 million in 2018 and 2017, respectively. The significant cash investing activities for the current year primarily related to cash outflows of \$154 million for capital expenditures. Additionally, there were reimbursements of \$32 million from the restricted renewable annual asbestos trust.

The 2018 year included cash outflows of \$157 million for capital expenditures, \$37 million related to payments for a corporate-owned life insurance policy loan and \$11 million for the purchase of Vornia Limited. Additionally, there were reimbursements of \$33 million from the restricted renewable annual asbestos trust.

The significant cash investing activities for 2017 primarily related to cash outflows of \$680 million for the acquisition of Pharmachem and \$168 million for capital expenditures. Additionally, there were reimbursements of \$27 million from the restricted renewable annual asbestos trust.

Financing activities

The following discloses the cash flows associated with Ashland's financing activities for 2019, 2018 and 2017, respectively.

(In millions)	2019	2018	2017
Cash flows provided (used) by financing activities from continuing operations			
Proceeds from issuance of long-term debt	\$ —	\$ —	\$ 1,100
Repayment of long-term debt	(797)	(311)	(915)
Premium on long-term debt repayment	—	—	(17)
Proceeds from (repayment of) short-term debt	(78)	15	75
Repurchase of common stock	(200)	—	—
Debt issuance costs	—	(2)	(15)
Cash dividends paid	(64)	(60)	(77)
Stock based compensation employee withholding taxes paid in cash	(10)	(10)	(15)
Total cash flows provided (used) by financing activities from continuing operations	\$ (1,149)	\$ (368)	\$ 136

Cash provided (used) by financing activities was \$(1,149) million for 2019, \$(368) million for 2018, and \$136 million for 2017. Significant cash financing activities for the current year included a cash outflow \$797 million for repayments of long-term debt, including \$593 million for the full repayment of the term loan B facility, \$195 million for the full repayment of the five-year term loan A facility, \$5 million for repayments of the Series B – 9.35% Medium Term Notes, \$3 million for repayments of the 4.75% Senior Notes due 2022, and \$1 million for the 6.875% Senior Notes due 2043. The current period also included short-term debt net repayments of \$78 million related to the revolving credit facility, the accounts receivable securitization facilities and a short-term loan facility. The revolving credit facility and the outstanding balance of the three-year term loan A facility were repaid primarily using cash from repatriations. The current year included cash dividends paid of \$1.05 per share, for a total of \$64 million.

Significant cash financing activities for 2018 included a cash outflow of \$311 million for repayments of long-term debt, including \$250 million for the full repayment of the three-year term loan A facility, \$55 million for early repayments of the five-year term loan A facility and \$6 million for repayments of the term loan B facility. Financing activities for 2018 also included short-term debt net proceeds of \$15 million related to the revolving credit facility, the accounts receivable securitization facilities and a short-term loan facility. The revolving credit facility and the outstanding balance of the three-year term loan A facility were repaid primarily using cash from repatriations. 2018 included cash dividends paid of \$0.95 per share, for a total of \$60 million.

Significant cash financing activities during 2017 included cash outflows of \$915 million primarily related to the full repayment of the 2018 notes and partial repayments of the 2029 notes and 2022 notes. There were also cash inflows of \$1,100 million from the issuance of the term loan A facilities and the term loan B facility. Additionally, 2018 included short-term debt net cash inflows of \$75 million primarily related to debt outstanding on the revolving credit facility and the accounts receivable securitization, partially offset by the repayment of the term loan due 2017. Ashland also paid cash dividends of \$1.23 per share, for a total of \$77 million.

Cash provided (used) by discontinued operations

The following discloses the cash flows associated with Ashland's discontinued operations for 2019, 2018 and 2017, respectively.

(In millions)	2019	2018	2017
Cash provided (used) by discontinued operations			
Operating cash flows	\$ 13	\$ 56	\$ 209
Investing cash flows	967	(28)	(321)
Financing cash flows	—	—	(17)
Total cash provided (used) by discontinued operations	<u>\$ 980</u>	<u>\$ 28</u>	<u>\$ (129)</u>

Cash flows for discontinued operations in 2019, 2018 and 2017 primarily related to net cash inflows of \$1 billion (which includes net proceeds from the completed sale of the Composites business (excluding the Maleic business) and Marl facility of \$972 million), \$74 million and \$67 million related to the divestiture of the Composites business (including the Maleic business) and Marl facility.

During 2017, net cash outflows of \$158 million related to the activity of Valvoline Inc. The remaining cash flows for discontinued operations for these years related to other previously divested businesses, including net payments of asbestos and environmental liabilities.

Free cash flow and other liquidity information

The following represents Ashland's calculation of free cash flow for the disclosed periods and reconciles free cash flow to cash flows provided by operating activities from continuing operations. Free cash flow does not reflect adjustments for certain non-discretionary cash flows such as mandatory debt repayments. See "Results of Operations - Consolidated Review - Use of non-GAAP measures" for additional information.

(In millions)	September 30		
	2019	2018	2017
Cash flows provided by operating activities from continuing operations	\$ 228	\$ 241	\$ 174
Less:			
Additions to property, plant and equipment	(154)	(157)	(168)
Free cash flows (a)	<u>\$ 74</u>	<u>\$ 84</u>	<u>\$ 6</u>

(a) Included \$61 million, \$39 million and \$64 million of restructuring-related and separation payments during 2019, 2018 and 2017, respectively.

At September 30, 2019, working capital (current assets minus current liabilities, excluding long-term debt due within one year) amounted to \$676 million, compared to \$647 million at the end of 2018. Liquid assets (cash, cash equivalents and accounts receivable) amounted to 94% of current liabilities at September 30, 2019 and 76% at September 30, 2018.

The following summary reflects Ashland's cash, investment securities and unused borrowing capacity as of September 30, 2019, 2018 and 2017.

(In millions)	September 30		
	2019	2018	2017
Cash and cash equivalents	\$ 232	\$ 294	\$ 566
Unused borrowing capacity			
2017 Revolving Credit Facility	\$ 752	\$ 725	\$ 579
Accounts receivable securitizations	48	29	35

The borrowing capacity remaining under the 2017 Revolving Credit Facility was \$752 million due to a reduction of \$48 million for letters of credit outstanding at September 30, 2019. In total, Ashland's available liquidity position, which includes cash, the revolving credit facilities and accounts receivable securitization facilities, was \$1,032 million at September 30, 2019 as compared to \$1,048 million at September 30, 2018 and \$1,180 million at September 30, 2017. For further information, see Note J within the Notes to Consolidated Financial Statements.

Capital resources

Debt

The following summary reflects Ashland's debt as of September 30, 2019 and 2018.

(In millions)	September 30	
	2019	2018
Short-term debt (includes current portion of long-term debt)	\$ 166	\$ 254
Long-term debt (less current portion and debt issuance cost discounts) (a)	1,501	2,275
Total debt	<u>\$ 1,667</u>	<u>\$ 2,529</u>

(a) Includes \$12 million and \$21 million of debt issuance cost discounts as of September 30, 2019 and 2018, respectively.

The current portion of long-term debt was zero at September 30, 2019. Debt as a percent of capital employed was 32% at September 30, 2019 and 43% at September 30, 2018. At September 30, 2019, Ashland's total debt had an outstanding principal balance of \$1,726 million, discounts of \$47 million and debt issuance costs of \$12 million. The scheduled aggregate maturities of long-term debt for the next five fiscal years (including the current portion and excluding debt issuance costs) are as follows: zero in 2020, zero in 2021, \$1,083 million in 2022, zero in 2023 and zero in 2024.

Credit Agreements and Refinancing

2017 Credit Agreement

On May 17, 2017, in conjunction with the closing of the Pharmachem acquisition, Ashland entered into a secured credit agreement (the 2017 Credit Agreement) with a group of lenders. The 2017 Credit Agreement provided for (i) a \$250 million three-year term loan A facility (the Three-Year TLA Facility), (ii) a \$250 million five-year term loan A facility (the Five-Year TLA Facility and together with the Three-Year TLA Facility, the TLA Facilities) and (iii) a \$680 million five-year revolving credit facility (including a \$125 million letter of credit sublimit) (the 2017 Revolving Credit Facility). Proceeds of borrowings under the TLA Facilities were used solely to finance the acquisition of Pharmachem, while the proceeds of the 2017 Revolving Credit Facility were used to finance, in part, the acquisition of Pharmachem, to refinance the 2015 Senior Credit Agreement and for general corporate purposes. On May 19, 2017, Ashland entered into Amendment No. 1 to the 2017 Credit Agreement, which increased the aggregate commitments under the 2017 Revolving Credit Facility from \$680 million to \$800 million.

At Ashland's option, loans issued under the 2017 Credit Agreement bear interest at either LIBOR or an alternate base rate, in each case plus the applicable interest rate margin. Loans bear interest at LIBOR plus 1.75% per annum, in the case of LIBOR borrowings, or at the alternate base rate plus 0.75%, in the alternative, through and including the date of delivery of a quarterly compliance certificate and thereafter the interest rate will fluctuate between LIBOR plus 1.375% per annum and LIBOR plus 2.500% per annum (or between the alternate base rate plus 0.375% per annum and the alternate base rate plus 1.500% per annum), based upon Ashland's secured facilities ratings or the consolidated net leverage ratio (as defined in the 2017 Credit Agreement) (whichever yields a lower applicable interest rate margin) at such time. In addition, Ashland was required to pay fees of 0.25% per annum on the daily unused amount of the 2017 Revolving Credit Facility through and including the date of delivery of a compliance certificate, and thereafter the fee fluctuates between 0.175% and 0.40% per annum, based upon Ashland's secured facilities rating or the consolidated net leverage ratio (whichever yields a lower applicable rate). The TLA Facilities may be prepaid at any time without premium. The Three-Year TLA Facility will not amortize and had a due date of May 17, 2020. The Five-Year TLA Facility will not amortize in each of the first, second and third years and will amortize at a rate of 20% per annum in each of the fourth and fifth years (payable in equal quarterly installments), with the outstanding balance of the Five-Year TLA Facility to be paid on May 17, 2022.

On June 14, 2017, Ashland entered into Amendment No. 2 to the 2017 Credit Agreement, which provided for a new \$600 million seven-year senior secured term loan B facility (the 2017 TLB Facility). At Ashland's option, loans issued under the 2017 TLB Facility bear interest at either (x) LIBOR plus 2.00% per annum or (y) an alternate base rate plus 1.00% per annum. The 2017 TLB Facility may be prepaid at any time. The 2017 TLB Facility amortizes at a rate of 1.00% per annum (payable in equal quarterly installments) with the outstanding balance to be paid on May 17, 2024.

Ashland incurred \$15 million of new debt issuance costs in connection with the 2017 Credit Agreement, of which \$2 million was expensed immediately during 2017 within the net interest and other financing expense caption of the Statements of Consolidated Comprehensive Income (Loss). The remaining balance is amortized using the effective interest method. Additionally, as a result of the termination of the 2015 Senior Credit Agreement, Ashland recognized a \$5 million charge for the accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

The credit facilities under the 2017 Credit Agreement are guaranteed by Ashland Global Holdings Inc., Ashland Chemco Inc. and Ashland LLC's existing and future subsidiaries (other than certain immaterial subsidiaries, joint ventures, special purpose financing subsidiaries, regulated subsidiaries, foreign subsidiaries and certain other subsidiaries) and are secured by a first-priority security interest in substantially all of the personal property assets of Ashland and the guarantors, including all or a portion of the equity interests of certain of Ashland's domestic subsidiaries and first-tier foreign subsidiaries and, in certain cases, a portion of the equity interests of other foreign subsidiaries. The guarantees by Ashland's subsidiaries and pledge of security interests by such guarantors may, at Ashland's option, be released upon and during the occurrence of a Collateral Release Event (as defined in the 2017 Credit Agreement).

2018 financing activity related to the 2017 Credit Agreement

On May 22, 2018, Ashland entered into Amendment No. 3 to the 2017 Credit Agreement which provided for the re-pricing of the 2017 TLB Facility. Due to this amendment, loans issued under the 2017 TLB Facility bear interest at LIBOR plus 1.75% per annum (previously LIBOR plus 2.00% per annum). All other significant terms of the agreement remained unchanged. Ashland incurred \$1 million of new debt issuance costs in connection with the re-pricing, which was expensed during 2018 within the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

During 2018, Ashland utilized cash primarily from repatriations and borrowings from the accounts receivable securitization facilities to fully repay the \$250 million outstanding balance of the Three-Year TLA Facility and to repay \$55 million of the Five-Year TLA Facility. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of less than \$1 million during 2018, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

2019 financing activity related to the 2017 Credit Agreement

During 2019, Ashland utilized proceeds from the sale of its Composites business (excluding the Maleic business) and the Marl facility to repay the remaining principal balance of the TLA Facility and the TLB Facility. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$6 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Debt repayments and repurchases

Cash repatriation

During 2019 and 2018, Ashland repatriated approximately \$900 million and \$590 million, respectively, in cash that was primarily used to repay existing debt, principally the TLA Facility and TLB Facility in 2019 and the 2017 Revolving Credit Facility and the outstanding balance of the Three-Year TLA Facility in 2018 (as previously discussed).

Repayment of the Term loan A due 2022

During 2019, Ashland repaid all of the outstanding principal balance of its term loan A for a total of \$195 million. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$1 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Repayment of the Term loan B due 2024

During 2019, Ashland repaid all of the outstanding principal balance of its term loan B for a total of \$593 million. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$5 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Redemption of 9.35% notes due 2019

During 2019, Ashland redeemed all of its outstanding 9.35% medium term notes due 2019, of which approximately \$5 million were outstanding. Cash on hand was used to pay for the redemption.

Redemption of 3.875% notes due 2018

During 2017, Ashland redeemed all of its outstanding 3.875% senior notes due 2018 (2018 Senior Notes), of which approximately \$659 million were outstanding. Proceeds of borrowings under the 2017 TLB Facility, together with cash on hand, were used to pay for the redemption. Ashland recognized a \$13 million charge related to premiums paid and accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss).

Open market repurchases of 4.750% notes due 2022, 3.875% notes due 2018 and 6.875% notes due 2043

During 2017, Ashland executed open market repurchases of its 4.750% notes due 2022 (2022 Senior Notes) and its 3.875% notes due 2018 (2018 Senior Notes). As a result of these repurchases, the carrying values of the 2022 and 2018 Senior Notes were reduced by \$39 million and \$41 million, respectively. Ashland recognized a \$3 million charge related to premiums paid in the open market repurchases and accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss). As previously discussed, the remaining outstanding amount of the 2018 Senior Notes was redeemed during 2017.

During 2019, Ashland executed open market repurchases of its 4.750% notes due 2022 (2022 Senior Notes) and its 6.875% notes due 2043 (2043 Senior Notes). As a result of these repurchases, the carrying values of the 2022 and 2043 Senior Notes were reduced by \$3 million and \$1 million, respectively.

6.50% junior subordinated notes due 2029

In December 2016, Hercules, an indirect wholly-owned subsidiary of Ashland, repurchased, through a cash tender offer, \$182 million of the aggregate principal par value amount of its 6.50% junior subordinated notes due 2029 (2029 Notes) for an aggregate purchase price of \$177 million. As a result, the carrying value of the 2029 Notes was reduced by \$90 million and Ashland recognized a \$92 million charge related to accelerated accretion of the recorded debt discount (compared to the total par value) and \$5 million of a net gain related to the repayment of the debt during 2017. The charge and net gain are included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss).

Accounts receivable securitizations

2018 accounts receivable securitization

During July 2018, Ashland entered into a €115 million accounts receivable securitization facility (the Program) for the transfer by certain subsidiaries of Ashland (the Sellers) directly or indirectly to Ester Finance Titrisation (the Purchaser), a wholly-owned subsidiary of Crédit Agricole Corporate and Investment Bank (the Arranger), of certain receivables and/or collections originated by the Sellers towards certain corporate debtors located in multiple European jurisdictions and denominated in multiple currencies. The Program originally had a term of two years, but was extended to August 2021 in September 2019.

Under the Program, each Seller will assign, on an ongoing basis, certain of its accounts receivable and the right to the collections on those accounts receivable to the Purchaser. Under the terms of the Program, the Sellers could, from time to time, obtain up to €115 million from the Purchaser through the sale of an undivided interest in such accounts receivable and collections. Ashland accounts for the securitization facility as secured borrowings, and the receivables sold pursuant to the facility are included in the Consolidated Balance Sheets as accounts receivable. Fundings under the Program will be repaid as accounts receivable are collected, with new fundings being advanced (through daily advanced purchase price) as new accounts receivable are originated by the Sellers and assigned to the Purchaser, with settlement occurring monthly. Ashland classifies any borrowings under this facility as a short-term debt instrument within the Consolidated Balance Sheets. Once sold to the Purchaser, the accounts receivable and rights to collection described above are separate and distinct from each Sellers' own assets and are not available to its creditors should such Sellers become insolvent.

At September 30, 2019 and 2018, the outstanding amount of accounts receivable transferred by Ashland to the Purchaser was \$133 million and \$153 million, respectively, and there were \$94 million and \$109 million, respectively, of borrowings (denominated in multiple currencies) under the facility. The weighted-average interest rate for this instrument was 1.2% for 2019 and 1.8% for 2018.

2012 accounts receivable securitization

On August 31, 2012, Ashland entered into a \$350 million accounts receivable securitization facility pursuant to (i) a Sale Agreement, among Ashland and certain of its direct and indirect subsidiaries (each an Originator and collectively, the Originators) and CVG Capital III LLC, a wholly-owned “bankruptcy remote” special purpose subsidiary of the Originators (CVG) and (ii) a Transfer and Administration Agreement, among CVG, each Originator, Ashland, as Master Servicer, certain Conduit Investors, Uncommitted Investors, Letter of Credit Issuers, Managing Agents, Administrators and Committed Investors, and The Bank of Nova Scotia, as agent for various secured parties (the Agent). The Transfer and Administration Agreement had a term of three years, but was extendable at the discretion of Ashland and the Investors.

Under the Sale Agreement, each Originator transfers, on an ongoing basis, certain of its accounts receivable, certain related assets and the right to the collections on those accounts receivable to CVG. Ashland accounts for the securitization facility as secured borrowings, and the receivables sold pursuant to the facility are included in the Consolidated Balance Sheets as accounts receivable. Fundings under the Transfer and Administration Agreement will be repaid as accounts receivable are collected, with new fundings being advanced (through daily reinvestments) as new accounts receivable are originated by the Originators and transferred to CVG, with settlement generally occurring monthly. Ashland continues to classify any borrowings under this facility as a short-term debt instrument within the Consolidated Balance Sheets. Once sold to CVG, the accounts receivable, related assets and rights to collection described above are separate and distinct from each Originator’s own assets and are not available to its creditors should such Originator become insolvent. Substantially all of CVG’s assets have been pledged to the Agent in support of its obligations under the Transfer and Administration Agreement.

During 2016, the termination date of the commitments under the Transfer and Administration Agreement was extended from December 31, 2015, the previous termination extension date, to March 22, 2017. During March 2017, this facility was extended for an additional year with similar terms as the previous facility agreement. During March 2018, the termination date of the accounts receivable securitization facility was extended from March 2018 to March 2020. The available funding for qualified receivables under the accounts receivable securitization facility increased from \$100 million to \$115 million, however this was decreased back to \$100 million on August 30, 2019 in conjunction with the Composites and Marl facility divestiture. No other changes to the agreement are expected to have a significant impact to Ashland's results of operations and financial position.

At September 30, 2019 and 2018, the outstanding amount of accounts receivable transferred by Ashland to CVG was \$147 million and \$166 million, respectively. There were \$50 million of borrowings under the facility as of September 30, 2019, while Ashland had \$86 million of borrowings under the facility as of September 30, 2018. The weighted-average interest rate for this instrument was 3.3% for 2019 and 2.7% for 2018.

Other debt

At September 30, 2019 and 2018, Ashland held other debt totaling \$81 million and \$83 million, respectively, comprised primarily of a European short-term loan facility, the 6.50% notes due 2029 and other notes.

Ashland debt covenants restrictions

Ashland’s debt contains usual and customary representations, warranties and affirmative and negative covenants, including financial covenants for leverage and interest coverage ratios, limitations on liens, additional subsidiary indebtedness, restrictions on subsidiary distributions, investments, mergers, sale of assets and restricted payments and other customary limitations. As of September 30, 2019, Ashland was in compliance with all debt agreement covenant restrictions.

The maximum consolidated net leverage ratio permitted under Ashland's most recent credit agreement (the 2017 Credit Agreement) is 4.5. The 2017 Credit Agreement defines the consolidated net leverage ratio as the ratio of consolidated indebtedness minus unrestricted cash and cash equivalents to consolidated EBITDA (Covenant Adjusted EBITDA) for any measurement period. In general, the 2017 Credit Agreement defines Covenant Adjusted EBITDA as net income plus consolidated interest charges, taxes, depreciation and amortization expense, fees and expenses related to capital market transactions and proposed or actual acquisitions and divestitures, restructuring and integration charges, non-cash stock and equity compensation expense, and any other nonrecurring expenses or losses that do not represent a cash item in such period or any future period; less any non-cash gains or other items increasing net income. The computation of Covenant Adjusted EBITDA differs from the calculation of EBITDA and Adjusted EBITDA, which have been reconciled on page M-8. In general, consolidated indebtedness includes debt plus all purchase money indebtedness, banker's acceptances and bank guarantees, deferred purchase price of property or services, attributable indebtedness and guarantees. At September 30, 2019, Ashland's calculation of the consolidated net leverage ratio was 2.6.

The minimum required consolidated interest coverage ratio under the 2017 Credit Agreement is 3.0. The 2017 Credit Agreement defines the consolidated interest coverage ratio as the ratio of Covenant Adjusted EBITDA to consolidated interest charges for any measurement period. At September 30, 2019, Ashland's calculation of the consolidated interest coverage ratio was 6.1.

Any change in Covenant Adjusted EBITDA of \$100 million would have an approximate 0.4x effect on the consolidated net leverage ratio and a 1.1x effect on the consolidated interest coverage ratio. Any change in consolidated indebtedness of \$100 million would affect the consolidated net leverage ratio by approximately 0.2x.

Ashland credit ratings

Ashland's corporate credit ratings with both Standard & Poor's and Moody's Investor Services were upgraded as follows: Standard & Poor's from BB to BB+; and Moody's Investor Services from Ba2 to Ba1. Moody's Investor Services and Standard & Poor's outlooks both remained at stable. Subsequent changes to these ratings may have an effect on Ashland's borrowing rate or ability to access capital markets in the future.

Additional capital resources

Ashland cash projection

Ashland projects that cash flow from operations and other available financial resources such as cash on hand and revolving credit should be sufficient to meet investing and financing requirements to enable Ashland to comply with the covenants and other terms of its financing obligations. These projections are based on various assumptions that include, but are not limited to: operational results, capital expenditures, working capital needs and tax payment and receipts.

Total Equity

Total equity was \$3,571 million and \$3,406 million at September 30, 2019 and September 30, 2018, respectively. During 2019, there were increases of \$505 million from net income, \$10 million for common shares issued under stock incentive plans and repurchases of common stock of \$200 million. These increases were offset by decreases of \$80 million for deferred translation losses, \$5 million for pension and postretirement obligation adjustments and \$65 million for dividends paid during 2019.

Stock repurchase programs

During March 2018, Ashland's Board of Directors approved a new \$1 billion stock repurchase program, which replaced the 2015 stock repurchase program. Under the new program, Ashland's common shares may be repurchased in open market transactions, privately negotiated transactions or pursuant to one or more accelerated stock repurchase programs or Rule 10b5-1 plans. As of September 30, 2019, \$800 million remained available for repurchase under this authorization.

Stock repurchase program agreements

In May 2019, under the 2018 stock repurchase program, Ashland announced that it entered into an accelerated share repurchase agreement (2019 ASR Agreement). Under the 2019 ASR Agreement, Ashland paid an initial purchase price of \$200 million and received an initial delivery of 2.2 million shares of common stock during May 2019. The bank exercised its early termination option under the 2019 ASR Agreement in August 2019, and an additional 400 thousand shares were repurchased, bringing the total shares repurchased upon settlement to 2.6 million.

Stockholder dividends

Ashland paid dividends per common share of \$1.05, \$0.95 and \$1.23 during 2019, 2018 and 2017, respectively.

In May 2019, the Board of Directors of Ashland announced a quarterly cash dividend of 27.5 cents per share to eligible stockholders at record, which represented an increase from the previous quarterly cash dividend of 25.0 cents per share. This dividend was paid in the third quarter and fourth quarters of fiscal 2019.

In May 2018, the Board of Directors of Ashland announced a quarterly cash dividend of 25 cents per share to eligible stockholders at record, which represented an increase from the previous quarterly cash dividend of 22.5 cents per share. This dividend was paid in the third quarter and fourth quarters of fiscal 2018.

During May 2017, subsequent to the final distribution of Valvoline Inc.'s common stock, the Board of Directors announced a quarterly cash dividend of 22.5 cents per share to eligible shareholders at record, which was paid for quarterly dividends in the first and second quarter quarters of fiscal 2018 and the third and fourth quarters of fiscal 2017. This represented a reduction from the previous quarterly dividend of 39 cents per share paid during the first and second quarters of fiscal 2017.

Capital expenditures

Capital expenditures were \$154 million for 2019 and averaged \$160 million during the last three years. A summary of capital expenditures by reportable segment during 2019, 2018 and 2017 follow.

(In millions)	2019	2018	2017
Specialty Ingredients	\$ 137	\$ 138	\$ 148
Intermediates and Solvents	7	5	5
Unallocated and other	10	14	15
Total capital expenditures	<u>\$ 154</u>	<u>\$ 157</u>	<u>\$ 168</u>

A summary of the capital employed in Ashland's current operations, which is calculated by adding equity to capital investment, as of the end of the last three years is as follows.

(In millions)	2019	2018	2017
Capital employed (a)			
Specialty Ingredients	\$ 5,409	\$ 5,599	\$ 5,726
Intermediates and Solvents	165	173	176

(a) Excludes the assets and liabilities classified within unallocated and other which primarily includes debt and other long-term liabilities such as asbestos and pension. The net liability in unallocated and other was \$2,055 million, \$2,894 million and \$3,027 million as of September 30, 2019, 2018 and 2017, respectively. Additionally, net assets held for sale were \$52 million, \$528 million and \$531 million as of September 30, 2019, 2018 and 2017, respectively.

Contractual obligations and other commitments

The following table aggregates Ashland's obligations and commitments to make future payments under existing contracts at September 30, 2019. Contractual obligations for which the ultimate settlement of quantities or prices are not fixed and determinable have been excluded.

(In millions)	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Contractual obligations					
Raw material and service contract purchase obligations (a)	\$ 180	\$ 79	\$ 85	\$ 11	\$ 5
Employee benefit obligations (b)	84	9	12	31	32
Operating lease obligations (c)	213	28	58	24	103
Debt	1,726	166	1,083	—	477
Interest payments (d)	844	88	172	65	519
Unrecognized tax benefits (e)	165	—	—	—	165
One-time transition tax (f)	60	5	11	15	29
Total contractual obligations	\$ 3,272	\$ 375	\$ 1,421	\$ 146	\$ 1,330
Other commitments					
Letters of credit (g)	\$ 48	\$ 48	\$ —	\$ —	\$ —

(a) Includes raw material and service contracts where minimal committed quantities and prices are fixed.

(b) Includes estimated funding of Ashland's qualified U.S. and non-U.S. pension plans for 2019 as well as projected benefit payments through 2028 under Ashland's unfunded pension and other postretirement benefit plans. Excludes the benefit payments from the pension plan trust funds. See Note N of the Notes to Consolidated Financial Statements for additional information.

(c) Includes leases for office buildings, transportation equipment, warehouses and storage facilities and other equipment. For further information, see Note L of the Notes to Consolidated Financial Statements.

(d) Includes interest expense on both variable and fixed rate debt assuming no prepayments. Variable interest rates have been assumed to remain constant through the end of the term at rates that existed as of September 30, 2019.

(e) Due to uncertainties in the timing of the effective settlement of tax positions with respect to taxing authorities, Ashland is unable to determine the timing of payments related to noncurrent unrecognized tax benefits, including interest and penalties. Therefore, these amounts were included in the "More than 5 years" column.

(f) As a result of the Tax Act enacted during fiscal year 2018, Ashland has currently recorded a \$60 million liability for the one-time transition tax. This liability will be payable over 7 years.

(g) Ashland issues various types of letters of credit as part of its normal course of business. For further information, see Note J of the Notes to Consolidated Financial Statements.

OFF-BALANCE SHEET ARRANGEMENTS

As part of its normal course of business, Ashland is a party to various financial guarantees and other commitments. These arrangements involve elements of performance and credit risk that are not included in the Consolidated Balance Sheets. The possibility that Ashland would have to make actual cash expenditures in connection with these obligations is largely dependent on the performance of the guaranteed party, or the occurrence of future events that Ashland is unable to predict. Ashland has reserved the approximate fair value of these guarantees in accordance with U.S. GAAP.

NEW ACCOUNTING PRONOUNCEMENTS

For a discussion and analysis of recently issued accounting pronouncements and its impact on Ashland, see Note A of Notes to Consolidated Financial Statements.

CRITICAL ACCOUNTING POLICIES

The preparation of Ashland's Consolidated Financial Statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, sales and expenses, and the disclosures of contingent assets and liabilities. Significant items that are subject to such estimates and assumptions include, but are not limited to, environmental remediation, asbestos litigation, long-lived assets (including goodwill and other intangible assets) and income taxes. Although management bases its estimates on historical experience and various other assumptions that are believed to be reasonable under the circumstances, actual results could differ significantly from the estimates under different assumptions or conditions. Management has reviewed the estimates affecting these items with the Audit Committee of Ashland's Board of Directors.

Environmental remediation and asset retirement obligations

Ashland is subject to various federal, state and local environmental laws and regulations that require environmental assessment or remediation efforts (collectively environmental remediation) at multiple locations. At September 30, 2019, such locations included 80 waste treatment or disposal sites where Ashland has been identified as a potentially responsible party under Superfund or similar state laws, 113 current and former operating facilities and about 1,225 service station properties, of which 29 are being actively remediated. See Note O of the Notes to Consolidated Financial Statements for additional information.

Ashland's reserves for environmental remediation and related environmental litigation amounted to \$186 million at September 30, 2019 compared to \$187 million at September 30, 2018 of which \$143 million at September 30, 2019 and \$147 million at September 30, 2018 were classified in other noncurrent liabilities on the Consolidated Balance Sheets. The remaining reserves were classified in accrued expenses and other liabilities on the Consolidated Balance Sheets.

The total reserves for environmental remediation reflect Ashland's estimates of the most likely costs that will be incurred over an extended period to remediate identified conditions for which the costs are reasonably estimable, without regard to any third-party recoveries. Engineering studies, probability techniques, historical experience and other factors are used to identify and evaluate remediation alternatives and their related costs in determining the estimated reserves for environmental remediation. Ashland continues to discount certain environmental sites and regularly adjusts its reserves as environmental remediation continues. Ashland has estimated the value of its probable insurance recoveries associated with its environmental reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage. At September 30, 2019 and 2018, Ashland's recorded receivable for these probable insurance recoveries was \$13 million and \$12 million, respectively, of which \$12 million and \$11 million, respectively, were classified in other noncurrent assets in the Consolidated Balance Sheets.

During 2019, Ashland recognized a \$30 million charge for certain environmental liabilities related to normal ongoing remediation cost estimate updates for sites, which is consistent with Ashland's historical environmental accounting policy.

During 2018, Ashland recognized a \$60 million charge for certain environmental liabilities. Of that amount, \$18 million related to one site where, after significant research and analysis as part of Ashland's normal process and protocol for these matters, the estimated cost for the ongoing remediation was finalized. As such, Ashland recorded the expense for this remediation project during 2018 since a reasonable estimate that is in accordance with U.S. GAAP provisions could be determined. The remaining charges in 2018 related to normal ongoing remediation cost estimate updates for sites, which is consistent with Ashland's historical environmental accounting policy.

Environmental remediation reserves are subject to numerous inherent uncertainties that affect Ashland's ability to estimate its share of the costs. Such uncertainties involve the nature and extent of contamination at each site, the extent of required cleanup efforts under existing environmental regulations, widely varying costs of alternate cleanup methods, changes in environmental regulations, the potential effect of continuing improvements in remediation technology, and the number and financial strength of other potentially responsible parties at multiparty sites. Although it is not possible to predict with certainty the ultimate costs of environmental remediation, Ashland currently estimates that the upper end of the reasonably possible range of future costs for identified sites could be as high as approximately \$440 million. The largest reserve for any site is 14% of the remediation reserve.

Asbestos litigation

Ashland and Hercules have liabilities from claims alleging personal injury caused by exposure to asbestos. To assist in developing and annually updating independent reserve estimates for future asbestos claims and related costs given various assumptions, Ashland retained third party actuarial experts. Prior to 2018, Ashland retained Hamilton, Rabinovitz & Associates, Inc. (HR&A). During 2018, Ashland transitioned these responsibilities to Nathan Associates, Inc. (Nathan). The processes and methodologies used by Nathan are consistent with the ones historically employed by HR&A. The methodology used by Nathan to project future asbestos costs is based largely on recent experience, including claim-filing and settlement rates, disease mix, enacted legislation, open claims and litigation defense. The claim experience of Ashland and Hercules are separately compared to the results of previously conducted third party epidemiological studies estimating the number of people likely to develop asbestos-related diseases. Those studies were undertaken in connection with national analyses of the population expected to have been exposed to asbestos. Using that information, Nathan estimates a range of the number of future claims that may be filed, as well as the related costs that may be incurred in resolving those claims. Changes in asbestos-related liabilities and receivables are recorded on an after-tax basis within the discontinued operations caption in the Statements of Consolidated Comprehensive Income (Loss). See Note O of the Notes to Consolidated Financial Statements for additional information.

Ashland asbestos-related litigation

The claims alleging personal injury caused by exposure to asbestos asserted against Ashland result primarily from indemnification obligations undertaken in 1990 in connection with the sale of Riley, a former subsidiary. The amount and timing of settlements and number of open claims can fluctuate from period to period.

Ashland asbestos-related liability

From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs, which generally approximates the mid-point of the estimated range of exposure from model results. Ashland reviews this estimate and related assumptions quarterly and annually updates the results of a non-inflated, non-discounted approximate 50-year model developed with the assistance of Nathan.

During the most recent update completed during 2019, it was determined that the liability for Ashland asbestos-related claims should be increased by \$1 million. Total reserves for asbestos claims were \$352 million at September 30, 2019 compared to \$380 million at September 30, 2018.

Ashland asbestos-related receivables

Ashland has insurance coverage for certain litigation defense and claim settlement costs incurred in connection with its asbestos claims, and coverage-in-place agreements exist with the insurance companies that provide substantially all of the coverage that will be accessed.

For the Ashland asbestos-related obligations, Ashland has estimated the value of probable insurance recoveries associated with its asbestos reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage, including an assumption that all solvent insurance carriers remain solvent. Substantially all of the estimated receivables from insurance companies are expected to be due from domestic insurers, all of which are solvent.

At September 30, 2019, Ashland's receivable for recoveries of litigation defense and claim settlement costs from insurers amounted to \$123 million (excluding the Hercules receivable for asbestos claims). Receivables from insurers amounted to \$140 million at September 30, 2018. During 2019, the annual update of the model used for purposes of valuing the asbestos reserve and its impact on valuation of future recoveries from insurers, was completed. This model update resulted in a \$5 million decrease in the receivable for probable insurance recoveries.

Hercules asbestos-related litigation

Hercules has liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims typically arise from alleged exposure to asbestos fibers from resin encapsulated pipe and tank products which were sold by one of Hercules' former subsidiaries to a limited industrial market. The amount and timing of settlements and number of open claims can fluctuate from period to period.

Hercules asbestos-related liability

From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs, which generally approximates the mid-point of the estimated range of exposure from model results. Ashland reviews this estimate and related assumptions quarterly and annually updates the results of a non-inflated, non-discounted approximate 50-year model developed with the assistance of Nathan. As a result of the most recent annual update of this estimate, completed during 2019, it was determined that the liability for Hercules asbestos-related claims should be decreased by \$10 million. Total reserves for asbestos claims were \$252 million at September 30, 2019 compared to \$282 million at September 30, 2018.

Hercules asbestos-related receivables

For the Hercules asbestos-related obligations, certain reimbursement obligations pursuant to coverage-in-place agreements with insurance carriers exist. As a result, any increases in the asbestos reserve have been partially offset by probable insurance recoveries. Ashland has estimated the value of probable insurance recoveries associated with its asbestos reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage, including an assumption that all solvent insurance carriers remain solvent. The estimated receivable consists exclusively of solvent domestic insurers.

As of September 30, 2019 and 2018, the receivables from insurers amounted to \$49 million and \$54 million, respectively. During 2019, the annual update of the model used for purposes of valuing the asbestos reserve and its impact on valuation of future recoveries from insurers was completed. This model update resulted in a \$5 million decrease in the receivable for probable insurance recoveries.

Asbestos litigation cost projection

Projecting future asbestos costs is subject to numerous variables that are extremely difficult to predict. In addition to the significant uncertainties surrounding the number of claims that might be received, other variables include the type and severity of the disease alleged by each claimant, the long latency period associated with asbestos exposure, mortality rates, dismissal rates, costs of medical treatment, the impact of bankruptcies of other companies that are co-defendants in claims, uncertainties surrounding the litigation process from jurisdiction to jurisdiction and from case to case, and the impact of potential changes in legislative or judicial standards. Furthermore, any predictions with respect to these variables are subject to even greater uncertainty as the projection period lengthens. In light of these inherent uncertainties, Ashland believes that the asbestos reserves for Ashland and Hercules represent the best estimate within a range of possible outcomes. As a part of the process to develop these estimates of future asbestos costs, a range of long-term cost models was developed. These models are based on national studies that predict the number of people likely to develop asbestos-related diseases and are heavily influenced by assumptions regarding long-term inflation rates for indemnity payments and legal defense costs, as well as other variables mentioned previously. Ashland has currently estimated in various models ranging from approximately 40 to 50 year periods that it is reasonably possible that total future litigation defense and claim settlement costs on an inflated and undiscounted basis could range as high as approximately \$550 million for the Ashland asbestos-related litigation (current reserve of \$352 million) and approximately \$390 million for the Hercules asbestos-related litigation (current reserve of \$252 million), depending on the combination of assumptions selected in the various models. If actual experience is worse than projected, relative to the number of claims filed, the severity of alleged disease associated with those claims or costs incurred to resolve those claims, or actuarial refinement or improvements to the assumptions used within these models are initiated, Ashland may need to further increase the estimates of the costs associated with asbestos claims and these increases could be material over time.

Long-lived assets

Tangible assets

The cost of property, plant and equipment is depreciated by the straight-line method over the estimated useful lives of the assets. Buildings are depreciated principally over 12 to 35 years and machinery and equipment principally over 2 to 25 years. Ashland reviews property, plant and equipment asset groups for impairment whenever events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. Ashland monitors these changes and events on at least a quarterly basis. Examples of events or changes in circumstances could include, but are not limited to, a prolonged economic

downturn, current period operating or cash flow losses combined with a history of losses or a forecast of continuing losses associated with the use of an asset group, or a current expectation that an asset group will be sold or disposed of before the end of its previously estimated useful life. Recoverability is based upon projections of anticipated future undiscounted cash flows associated with the use and eventual disposal of the property, plant and equipment asset groups, as well as specific appraisals in certain instances. Reviews occur at the lowest level for which identifiable cash flows are largely independent of cash flows associated with other property, plant and equipment asset groups. If the future undiscounted cash flows result in a value that is less than the carrying value, then the long-lived asset is considered impaired and a loss is recognized based on the amount by which the carrying amount exceeds the estimated fair value. Various factors that Ashland uses in determining the impact of these assessments include the expected useful lives of long-lived assets and the ability to realize any undiscounted cash flows in excess of the carrying amounts of such asset groups, and are affected primarily by changes in the expected use of the assets, changes in technology or development of alternative assets, changes in economic conditions, changes in operating performance and changes in expected future cash flows. Because judgment is involved in determining the fair value of property, plant and equipment asset groups, there is risk that the carrying value of these assets may require adjustment in future periods.

Total depreciation expense on property, plant and equipment for 2019, 2018 and 2017 was \$203 million, \$184 million and \$185 million, respectively. Depreciation expense for 2019, 2018 and 2017 included \$39 million, \$14 million and \$19 million, respectively, in accelerated depreciation. Capitalized interest for 2019, 2018 and 2017 was zero, zero and \$1 million, respectively.

Finite-lived intangible assets

Finite-lived intangible assets principally consist of certain trademarks and trade names, intellectual property, and customer relationships. These intangible assets are amortized on a straight-line basis over their estimated useful lives. The cost of trademarks and trade names is amortized principally over 3 to 25 years, intellectual property over 5 to 25 years and customer and supplier relationships over 3 to 24 years. Ashland reviews finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. Ashland monitors these changes and events on at least a quarterly basis.

Amortization expense recognized on finite-lived intangible assets was \$86 million for 2019, \$93 million for 2018 and \$80 million for 2017, and is primarily included in the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Goodwill

Ashland accounts for goodwill and other intangible assets acquired in a business combination in conformity with current accounting guidance which does not allow for goodwill and indefinite-lived intangible assets to be amortized.

Ashland reviews goodwill for impairment annually as of July 1 or when events and circumstances indicate an impairment may have occurred. Ashland tests goodwill for impairment by comparing the estimated fair value of the reporting units to the related carrying value. Reporting units are defined as either operating segments or one level below the operating segments for which discrete financial information is available and reviewed by the business management. Ashland determined that its reporting units are its two reportable segments: Specialty Ingredients (“ASI”) and Intermediates and Solvents (“I&S”). Ashland tests goodwill either quantitatively or qualitatively for impairment.

For the qualitative approach, Ashland considers relevant events and circumstances such as macroeconomic conditions, industry and market considerations, overall financial performance and changes in management and business strategy, changes in carrying value, among others. Ashland considers how these relevant events and circumstances change between quantitative goodwill impairment tests. Ashland decides whether it is more likely than not that the fair value of its reporting units exceeds the carrying values. If not, a quantitative assessment must be performed.

For the quantitative approach, Ashland makes various estimates and assumptions in determining the estimated fair value of each reporting unit using a combination of discounted cash flow models and valuations based on earnings multiples for guideline public companies in each reporting unit’s industry peer group, when externally quoted market prices are not readily available. Discounted cash flow models are highly reliant on various assumptions, including projected business results and future industry direction, long-term growth factors and weighted-average cost of capital. Significant management judgement is

involved in estimating these variables, and they include inherent uncertainties since they are forecasting future events. Ashland performs sensitivity analyses by using a range of inputs to confirm reasonableness of these estimates. Additionally, Ashland compares the indicated equity value to Ashland's market capitalization, and implied control premium/discount, to determine if the estimated enterprise value is reasonable compared to external market indicators. If this comparison indicates that a reporting unit's estimated fair value is less than its carrying value, it is adjusted to its calculated fair value and the adjustment represents the impairment charge.

Ashland performed its annual goodwill impairment test using the quantitative approach as of July 1, 2019 and concluded there was no impairment as of that date. For further information, see Note I of Notes to Consolidated Financial Statements.

Other indefinite-lived intangible assets

Other indefinite-lived intangible assets include certain trademarks and trade names. Ashland reviews these intangible assets for possible impairment annually as of July 1 or whenever events or changes in circumstances indicate that carrying amounts may not be recoverable. If the carrying value of an individual indefinite-lived intangible asset exceeds its fair value, the asset is written down to its fair value and the amount of the write down is the impairment charge. Similar to its annual assessment for goodwill, Ashland performs either a qualitative or quantitative test for impairment.

If a quantitative analysis is performed, Ashland tests these assets using a "relief-from-royalty" valuation method to determine the fair value. Significant assumptions inherent in the valuation methodologies include, but are not limited to, future projected business results, growth rates, the weighted-average cost of capital for a market participant, and royalty and discount rates.

In conjunction with the July 1 annual assessment of indefinite-lived intangible assets, Ashland's quantitative approach models did not indicate any impairment, as each indefinite-lived intangible asset's fair value exceeded their carrying values.

Ashland's assessment of an impairment on any of these assets classified currently as having indefinite lives, including goodwill, could change in future periods if significant events happen and/or circumstances change that effect the previously mentioned assumptions. Significant assumptions inherent in the valuation methodologies include, but are not limited to, such estimates as future projected business results, growth rates, the weighted average cost of capital for a market participant, and royalty and discount rates. For further information, see Note I of Notes to Consolidated Financial Statements.

Income taxes

Ashland is subject to income taxes in the United States and numerous foreign jurisdictions. Judgment in the forecasting of taxable income using historical and projected future operating results is required in determining Ashland's provision for income taxes and the related assets and liabilities. The provision for income taxes includes income taxes paid, currently payable or receivable, and deferred taxes. Under U.S. GAAP, deferred tax assets and liabilities are determined based on differences between financial reporting and tax basis of assets and liabilities and are measured using enacted tax rates and laws that are expected to be in effect when the differences reverse. Deferred tax assets are also recognized for the estimated future effects of tax loss and credit carryforwards. The effect on deferred taxes of changes in tax rates is recognized in the period in which the enactment date occurs. Valuation allowances are established when necessary on a jurisdictional basis to reduce deferred tax assets to the amounts expected to be realized. Deferred taxes are not provided on the unremitted earnings of subsidiaries outside of the United States when it is expected that these earnings are indefinitely reinvested. In the event that the actual outcome of future tax consequences differs from Ashland's estimates and assumptions due to changes or future events such as tax legislation, geographic mix of earnings, completion of tax audits or earnings repatriation plans, the resulting change to the provision for income taxes could have a material effect on the Statement of Consolidated Comprehensive Income (Loss) and Consolidated Balance Sheet.

The recoverability of deferred tax assets and the recognition and measurement of uncertain tax positions are subject to various assumptions and judgment by Ashland. If actual results differ from the estimates made by Ashland in establishing or maintaining valuation allowances against deferred tax assets, the resulting change in the valuation allowance would generally impact earnings or other comprehensive income depending on the nature of the respective deferred tax asset. Additionally, the positions taken with regard to tax contingencies may be subject to audit and review by tax authorities, which may result in future taxes, interest and penalties. Positive and negative evidence is considered in determining the need for a valuation

allowance against deferred tax assets, which includes such evidence as historical earnings, projected future earnings, tax planning strategies and expected timing of reversal of existing temporary differences.

In determining the recoverability of deferred tax assets Ashland gives consideration to all available positive and negative evidence including reversals of deferred tax liabilities (other than those with an indefinite reversal period), projected future taxable income, tax planning strategies and recent financial operations. Ashland attaches the most weight to historical earnings due to their verifiable nature. In evaluating the objective evidence that historical results provide, Ashland considers three years of cumulative income or loss. In addition, Ashland has reflected increases and decreases in our valuation allowance based on the overall weight of positive versus negative evidence on a jurisdiction by jurisdiction basis.

EFFECTS OF INFLATION AND CHANGING PRICES

Ashland's financial statements are prepared on the historical cost method of accounting in accordance with U.S. GAAP and, as a result, do not reflect changes in the purchasing power of the U.S. dollar. Monetary assets (such as cash, cash equivalents and accounts receivable) lose purchasing power as a result of inflation, while monetary liabilities (such as accounts payable and indebtedness) result in a gain, because they can be settled with dollars of diminished purchasing power. As of September 30, 2019, Ashland's monetary assets exceed its monetary liabilities, leaving it currently more exposed to the effects of future inflation. However, given the recent consistent stability of inflation in the United States in the past decade as well as forward economic outlooks, current inflationary pressures seem moderate.

Certain of the industries in which Ashland operates are capital-intensive, and replacement costs for its plant and equipment generally would substantially exceed their historical costs. Accordingly, depreciation and amortization expense would be greater if it were based on current replacement costs. However, because replacement facilities would reflect technological improvements and changes in business strategies, such facilities would be expected to be more productive than existing facilities, mitigating at least part of the increased expense.

Ashland uses the LIFO method to value a relatively small portion of its inventories to provide a better matching of revenues with current costs. However, LIFO values such inventories below their replacement costs during inflationary periods.

FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements including, without limitation, statements made under the caption "Management's Discussion and Analysis of Financial Condition and Results of Operation" (MD&A), within the meaning of Section 27A of the Securities Act of 1933, as amended and Section 21E of the Securities Exchange Act of 1934, as amended. Ashland has identified some of these forward-looking statements with words such as "anticipates," "believes," "expects," "estimates," "is likely," "predicts," "projects," "forecasts," "objectives," "may," "will," "should," "plans" and "intends" and the negative of these words or other comparable terminology. Ashland may from time to time make forward-looking statements in its Annual Report to Shareholders, quarterly reports and other filings with the Securities and Exchange Commission (SEC), news releases and other written and oral communications. These forward-looking statements are based on Ashland's expectations and assumptions, as of the date such statements are made, regarding Ashland's future operating performance and financial condition, as well as the economy and other future events or circumstances. Ashland's expectations and assumptions include, without limitation, those mentioned within the MD&A, internal forecasts and analyses of current and future market conditions and trends, management plans and strategies, operating efficiencies and economic conditions (such as prices, supply and demand, cost of raw materials, and the ability to recover raw-material cost increases through price increases), and risks and uncertainties associated with the following: the program to eliminate certain existing corporate and Specialty Ingredients expenses (including the possibility that such cost eliminations may not occur or may take longer to implement than anticipated), the impact of acquisitions and/or divestitures that Ashland has made or may make (including the possibility that Ashland may not realize the anticipated benefits from such transactions); Ashland's substantial indebtedness (including the possibility that such indebtedness and related restrictive covenants may adversely affect Ashland's future cash flows, results of operations, financial condition and its ability to repay debt); Ashland's ability to generate sufficient cash to finance its stock repurchase plans; severe weather, natural disasters, cyber events and legal proceedings and claims (including product recalls, environmental and asbestos matters); and without limitation, risks and uncertainties affecting Ashland that are contained in "Use of estimates, risks and uncertainties" in Note A of the Notes to Consolidated Financial Statements and in Item 1A of this Annual Report on Form 10-K. Various risks and uncertainties may cause actual results to differ materially from those stated,

projected or implied by any forward-looking statements. Ashland believes its expectations and assumptions are reasonable, but there can be no assurance that the expectations reflected herein will be achieved. Unless legally required, Ashland undertakes no obligation to update any forward-looking statements made in this Form 10-K whether as a result of new information, future events or otherwise. Information on Ashland's website is not incorporated into or a part of this Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Ashland conducts business in a variety of foreign currencies. Accordingly, Ashland regularly uses foreign currency derivative instruments to manage exposure on certain transactions denominated in foreign currencies to curtail potential earnings volatility effects of certain assets and liabilities, including short-term inter-company loans, denominated in currencies other than Ashland's functional currency of an entity. These derivative contracts generally require exchange of one foreign currency for another at a fixed rate at a future date and generally have maturities of less than twelve months. All contracts are valued at fair value with net changes in fair value recorded within the selling, general and administrative expense caption. The impacts of these contracts were largely offset by gains and losses resulting from the impact of changes in exchange rates on transactions denominated in non-functional currencies.

As of September 30, 2019 and 2018, Ashland had not identified any significant credit risk on open derivative contracts. The potential loss from a hypothetical 10% adverse change in foreign currency rates on Ashland's open foreign currency derivative instruments would be largely offset by gains resulting from the impact of changes in exchange rates on transactions denominated in non-functional currencies. Ashland did not transact or have open any significant hedging contracts with respect to commodities or any related raw material requirements as of and for the year ended September 30, 2019.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management is responsible for the preparation and integrity of the Consolidated Financial Statements and other financial information included in this annual report on Form 10-K. Such financial statements are prepared in accordance with accounting principles generally accepted in the United States. Accounting principles are selected and information is reported which, using management's best judgment and estimates, present fairly Ashland's consolidated financial position, results of operations and cash flows. The other financial information in this annual report on Form 10-K is consistent with the Consolidated Financial Statements.

Ashland's management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Ashland's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of Ashland's Consolidated Financial Statements. Ashland's internal control over financial reporting is supported by a code of business conduct which summarizes our guiding values such as obeying the law, adhering to high ethical standards and acting as responsible members of the communities where we operate. Compliance with that Code forms the foundation of our internal control systems, which are designed to provide reasonable assurance that Ashland's assets are safeguarded and its records reflect, in all material respects, transactions in accordance with management's authorization. The concept of reasonable assurance is based on the recognition that the cost of a system of internal control should not exceed the related benefits. Management believes that adequate internal controls are maintained by the selection and training of qualified personnel, by an appropriate division of responsibility in all organizational arrangements, by the establishment and communication of accounting and business policies, and by internal audits.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements and even when determined to be effective, can only provide reasonable assurance with respect to financial statement preparation and presentation. Also, projections of any evaluation of effectiveness to future periods are subject to the risks that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The Board, subject to stockholder ratification, selects and engages the independent auditors based on the recommendation of the Audit Committee. The Audit Committee, composed of directors who are not members of management, reviews the adequacy of Ashland's policies, procedures, controls and risk management strategies, the scope of auditing and other services performed by the independent auditors, and the scope of the internal audit function. The Committee holds meetings with Ashland's internal auditor and independent auditors, with and without management present, to discuss the findings of their audits, the overall quality of Ashland's financial reporting and their evaluation of Ashland's internal controls. The report of Ashland's Audit Committee can be found in Ashland's Proxy for its 2020 Annual Meeting.

Management assessed the effectiveness of Ashland's internal control over financial reporting as of September 30, 2019. Management conducted its assessment utilizing the framework described in *Internal Control - Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on this assessment, management believes that Ashland maintained effective internal control over financial reporting as of September 30, 2019.

Ernst & Young LLP, an independent registered public accounting firm, has audited and reported on the Consolidated Financial Statements of Ashland Global Holdings Inc. and Consolidated Subsidiaries as of and for the year ended September 30, 2019 and the effectiveness of Ashland's internal control over financial reporting as of September 30, 2019. The reports of the independent registered public accounting firm are contained in this Annual Report on Form 10-K.

/s/ William A. Wulfsohn
William A. Wulfsohn
Chairman of the Board and Chief Executive Officer

/s/ J. Kevin Willis
J. Kevin Willis
Senior Vice President and Chief Financial Officer

November 25, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Ashland Global Holdings Inc. and Consolidated Subsidiaries

Opinion on Internal Control Over Financial Reporting

We have audited Ashland Global Holdings Inc. and Consolidated Subsidiaries' internal control over financial reporting as of September 30, 2019, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), (the COSO criteria). In our opinion, Ashland Global Holdings Inc. and Consolidated Subsidiaries (the Company) maintained, in all material respects, effective internal control over financial reporting as of September 30, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of September 30, 2019 and 2018, the related consolidated statements of comprehensive income (loss), equity and cash flows for each of the three years in the period ended September 30, 2019, and the related notes and our report dated November 25, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

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

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

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

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

Cincinnati, Ohio
November 25, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Ashland Global Holdings Inc. and Consolidated Subsidiaries

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Ashland Global Holdings Inc. and Consolidated Subsidiaries (the Company) as of September 30, 2019 and 2018, the related consolidated statements of comprehensive income (loss), equity and cash flows for each of the three years in the period ended September 30, 2019, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at September 30, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of September 30, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated November 25, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

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

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

Critical Audit Matters

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

Valuation of Environmental Remediation Reserves

Description of the Matter

At September 30, 2019, the reserves for environmental remediation amounted to \$186 million. As discussed within Note O of the consolidated financial statements, the reserves for environmental remediation reflect Ashland's estimates of the most likely costs that will be incurred over an extended period to remediate identified conditions for which the costs are reasonably estimable and probable of being incurred, without regard to any third-party recoveries. The Company uses engineering studies, historical experience and other factors to identify and evaluate remediation alternatives and their related costs in determining the estimated reserves for environmental remediation. Ashland regularly adjusts its reserves as environmental remediation continues.

Auditing the environmental remediation reserve was complex due to inherent uncertainties that affect Ashland's ability to estimate its share of the probable costs. Such uncertainties involve assumptions regarding the nature and extent of contamination at each site, the nature and extent of required cleanup efforts under existing environmental regulations, the duration and effectiveness of the chosen remedial strategy, and changes in environmental regulations.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of relevant controls over Ashland's environmental remediation process. For example, we tested controls over the Company's annual training process for the setting of reserves, management's review of the assumptions used in determining the probability and the development of the environmental reserve estimates. We also tested management's controls over the completeness and accuracy of the underlying data used in the reserve estimates.

To test the environmental reserves, we performed audit procedures that included, among others: assessing the appropriateness of Ashland's policies and procedures and testing the significant assumptions discussed above and the underlying data used by Ashland in its analysis. We obtained an understanding of the assumptions underlying the reserves through discussions with Ashland's remediation project managers. We also involved our environmental reserve subject matter specialists to evaluate the reasonableness of management's estimates, including consideration of information available on regulatory databases in the public domain that was assessed for possible contrary evidence. With the support of our environmental reserve subject matter specialists, we evaluated whether the method, models and assumptions utilized in estimating the reserve balances were appropriate based on testing of engineering studies and historical experience.

Valuation of Asbestos Litigation Reserve

Description of the Matter

At September 30, 2019, the reserves for asbestos litigation amounted to \$604 million. As discussed within Note O of the consolidated financial statements, Ashland has liabilities from claims alleging personal injury caused by exposure to asbestos. Ashland retained third party actuarial experts to assist in developing and annually updating independent reserve estimates for future asbestos claims and related costs given various assumptions. The methodology used by the actuarial experts to project future asbestos costs is based largely on recent experience, including claim-filing and settlement rates, disease mix, enacted legislation, open claims and litigation defense. Further, the claim experience identified is compared to the results of previously conducted third party epidemiological studies estimating the number of people likely to develop asbestos-related diseases. Using that information, the Company estimates a range of the number of future claims that may be filed, as well as the related costs that may be incurred in resolving those claims. From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs, which generally approximates the mid-point of the estimated range of exposure from model results. Ashland reviews this estimate and related assumptions quarterly and annually updates the results of a non-inflated, non-discounted approximate 50-year model developed with the assistance of the Company's third party actuarial experts.

Auditing the Company's asbestos litigation reserve is complex and highly judgmental due to uncertainty associated with the estimate of projected future asbestos costs. The methodology employed by management to develop the estimate of projected future asbestos costs is subject to assumptions such as the number of claims that may be received in the future, the type and severity of disease alleged by claimant, the related costs incurred in resolving those claims, the mortality rates, and the dismissal rates. These assumptions have a significant effect on the asbestos litigation reserve.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of internal controls over the asbestos litigation reserves process. These include controls over management's assessment of the assumptions utilized within the estimate, management's oversight of asbestos trends including claims movement and costs incurred, and the completeness and accuracy of the underlying data utilized to project future costs.

To evaluate the reasonableness of the reserve for asbestos litigation, our audit procedures included testing the completeness and accuracy of the underlying claims data provided to management's actuarial specialist utilized to project future costs. Additionally, we evaluated the claims and spend activity from legal letters obtained from internal and external legal counsel. Furthermore, we involved our actuarial subject matter specialists to assist in the evaluation of the methodologies and assumptions applied by management's experts as described above to determine the appropriateness of the asbestos litigation reserve, to independently prepare an estimated range of the liability. We then assessed the reasonableness of the Company's recorded reserve against our independently calculated range.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2014.
Cincinnati, Ohio
November 25, 2019

Ashland Global Holdings Inc. and Consolidated Subsidiaries
Statements of Consolidated Comprehensive Income (Loss)
Years Ended September 30

(In millions except per share data)	2019	2018	2017
Sales	\$ 2,493	\$ 2,589	\$ 2,309
Cost of sales	1,726	1,726	1,580
Gross profit	767	863	729
Selling, general and administrative expense	539	692	610
Research and development expense	66	73	73
Equity and other income	4	4	3
Operating income	166	102	49
Net interest and other expense - Note J	99	102	229
Other net periodic benefit income (costs) - Note N	5	15	(6)
Net loss on acquisitions and divestitures - Notes C and D	(2)	(4)	(10)
Income (loss) from continuing operations before income taxes	70	11	(196)
Income tax expense (benefit) - Note M	46	(8)	(16)
Income (loss) from continuing operations	24	19	(180)
Income from discontinued operations (net of tax) - Note E	481	95	208
Net income	505	114	28
Net income attributable to noncontrolling interest (a)	—	—	27
Net income attributable to Ashland	<u>\$ 505</u>	<u>\$ 114</u>	<u>\$ 1</u>

PER SHARE DATA - NOTE A

Basic earnings per share			
Income (loss) from continuing operations	\$ 0.39	\$ 0.30	\$ (2.90)
Income from discontinued operations attributable to Ashland	7.76	1.52	2.91
Net income attributable to Ashland	<u>\$ 8.15</u>	<u>\$ 1.82</u>	<u>\$ 0.01</u>

Diluted earnings per share			
Income (loss) from continuing operations	\$ 0.39	\$ 0.29	\$ (2.90)
Income from discontinued operations attributable to Ashland	7.64	1.50	2.91
Net income attributable to Ashland	<u>\$ 8.03</u>	<u>\$ 1.79</u>	<u>\$ 0.01</u>

COMPREHENSIVE INCOME (LOSS)

Net income	\$ 505	\$ 114	\$ 28
Other comprehensive income (loss), net of tax			
Unrealized translation gain (loss)	(80)	(82)	81
Pension and postretirement obligation adjustment	(5)	—	(4)
Net change in investment securities	—	13	15
Other comprehensive income (loss)	(85)	(69)	92
Comprehensive income	420	45	120
Comprehensive income attributable to noncontrolling interest	—	—	27
Comprehensive income attributable to Ashland	<u>\$ 420</u>	<u>\$ 45</u>	<u>\$ 93</u>

(a) Represents the income attributable to the previous noncontrolling interest in Valvoline Inc., whose results are now included within discontinued operations. See Note B for more information.

See Notes to Consolidated Financial Statements.

Ashland Global Holdings Inc. and Consolidated Subsidiaries
Consolidated Balance Sheets
At September 30

(In millions)	2019	2018
Assets		
Current assets		
Cash and cash equivalents	\$ 232	\$ 294
Accounts receivable (a)	481	522
Inventories - Note A	597	596
Other assets	64	60
Current assets held for sale - Note D	59	240
Total current assets	1,433	1,712
Noncurrent assets		
Property, plant and equipment - Note H		
Cost	3,165	3,172
Accumulated depreciation	1,588	1,526
Net property, plant and equipment	1,577	1,646
Goodwill - Note I	2,253	2,304
Intangibles - Note I	1,088	1,185
Restricted investments - Note G	310	312
Asbestos insurance receivable - Note O	157	179
Deferred income taxes - Note M	23	28
Other assets - Note K	410	416
Noncurrent assets held for sale - Note D	—	477
Total noncurrent assets	5,818	6,547
Total assets	\$ 7,251	\$ 8,259
Liabilities and Equity		
Current liabilities		
Short-term debt - Note J	\$ 166	\$ 254
Trade and other payables	313	331
Accrued expenses and other liabilities	271	328
Current liabilities held for sale - Note D	7	163
Total current liabilities	757	1,076
Noncurrent liabilities		
Long-term debt - Note J	1,501	2,275
Asbestos litigation reserve - Note O	555	612
Deferred income taxes - Note M	264	286
Employee benefit obligations - Note N	150	156
Other liabilities - Note K	453	422
Noncurrent liabilities held for sale - Note D	—	26
Total noncurrent liabilities	2,923	3,777
Commitments and contingencies - Notes L and O		
Equity - Notes P and Q		
Common stock, par value \$.01 per share, 200 million shares authorized	1	1
Issued 60 million and 62 million shares in 2019 and 2018		
Paid-in capital	756	946
Retained earnings	3,224	2,750
Accumulated other comprehensive loss	(410)	(291)
Total equity	3,571	3,406
Total liabilities and equity	\$ 7,251	\$ 8,259

(a) Accounts receivable includes an allowance for doubtful accounts of \$3 million at both September 30, 2019 and 2018.
See Notes to Consolidated Financial Statements.

Ashland Global Holdings Inc. and Consolidated Subsidiaries
Statements of Consolidated Equity

(In millions)	Common stock	Paid-in capital	Retained earnings	Accumulated other comprehensive income (loss)		Total
				(a)	(b)	
Balance at September 30, 2016	\$ 1	\$ 923	\$ 2,704	\$ (281)	\$ (182)	\$ 3,165
Total comprehensive income (loss)						
Net income			1		27	28
Other comprehensive income				92		92
Dividends, \$1.23 per common share			(77)			(77)
Common shares issued under stock incentive and other plans (c) (d)		15	68	(33)	152	187
Distribution of Valvoline Inc. (b)		(7)			7	—
Other					(4)	(4)
Distributions to noncontrolling interest				(222)		(222)
Balance at September 30, 2017	1	931	2,696	(222)	—	3,406
Total comprehensive income (loss)						
Net income			114			114
Other comprehensive loss				(69)		(69)
Dividends, \$.95 per common share			(60)			(60)
Common shares issued under stock incentive and other plans (c) (d)		15				15
Balance at September 30, 2018	1	946	2,750	(291)	—	3,406
Adoption of new accounting pronouncements (e)			34	(34)		—
Total comprehensive income (loss)						
Net income			505			505
Other comprehensive loss				(85)		(85)
Dividends, \$1.05 per common share			(65)			(65)
Common shares issued under stock incentive and other plans (c) (d)		10				10
Repurchase of common stock (f)		(200)				(200)
Balance at September 30, 2019	1	756	3,224	(410)	—	3,571

(a) At September 30, 2019 and 2018, the accumulated other comprehensive loss of \$410 million and \$291 million, respectively, was comprised of net unrealized translation losses of \$408 million and \$328 million, respectively, net unrealized gains on investment securities of zero and \$34 million, respectively, and unrecognized prior service costs as a result of certain employee benefit plan amendments of \$2 million and unrecognized prior service credits of \$3 million, respectively.

(b) See Note B for discussion of the noncontrolling interest and the initial public offering and distribution of Valvoline Inc.

(c) Includes income tax expense resulting from the exercise of stock options of \$1 million in 2019 and 2018, respectively, and income tax benefit of \$4 million in 2017.

(d) Common shares issued were 336,188, 360,468 and 42,861 for 2019, 2018 and 2017, respectively.

(e) Represents the cumulative-effect adjustment related to the adoption of the new guidance related to the accounting for equity securities and the tax effects of intercompany transfers during fiscal 2019. See note A for more information.

(f) Common shares repurchased were 2,637,054 for 2019.

See Notes to Consolidated Financial Statements.

Ashland Global Holdings Inc. and Consolidated Subsidiaries
Statements of Consolidated Cash Flows
Years Ended September 30

(In millions)	2019	2018	2017
Cash flows provided (used) by operating activities from continuing operations			
Net income	\$ 505	\$ 114	\$ 28
Income from discontinued operations (net of tax)	(481)	(95)	(208)
Adjustments to reconcile income from continuing operations to cash flows from operating activities			
Depreciation and amortization	289	277	265
Original issue discount and debt issuance cost amortization	13	8	109
Deferred income taxes	20	(100)	(26)
Distributions from equity affiliates	—	1	—
Stock based compensation expense - Note Q	21	27	20
Excess tax benefits on stock based compensation	11	4	3
Loss on early retirement of debt	—	—	9
Loss (income) from restricted investments	(17)	(14)	(11)
Net (income) loss on acquisitions and divestitures - Notes C and D	—	1	4
Impairments	8	16	—
Pension contributions	(5)	(9)	(7)
Loss (gain) on pension and other postretirement plan remeasurements	(7)	(14)	8
Change in operating assets and liabilities (a)	(129)	25	(20)
Total cash flows provided by operating activities from continuing operations	228	241	174
Cash flows provided (used) by investing activities from continuing operations			
Additions to property, plant and equipment	(154)	(157)	(168)
Proceeds from disposal of property, plant and equipment	9	4	5
Purchase of operations - net of cash acquired	(2)	(11)	(680)
Proceeds from sale or restructuring of operations	—	6	18
Life insurance payments	—	(37)	—
Net purchases of funds restricted for specific transactions	(7)	(10)	(2)
Reimbursement from restricted investments	32	33	27
Proceeds from sale of securities	348	26	19
Purchase of securities	(348)	(26)	(19)
Proceeds from the settlement of derivative instruments	6	1	5
Payments for the settlement of derivative instruments	(2)	(3)	(3)
Total cash flows used by investing activities from continuing operations	(118)	(174)	(798)
Cash flows provided (used) by financing activities from continuing operations			
Proceeds from issuance of long-term debt	—	—	1,100
Repayment of long-term debt	(797)	(311)	(915)
Premium on long-term debt repayment	—	—	(17)
Proceeds from (repayment of) short-term debt	(78)	15	75
Repurchase of common stock	(200)	—	—
Debt issuance costs	—	(2)	(15)
Cash dividends paid	(64)	(60)	(77)
Stock based compensation employee withholding taxes paid in cash	(10)	(10)	(15)
Total cash flows provided (used) by financing activities from continuing operations	(1,149)	(368)	136
Cash used by continuing operations			
Cash provided (used) by discontinued operations	(1,039)	(301)	(488)
Operating cash flows	13	56	209
Investing cash flows	967	(28)	(321)
Financing cash flows	—	—	(17)
Total cash provided (used) by discontinued operations	980	28	(129)
Effect of currency exchange rate changes on cash and cash equivalents	(3)	1	(5)
Decrease in cash and cash equivalents	(62)	(272)	(622)
Cash and cash equivalents - beginning of year	294	566	1,017
Change in cash and cash equivalents held by Valvoline	—	—	171
Cash and cash equivalents - end of year	\$ 232	\$ 294	\$ 566
Changes in assets and liabilities (a)			
Accounts receivable	\$ 38	\$ (42)	\$ (29)
Inventories	(4)	(24)	(12)
Trade and other payables	(79)	48	33
Other assets and liabilities	(84)	43	(12)
Change in operating assets and liabilities	\$ (129)	\$ 25	\$ (20)
Supplemental disclosures			
Interest paid	\$ 124	\$ 126	\$ 132
Income taxes paid	67	77	79

(a) Excludes changes resulting from operations acquired or sold.

See Notes to Consolidated Financial Statements.

Notes to Consolidated Financial Statements

NOTE A – SIGNIFICANT ACCOUNTING POLICIES

Principles of consolidation and basis of presentation

On September 20, 2016, Ashland was reincorporated under the laws of the State of Delaware through a tax-free reorganization under a new holding company structure (the Reorganization). As a result of the Reorganization, Ashland Global Holdings Inc. replaced Ashland Inc. as the publicly held corporation and, through its subsidiaries, now conducts all of the operations that historically were conducted by Ashland Inc. Pursuant to the terms of the Reorganization, each outstanding share of Ashland common stock was automatically converted into one share of Ashland Global Holdings Inc. common stock. Following consummation of the Reorganization, (i) Ashland Inc. was converted into Ashland LLC, an indirect, wholly owned subsidiary of Ashland Global Holdings Inc., and (ii) Ashland Global Holdings Inc., as the new holding company, through its subsidiaries, conducts all of the operations conducted by Ashland Inc. immediately prior to the Reorganization. The Consolidated Financial Statements include the accounts of Ashland Global Holdings Inc. and its majority owned subsidiaries and, when applicable, entities for which Ashland has a controlling financial interest or is the primary beneficiary (Ashland). For entities for which Ashland has a controlling financial interest but owns less than 100%, the outside stockholders' interests are shown as noncontrolling interests. Investments in joint ventures and 20% to 50% owned affiliates where Ashland has the ability to exert significant influence are accounted for under the equity method.

The accompanying Consolidated Financial Statements have been prepared in accordance with accounting principles generally accepted in the United States of America (U.S. GAAP) and U.S. Securities and Exchange Commission (SEC) regulations. All intercompany transactions and balances have been eliminated. Additionally, certain prior period data, primarily related to discontinued operations, have been reclassified in the Consolidated Financial Statements and accompanying notes to conform to the current period presentation, as further described in this section.

On May 12, 2017, Ashland completed the distribution of its remaining 170 million shares of common stock of Valvoline Inc. which represented approximately 83% of the total outstanding shares of Valvoline Inc.'s common stock. This distribution of Valvoline represented a strategic shift in Ashland's business and, in accordance with U.S. GAAP, qualified as a discontinued operation. Accordingly, Valvoline's assets, liabilities, operating results and cash flows for all periods presented have been classified as discontinued operations within the Consolidated Financial Statements. See Note B for additional information on the separation of Valvoline Inc. The term Valvoline as used herein, depending on context, refers to either Valvoline Inc. or Valvoline as a previous reportable segment of Ashland.

On August 30, 2019, Ashland completed the sale of its Composites business (excluding Ashland's maleic anhydride business (Maleic business)) and its butanediol facility in Marl, Germany (Marl facility). This disposal group represented a strategic shift in Ashland's business and in accordance with U.S. GAAP, qualified as a discontinued operation. Accordingly, Composites (including the Maleic business) and the Marl facility assets, liabilities, operating results and cash flows for all periods presented have been classified as discontinued operations within the Consolidated Financial Statements. See Note D for additional information on the Composites business and Marl facility.

Subsequent to completing the separation from Valvoline Inc. and the Composites business (including the Maleic business) and Marl facility sale, Ashland's operations are managed within the following two reportable segments: Specialty Ingredients and Intermediates and Solvents.

During the periods presented in the Consolidated Financial Statements, Ashland sold certain assets in its portfolio of businesses which, in accordance with U.S. GAAP, were not reflected as discontinued operations. See Notes D and S for additional information on these transactions as well as Ashland's current reportable segment results.

Use of estimates, risks and uncertainties

The preparation of Ashland's Consolidated Financial Statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses, and the disclosures of contingent assets and liabilities. Significant items that are subject to such estimates and assumptions include, but are not limited to, environmental remediation, asbestos litigation, long-lived assets (including goodwill and other intangible

assets) and income taxes. Although management bases its estimates on historical experience and various other assumptions that are believed to be reasonable under the circumstances, actual results could differ significantly from the estimates under different assumptions or conditions.

Ashland's results are affected by domestic and international economic, political, legislative, regulatory and legal actions. Economic conditions, such as recessionary trends, inflation, interest and monetary exchange rates, government fiscal policies and changes in the prices of certain key raw materials, can have a significant effect on operations. While Ashland maintains reserves for anticipated liabilities and carries various levels of insurance, Ashland could be affected by civil, criminal, regulatory or administrative actions, claims or proceedings relating to asbestos, environmental remediation or other matters.

Cash and cash equivalents

Cash and cash equivalents include cash on hand and highly liquid investments maturing within three months after purchase.

Allowance for doubtful accounts

Ashland records an allowance for doubtful accounts as a best estimate of the amount of probable credit losses for accounts receivable. Ashland reviews this allowance and considers factors such as customer credit, past transaction history with the customer and changes in customer payment terms when determining whether the collection of a receivable is reasonably assured. Past due balances over 90 days and over a specified amount are reviewed individually for collectibility. The allowance for doubtful accounts is adjusted when it becomes probable a receivable will not be recovered.

A progression of activity in the allowance for doubtful accounts is presented in the following table.

(In millions)	2019	2018	2017
Allowance for doubtful accounts - beginning of year	\$ 3	\$ 3	\$ 5
Adjustments to net income	—	1	(1)
Reserves utilized	—	(1)	(1)
Other changes	—	—	—
Allowance for doubtful accounts - end of year	<u>\$ 3</u>	<u>\$ 3</u>	<u>\$ 3</u>

Inventories

Inventories are carried at the lower of cost or net realizable value. Inventories are primarily stated at cost using the weighted-average cost method. In addition, certain chemicals with a replacement cost of \$66 million at September 30, 2019 and \$70 million at September 30, 2018 are valued at cost using the last-in, first-out (LIFO) method.

The following summarizes Ashland's inventories as of the Consolidated Balance Sheet dates.

(In millions)	2019	2018
Finished products	\$ 395	\$ 381
Raw materials, supplies and work in process	197	215
LIFO benefit (reserve)	5	—
	<u>\$ 597</u>	<u>\$ 596</u>

A progression of activity in the inventory reserves, which reduce the amounts of finished products and raw materials, supplies and work in process reported, is presented in the following table.

(In millions)	2019	2018	2017
Inventory reserves - beginning of year	\$ 23	\$ 24	\$ 29
Adjustments to net income	3	4	2
Reserves utilized	(3)	(5)	(7)
Inventory reserves - end of year	<u>\$ 23</u>	<u>\$ 23</u>	<u>\$ 24</u>

Property, plant and equipment

The cost of property, plant and equipment is depreciated by the straight-line method over the estimated useful lives of the assets. Buildings are depreciated principally over 12 to 35 years and machinery and equipment principally over 2 to 25 years. Such costs are periodically reviewed for recoverability when impairment indicators are present. Such indicators include, among other factors, operating losses, unused capacity, market value declines and technological obsolescence. Recorded values of asset groups of property, plant and equipment that are not expected to be recovered through undiscounted future net cash flows are written down to current fair value, which generally is determined from estimated discounted future net cash flows (assets held for use) or net realizable value (assets held for sale).

Goodwill and other intangibles

Ashland tests goodwill and other indefinite-lived intangible assets for impairment annually as of July 1 and when events and circumstances indicate an impairment may have occurred. Ashland reviews goodwill for impairment based on its identified reporting units, which are defined as operating segments or groupings of businesses one level below the operating segment level. Ashland tests goodwill for impairment by comparing the carrying value to the estimated fair value of its reporting units.

In the current year, Ashland performed a quantitative goodwill impairment test and determined the fair value of its reporting units using a combination of discounted cash flow models and valuations based on earnings multiples for guideline public companies in each reporting unit's industry peer group, when externally quoted market prices are not readily available. If this comparison indicates that a reporting unit's estimated fair value is less than its carrying value, it is adjusted to its calculated fair value and the adjustment represents the impairment charge.

In the prior year for its July 1, 2018 goodwill impairment test, Ashland performed an extensive qualitative analysis in order to determine whether it was necessary to perform a quantitative goodwill impairment test. In performing this analysis, Ashland considered relevant events and circumstances such as macroeconomic conditions, industry and market considerations, overall financial performance and changes in management and business strategy, changes in carrying value, among others. Ashland considered how these relevant events and circumstances have changed since its most recent quantitative goodwill impairment test performed in the prior year as of July 1, 2017. After weighting the significance of these factors, Ashland determined that it was more likely than not that the fair value of its reporting units exceeds the carrying value and that a quantitative impairment test was not necessary to perform.

Ashland tests at least annually its indefinite-lived intangible assets, principally trademarks and trade names. If the carrying value of an individual indefinite-lived intangible asset exceeds its fair value, such individual indefinite-lived intangible asset is written down by an amount equal to such excess. Similar to goodwill, Ashland first performs a qualitative analysis in order to determine whether it is necessary to perform a quantitative goodwill impairment test for the trademarks and trade names. If a quantitative analysis is deemed necessary, trademarks and trade names are valued using a "relief-from-royalty" valuation method compared to the carrying value. Significant assumptions inherent in the valuation methodologies include, but are not limited to, such estimates as future projected business results, growth rates, the weighted-average cost of capital for a market participant, and royalty and discount rates.

Finite-lived intangible assets principally consist of certain trademarks and trade names, intellectual property, and customer lists. These intangible assets are amortized on a straight-line basis over their estimated useful lives. The cost of trademarks and trade names is amortized principally over 3 to 25 years, intellectual property over 5 to 25 years and customer and supplier relationships over 3 to 24 years. Ashland reviews finite-lived intangible assets for impairment whenever events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. Ashland monitors these changes and events on at least a quarterly basis. For further information on goodwill and other intangible assets, see Note I.

Derivative instruments

Ashland regularly uses derivative instruments to manage its exposure to fluctuations in foreign currencies and certain commodities. All derivative instruments are recognized as either assets or liabilities on the balance sheet and are measured at fair value. Changes in the fair value of all derivatives are recognized immediately in the Statements of Consolidated Comprehensive Income (Loss) unless the derivative qualifies as a hedge of future cash flows or a hedge of a net investment in a foreign operation. Gains and losses related to an instrument that qualifies for hedge accounting are either recognized in the Statements of Consolidated Comprehensive Income (Loss) immediately to offset the gain or loss on the hedged item, or deferred and recorded in the stockholders' equity section of the Consolidated Balance Sheets as a component of accumulated other comprehensive income and subsequently recognized in the Statements of Consolidated Comprehensive Income (Loss) when the hedged item affects net income. The ineffective portion of the change in fair value of a hedge is recognized in income immediately. For additional information on derivative instruments, see Note G.

Restricted investments

On January 13, 2015, Ashland and Hercules LLC (formerly Hercules Incorporated), an indirect wholly-owned subsidiary of Ashland that was acquired in 2009, entered into a comprehensive settlement agreement related to certain insurance coverage for asbestos bodily injury claims with Underwriters at Lloyd's, certain London companies and Chartis (AIG) member companies, along with National Indemnity Company and Resolute Management, Inc., under which Ashland and Hercules received a total of \$398 million (the January 2015 asbestos insurance settlement). During 2015, Ashland placed \$335 million of the settlement funds into a renewable annual trust that Ashland determined is restricted for the purpose of paying ongoing and future litigation defense and claim settlement costs incurred in conjunction with asbestos claims. These funds are presented primarily as noncurrent assets, with \$24 million and \$30 million classified within other current assets in the Consolidated Balance Sheets as of September 30, 2019 and 2018, respectively.

As of September 30, 2019 and 2018, the funds within the trust had a balance of \$334 million and \$342 million, respectively, and were primarily invested in equity, U.S. government bond and corporate bond investments with a portion maintained in demand deposits. The funds within the trust are classified as investment securities reported at fair value. Interest income and gains and losses on the investment securities are reported in the net interest and other expense caption in the Statements of Consolidated Comprehensive Income (Loss). See Note G for additional information regarding the fair value of these investments within the trust.

In January 2016, the FASB issued accounting guidance related to the recognition and measurement as well as the presentation and disclosures for certain financial instruments. Most notably, the guidance requires entities to measure equity investments at fair value and to recognize any changes in fair value in net income rather than accumulated other comprehensive income (AOCI). The guidance became effective for Ashland on October 1, 2018 and resulted in Ashland recording a cumulative-effect adjustment to reclassify net after-tax unrealized gains of \$34 million on its equity securities from AOCI to retained earnings.

Revenue recognition

In May 2014, the FASB issued accounting guidance outlining a single comprehensive five step model for entities to use in accounting for revenue arising from contracts with customers (ASC 606 Revenue from Contracts with Customers). The new guidance and subsequent amendments to it superseded most current revenue recognition guidance, in an effort to converge the revenue recognition principles within U.S. GAAP. This new guidance required entities to disclose certain quantitative and qualitative information regarding the nature, amount, timing and uncertainty of qualifying revenue and cash flows arising from contracts with customers. Entities had the option of using a full retrospective or a modified retrospective approach to adopt the new guidance. This guidance became effective for Ashland on October 1, 2018. Ashland elected to adopt this standard using the modified retrospective approach and determined that the overall impact was not material to the Consolidated Financial Statements.

Ashland's revenue is measured as the amount of consideration it expects to receive in exchange for transferring goods or providing services and is recognized when performance obligations are satisfied under the terms of contracts with customers. Ashland generally utilizes standardized language for the terms of contracts, unless a separate agreement has been entered into with a customer that supersedes the standard language.

For additional information on revenues see Note R.

Expense recognition

Cost of sales include material and production costs, as well as the costs of inbound and outbound freight, purchasing and receiving, inspection, warehousing, internal transfers and all other distribution network costs. Selling, general and administrative expense includes sales and marketing costs, advertising, customer support, environmental remediation, corporate and divisional administrative and other costs. Advertising costs (\$4 million in 2019, \$4 million in 2018 and \$5 million 2017) and research and development costs (\$66 million in 2019, \$73 million in 2018 and \$73 million in 2017) are expensed as incurred.

Income taxes

Ashland is subject to income taxes in the United States and numerous foreign jurisdictions. Significant judgment in the forecasting of taxable income using historical and projected future operating results is required in determining Ashland's provision for income taxes and the related assets and liabilities. The provision for income taxes includes income taxes paid, currently payable or receivable, and deferred taxes. Ashland recognizes the income tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by taxing authorities, based on the technical merits of the position. Ashland evaluates and adjusts these accruals based on changing facts and circumstances. Deferred tax assets and liabilities are determined based on differences between financial reporting and tax basis of assets and liabilities, and are measured using enacted tax rates and laws that are expected to be in effect when the differences reverse. Deferred tax assets are also recognized for the estimated future effects of tax loss and credit carryforwards. The effect on deferred taxes of changes in tax rates is recognized in the period in which the enactment date occurs. Valuation allowances are established when necessary on a jurisdictional basis to reduce deferred tax assets to the amounts expected to be realized. In the event that the actual outcome of future tax consequences differs from Ashland's estimates and assumptions due to changes or future events such as tax legislation, geographic mix of earnings, completion of tax audits or earnings repatriation plans, the resulting change to the provision for income taxes could have a material effect on the Statements of Consolidated Comprehensive Income (Loss) and Consolidated Balance Sheets. For additional information on income taxes, see Note M.

A progression of activity in the tax valuation allowances is presented in the following table.

(In millions)	2019	2018	2017
Tax valuation allowances - beginning of year	\$ 79	\$ 122	\$ 136
Adjustments to income tax expense (benefit)	8	(5)	27
Reserves utilized	(4)	(38)	(41)
Tax valuation allowances - end of year	<u>\$ 83</u>	<u>\$ 79</u>	<u>\$ 122</u>

Asbestos-related litigation

Ashland is subject to liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims result from indemnification obligations undertaken in 1990 in connection with the sale of Riley Stoker Corporation (Riley) and the acquisition of Hercules in November 2008. Although Riley, a former subsidiary, was neither a producer nor a manufacturer of asbestos, its industrial boilers contained some asbestos-containing components provided by other companies. Hercules, an indirect wholly-owned subsidiary of Ashland, has liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims typically arise from alleged exposure to asbestos fibers from resin encapsulated pipe and tank products sold by one of Hercules' former subsidiaries to a limited industrial market.

Prior to 2018, Ashland retained Hamilton, Rabinovitz & Associates, Inc. (HR&A) to assist in developing and annually updating independent reserve estimates for future asbestos claims and related costs given various assumptions. During 2018, Ashland transitioned these responsibilities to Nathan Associates, Inc. (Nathan). The processes and methodologies used by Nathan are consistent with the ones historically employed by HR&A. The methodology used to project future asbestos costs is

based largely on Ashland's recent experience, including claim-filing and settlement rates, disease mix, enacted legislation, open claims, and litigation defense. Ashland's claim experience is compared to the results of previously conducted epidemiological studies estimating the number of people likely to develop asbestos-related diseases. Those studies were undertaken in connection with national analyses of the population expected to have been exposed to asbestos. Using that information, Nathan estimates a range of the number of future claims that may be filed, as well as the related costs that may be incurred in resolving those claims. From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs. For additional information on asbestos-related litigation, see Note O.

Environmental remediation

Accruals for environmental remediation are recognized when it is probable a liability has been incurred and the amount of that liability can be reasonably estimated. Such costs are charged to expense if they relate to the remediation of conditions caused by past operations or are not expected to mitigate or prevent contamination from future operations. Liabilities are recorded at estimated cost values based on experience, assessments and current technology, without regard to any third-party recoveries and are regularly adjusted as environmental assessments and remediation efforts continue. For additional information on environmental remediation, see Note O.

Pension and other postretirement benefits

The funded status of Ashland's pension and other postretirement benefit plans is recognized in the Consolidated Balance Sheets. The funded status is measured as the difference between the fair value of plan assets and the benefit obligation at September 30, the measurement date. For defined benefit pension plans, the benefit obligation is the projected benefit obligation (PBO) and for the other postretirement benefit plans, the benefit obligation is the accumulated postretirement benefit obligation (APBO). The PBO represents the actuarial present value of benefits expected to be paid upon retirement based on estimated future compensation levels. The APBO represents the actuarial present value of postretirement benefits attributed to employee services already rendered. The measurement of the benefit obligation is based on Ashland's estimates and actuarial valuations. These valuations reflect the terms of the plans and use participant-specific information such as compensation, age and years of service, as well as certain key assumptions that require significant judgment, including, but not limited to, estimates of discount rates, expected return on plan assets, rate of compensation increases, interest rates and mortality rates. The fair value of plan assets represents the current market value of assets held by an irrevocable trust fund for the sole benefit of participants. For additional information regarding plan assumptions and the current financial position of the pension and other postretirement plans, see Note N.

Ashland recognizes the change in the fair value of plan assets and net actuarial gains and losses annually in the fourth quarter of each fiscal year and whenever a plan is determined to qualify for a remeasurement. The remaining components of pension and other postretirement benefits expense are recorded ratably on a quarterly basis. Pension and other postretirement benefits adjustments charged directly to cost of sales that are applicable to inactive participants are excluded from inventoriable costs. The service cost component of pension and other postretirement benefits costs is allocated to each reportable segment on a ratable basis; while the remaining components of pension and other postretirement benefits costs are recorded within the other net periodic benefit income (costs) caption on the Statements of Consolidated Comprehensive Income (Loss).

Foreign currency translation

Operations outside the United States are measured primarily using the local currency as the functional currency. Upon consolidation, the results of operations of the subsidiaries and affiliates whose functional currency is other than the U.S. dollar are translated into U.S. dollars at the average exchange rates for the year while assets and liabilities are translated at year-end exchange rates. Consistent with U.S. GAAP standards, adjustments to translate assets and liabilities into U.S. dollars are recorded in the stockholders' equity section of the Consolidated Balance Sheets as a component of accumulated other comprehensive income and are included in net earnings only upon sale or substantial liquidation of the underlying foreign subsidiary or affiliated company.

Stock incentive plans

Ashland recognizes compensation expense for stock incentive plans awarded to key employees and directors, primarily in the form of stock appreciation rights (SARs), restricted stock and restricted stock units, performance shares and other non-vested stock awards, that are generally based upon the grant-date fair value over the appropriate vesting period. Ashland utilizes several industry accepted valuation models to determine the fair value. For further information concerning stock incentive plans, see Note Q.

Earnings per share

The following is the computation of basic and diluted earnings per share (EPS) from continuing operations attributable to Ashland. Earnings per share are reported under the treasury stock method. Stock options and SARs for each reported year whose grant price was greater than the market price of Ashland Common Stock at the end of each fiscal year were not included in the computation of loss from continuing operations per diluted share because the effect of these instruments would be antidilutive. The total number of these shares outstanding was 1.0 million for 2019, 0.7 million for 2018 and 1.1 million for 2017.

(In millions except per share data)	2019	2018	2017
Numerator			
Numerator for basic and diluted EPS -			
Income (loss) from continuing operations, net of tax	\$ 24	\$ 19	\$ (180)
Denominator			
Denominator for basic EPS - Weighted-average common shares			
outstanding	62	63	62
Share based awards convertible to common shares (a)	1	1	—
Denominator for diluted EPS - Adjusted weighted - average shares and			
assumed conversions	63	64	62
EPS from continuing operations			
Basic	\$ 0.39	\$ 0.30	\$ (2.90)
Diluted	0.39	0.29	(2.90)

(a) As a result of the loss from continuing operations for 2017, the effect of the share-based awards convertible to common shares would be antidilutive. In accordance with U.S. GAAP, they have been excluded from the diluted EPS calculation.

New accounting pronouncements

Revenue recognition

In May 2014, the FASB issued accounting guidance outlining a single comprehensive five step model for entities to use in accounting for revenue arising from contracts with customers (ASC 606 Revenue from Contracts with Customers). The new guidance and subsequent amendments to it supersedes most current revenue recognition guidance, in an effort to converge the revenue recognition principles within U.S. GAAP. This new guidance also requires entities to disclose certain quantitative and qualitative information regarding the nature, amount, timing and uncertainty of qualifying revenue and cash flows arising from contracts with customers. Entities have the option of using a full retrospective or a modified retrospective approach to adopt the new guidance. This guidance became effective for Ashland on October 1, 2018.

Ashland formed an implementation team that evaluated the impact of the new standard on the Consolidated Financial Statements and the adoption method options available as well as the overall impact the new guidance will have on the organization. The assessment process consisted of categorizing Ashland's revenue streams and reviewing the current internal accounting policies and practices to determine potential differences that would result from applying the requirements of the new standard to revenue contracts. Additional discussions and meetings with each revenue stream team occurred to solicit input, identify potential impacts and appropriate changes to Ashland's business processes, systems and controls to support the revenue recognition and disclosure requirements under the new standard. Based on various assessments conducted, Ashland identified agreements with customers that contained elements of material rights and/or variable consideration. Ashland determined that these elements do not result in a material change to how revenue would be recognized for these agreements.

Ashland has elected to adopt this standard using the modified retrospective approach. Ashland has finalized its assessment of the standard and determined that the overall impact was not material to the Consolidated Financial Statements. As a result, no cumulative-effect adjustment was made to retained earnings in the Consolidated Balance Sheet. Additionally, Ashland had no significant change to its internal controls or the manner and timing of recognizing revenue. However, there are significant additional disclosures within the Notes to Consolidated Financial Statements moving forward. For additional information on revenues see Note R.

Upon adoption, Ashland utilized the following applicable practical expedients, as permitted by ASC 606, Revenue from Contracts with Customers:

- Sales and other similar taxes collected from customers on behalf of third parties are excluded from the contract price;
- Costs for shipping and handling activities, whether performed before or after the customer obtains control of the goods, are accounted for as fulfillment costs when not reimbursed; and
- Costs incurred to obtain contracts with customers are expensed immediately when the amortization period is one year or less.

Leases

In February 2016, the FASB issued new accounting guidance related to lease transactions. The main objective of this guidance is to increase transparency and comparability among organizations by requiring lessees to recognize assets and liabilities on the balance sheet for the right to use assets and obligations created by leases and to disclose key information about leasing arrangements. The presentation of the Statements of Consolidated Comprehensive Income (Loss) and the Statements of Consolidated Cash Flows is largely unchanged under this guidance. This guidance retains a distinction between finance leases and operating leases, and the classification criteria for distinguishing between finance leases and operating leases are substantially similar to the classification criteria for distinguishing between capital leases and operating leases in the current accounting literature.

In July 2018, the FASB amended this guidance to give entities the option to apply the standard at the adoption date and recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. Ashland will utilize this transition method upon adopting the guidance. Ashland will also elect the practical expedient package related to the identification, classification and accounting for initial direct costs whereby prior conclusions do not have to be reassessed for leases that commenced before the effective date. As Ashland will not reassess such conclusions, Ashland does not plan to adopt the practical expedient to use hindsight to determine the likelihood of whether a lease will be extended, terminated or whether a purchase option will be exercised.

While Ashland is still finalizing the evaluation of the impact that this guidance will have within its Consolidated Financial Statements, Ashland expects the adoption of this guidance will result in the recognition of operating lease liabilities in the range of \$140 million to \$180 million based on the present value of the remaining minimum lease commitments. See Note L for additional information on lease commitments. Ashland anticipates recognizing a corresponding right-of-use asset based on the operating lease liabilities adjusted for prepaid and deferred rent and unamortized other accrued costs. Ashland does not currently believe that the guidance will have a material impact on the results from operations, liquidity or debt covenants compliance under Ashland's current debt agreements. The majority of Ashland's lease spend related to certain real estate with the remaining lease spend primarily related to equipment.

Ashland's implementation team is continuing to finalize policy elections, implement changes to business processes and controls, and the impact that this guidance will have within its Consolidated Financial Statements.

This guidance will become effective for Ashland on October 1, 2019.

Other pronouncements

In February 2018, the FASB issued guidance which permits entities to reclassify tax effects stranded in accumulated other comprehensive income (AOCI) as a result of U.S. tax reform legislation to retained earnings. Additionally, this guidance requires entities to disclose whether they made an election to reclassify the tax effects and to disclose their accounting policy for releasing income tax effects from AOCI. This guidance becomes effective for Ashland on October 1, 2019. Ashland is currently evaluating the impact this guidance may have on Ashland's Consolidated Financial Statements, however this is not anticipated to have a significant impact.

In August 2017, the FASB issued accounting guidance amending the existing hedge accounting model to simplify various hedge documentation requirements while also expanding hedging abilities for certain nonfinancial and financial risk components. This guidance will become effective for Ashland on October 1, 2019. Ashland is currently evaluating the impact this guidance may have on Ashland's Consolidated Financial Statements, however this is not anticipated to have a significant impact.

In March 2017, the FASB issued accounting guidance that changes how employers who sponsor defined benefit pension and/or postretirement benefit plans present the net periodic benefit cost in the Statement of Consolidated Comprehensive Income. This guidance requires employers to present the service cost component of net periodic benefit cost in the same caption within the Statement of Consolidated Comprehensive Income (Loss) as other employee compensation costs from services rendered during the period. All other components of the net periodic benefit cost will be presented separately outside of the operating income caption. This guidance must be applied retrospectively. Ashland elected to early adopt this guidance on October 1, 2017, which resulted in a reclassification of \$4 million from the selling, general and administrative expense and cost of sales captions to the other net periodic benefit income (costs) caption in the Statement of Consolidated Comprehensive Income (Loss) for 2017. The components of net periodic benefit income (costs) reclassified primarily relate to interest cost, expected return on assets, curtailments, settlements and actuarial gains and losses. Ashland did not have to adjust the classification of service cost since it previously was recorded within the caption required by the new guidance. See Note K for additional information on net periodic benefit income (costs).

In October 2016, the FASB issued new accounting guidance which requires entities to recognize income tax effects of intercompany transfers of assets other than inventory when the transfer occurs. This guidance eliminates the exception under previous U.S. GAAP that the income tax effects of all intercompany transfers of assets other than inventory be deferred until the assets are sold to a third party or otherwise recovered through use. This guidance became effective for Ashland on October 1, 2018 and was applied using a modified retrospective approach. Consequently, Ashland recorded a cumulative-effect adjustment to reclassify less than \$1 million from other current assets and deferred taxes to retained earnings.

In June 2016, the FASB issued amended accounting guidance related to the measurement of credit losses on financial instruments. The amended accounting guidance changes the impairment model for most financial assets to require measurement and recognition of expected credit losses for financial assets held. The amended accounting guidance is effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years. Ashland is in the process of evaluating the effect this amended accounting guidance will have on our consolidated financial position and results of operations; however, we do not expect the amended accounting guidance to have a material impact on our ongoing financial reporting.

In March 2016, the FASB issued new accounting guidance for certain aspects of share-based payments to employees. This guidance requires all excess tax benefits and tax deficiencies related to share-based payments to be recognized as income tax expense in the Statements of Consolidated Comprehensive Income (Loss) instead of additional paid in capital and changes the classification of excess tax benefits from a financing activity to an operating activity within the statement of cash flows. This guidance also allows entities to make an accounting policy election to either estimate the number of awards that are expected to vest or account for forfeitures when they occur. In addition, this guidance increases the amount an employer can withhold to cover income taxes on awards and still qualify for equity classification and requires that cash paid by an employer when directly withholding shares for tax-withholding purposes be classified as a financing activity within Statements of Consolidated Cash Flows. The guidance became effective for Ashland and was adopted on October 1, 2017. The guidance specifically related to the Statements of Consolidated Comprehensive Income (Loss) was adopted prospectively while the guidance related to the Statements of Consolidated Cash Flows was adopted retrospectively, as required by the guidance. Additionally, Ashland made a

policy election to account for forfeitures when they occur across all share-based awards. Upon adoption, the overall impact on Ashland's Consolidated Financial Statements was not significant.

In January 2016, the FASB issued accounting guidance related to the recognition and measurement as well as the presentation and disclosures for certain financial instruments. Most notably, the guidance requires entities to measure equity investments as fair value and to recognize any changes in fair value in net income rather than accumulated other comprehensive income (AOCI). The guidance became effective for Ashland on October 1, 2018 and resulted in Ashland recording a cumulative-effect adjustment to reclassify net after-tax unrealized gains of \$34 million on its equity securities from AOCI to retained earnings. In the current period, the adoption of this guidance resulted in a significant impact to net income as Ashland recognized investment gains of \$7 million in 2019 within the net interest and other expense caption on the Statement of Consolidated Comprehensive Income (Loss). The impact of this guidance could continue to have a material impact on Ashland's Statements of Consolidated Comprehensive Income (Loss) in prospective periods depending on the fluctuations of unrealized gains and losses within the investment securities portfolio. For current and future periods, the changes in fair value of the equity securities will no longer be classified within other comprehensive income under the new guidance. For further information on Ashland's equity securities, see Note G.

NOTE B – VALVOLINE

Ashland Separation of Valvoline

On September 22, 2015, Ashland announced that the Board of Directors approved proceeding with a plan to separate Ashland into two independent, publicly traded companies comprising of the new Ashland (now known as Ashland Global Holdings Inc.) and Valvoline Inc. The initial step of the separation, the initial public offering (IPO) of Valvoline Inc., closed on September 28, 2016. As discussed further within the Final Separation section of this Note B, Ashland completed the distribution of its remaining shares in Valvoline Inc. on May 12, 2017.

After completing the IPO on September 28, 2016 and before the distribution of its remaining shares on May 12, 2017, Ashland owned 170 million shares of Valvoline Inc.'s common stock which represented approximately 83% of the total outstanding shares of Valvoline Inc.'s common stock. As a result, Ashland continued to consolidate Valvoline within the Consolidated Financial Statements up until the distribution of the remaining shares. The resulting outside stockholders' interests in Valvoline Inc., which were approximately 17%, was presented separately as a noncontrolling interest within Ashland's equity in the Consolidated Balance Sheets up until the distribution of the remaining shares. The amount of consolidated net income attributed to these previous minority holders is presented as a separate caption on the Statements of Consolidated Comprehensive Income (Loss) for 2017.

Final Separation

Ashland completed the distribution of its remaining 170 million shares of common stock of Valvoline Inc. as a pro rata dividend on shares of Ashland common stock outstanding at the close of business on the record date of May 5, 2017. Based on the shares of Ashland common stock outstanding as of May 5, 2017, the record date for the distribution, each share of Ashland common stock received 2.745338 shares of Valvoline common stock in the distribution. The distribution was recorded at the carrying amount of Valvoline Inc.'s net assets which was a deficit of \$187 million as of May 12, 2017, as follows:

(In millions)	May 12, 2017
ASSETS	
Current assets	
Cash	179
Accounts receivable, net	385
Inventories	153
Other current assets	24
Total current assets	741
Noncurrent assets	
Net property, plant and equipment	357
Goodwill	329
Equity and other unconsolidated investments	31
Deferred income taxes	391
Other noncurrent assets	93
Total noncurrent assets	1,201
Total assets	\$ 1,942
LIABILITIES AND EQUITY	
Current liabilities	
Short-term debt	75
Current portion of long-term debt	16
Trade and other payables	353
Other current liabilities	34
Total current liabilities	478
Noncurrent liabilities	
Long-term debt	662
Employee benefit obligations	826
Other long-term liabilities	163
Total noncurrent liabilities	1,651
Total liabilities	\$ 2,129
Net deficit	\$ (187)

A Tax Matters Agreement between Ashland and Valvoline Inc. governs the rights and obligations after the separation regarding certain income taxes and other taxes, including certain tax liabilities and benefits, attributes, returns and contests.

Discontinued Operations Assessment

Valvoline met the criteria to qualify as a discontinued operation and accordingly, its operating results and cash flows have been classified as discontinued operations within the Consolidated Financial Statements. See Note E for more information.

Costs of transaction

Ashland recognized separation costs of \$10 million and \$95 million during 2018 and 2017, respectively, which were primarily related to transaction, consulting and legal fees. During 2017, \$13 million of the separation costs directly related to Valvoline were included within the discontinued operations caption of the Statements of Consolidated Comprehensive Income (Loss). Otherwise, separation costs are primarily recorded within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss).

NOTE C – ACQUISITIONS

Pharmachem

On May 17, 2017, Ashland completed its acquisition of the stock of Pharmachem Laboratories, Inc. (Pharmachem), a leading provider of quality ingredients to the global health and wellness industries and high-value differentiated products to fragrance and flavor houses. At the acquisition date, Pharmachem had approximately \$300 million in annual revenues and 14 manufacturing facilities located in the United States and Mexico. New Jersey-based Pharmachem develops, manufactures and supplies custom and branded nutritional and fragrance products. Ashland has included Pharmachem within the Specialty Ingredients reporting segment.

Purchase price allocation

The acquisition was recorded by Ashland using the purchase method of accounting in accordance with U.S. GAAP whereby the total purchase price was allocated to tangible and intangible assets and liabilities acquired based on respective fair values. Goodwill was calculated as the excess of the consideration transferred over the net assets recognized and represents the estimated future economic benefits arising from other assets acquired that could not be individually identified and separately recognized. The factors contributing to the recognition of goodwill were based on strategic benefits that are expected to be realized from the acquisition. None of the goodwill is expected to be deductible for income tax purposes.

The all-cash purchase price of Pharmachem was \$680 million which included working capital adjustments of approximately \$20 million. Ashland incurred \$5 million of transaction costs during 2017 related to the acquisition, which was recorded within the net loss on acquisitions and divestitures caption in the Statement of Consolidated Comprehensive Income (Loss). The purchase price allocation was finalized during 2018 and the following table summarizes the values of the assets acquired and liabilities assumed at the date of acquisition.

	At May 17, 2017 As Adjusted
Purchase price allocation (in millions)	
Assets:	
Accounts receivable	52
Inventory	74
Other current assets	4
Intangible assets	330
Goodwill	288
Property, plant and equipment	94
Other noncurrent assets	17
Liabilities:	
Accounts payable	(33)
Deferred tax - net	(132)
Other noncurrent liabilities	(14)
Total purchase price	<u>\$ 680</u>

Subsequent adjustments to initial purchase price allocation

During the September 2017 quarter, Ashland updated certain valuations and reserve estimates as part of the purchase accounting process and procedures. As a result of these updates, Ashland increased the intangible assets associated with the purchase by \$18 million. The remaining updates to the Consolidated Balance Sheet during the September 2017 quarter related to certain liabilities that in total, along with the intangible assets impact, increased goodwill by \$11 million. These adjustments did not have a significant effect on the Statement of Consolidated Comprehensive Income (Loss) during 2017.

During 2018, there were subsequent adjustments of \$6 million to deferred tax liabilities, \$3 million to property, plant and equipment, \$3 million to other noncurrent assets and \$1 million to accounts payable. The combined impact of these adjustments resulted in an increase to goodwill of \$1 million. These adjustments did not have a significant effect on the Statement of Consolidated Comprehensive Income (Loss) during 2018.

Intangible assets identified

The purchase price allocation included \$330 million of certain definite-lived intangible assets which are being amortized over the estimated useful life in proportion to the economic benefits consumed. The determination of the useful lives is based upon various industry studies, historical acquisition experience, economic factors, and future cash flows of the combined company. In addition, Ashland reviewed certain technological trends and also considered the current Pharmachem customer base.

The following details the total intangible assets identified as of May 17, 2017.

Intangible asset type (in millions)	Value	Weighted-average amortization period (years)
Trademarks and trade names	\$ 26	15
Intellectual property	68	22
Customer and supplier relationships	236	20
Total	<u>\$ 330</u>	

Impact on operating results

The results of Pharmachem's operations have been included in Ashland's Consolidated Financial Statements since the May 17, 2017 closing date. The following table provides sales and operating income from the acquired Pharmachem operations included in Ashland's 2017 results.

Pharmachem results of operations (In millions)	2017 (a)
Sales	\$ 104
Operating income	7

(a) Amounts represent the sales and results of operations for the period May 17, 2017 through September 30, 2017, the period for which Pharmachem was owned during 2017.

The following unaudited pro forma information for 2017 assumes the acquisition of Pharmachem occurred at the beginning of the respective periods presented.

Unaudited pro forma information (In millions)	2017
Sales	\$ 2,483
Net income	31

These amounts have been calculated after applying Ashland's accounting policies and adjusting the results of Pharmachem to reflect the additional depreciation, amortization and interest expense that would have been charged assuming the fair value adjustments to tangible and intangible assets, and the related debt incurred had been applied on October 1, 2015, together with an estimate of the various tax effects.

The unaudited pro forma information presented above is for illustrative purposes only and does not purport to be indicative of the results of future operations of Ashland or the results that would have been attained had the operations been combined during the periods presented.

Vornia Limited

In January 2018, Ashland completed the acquisition of Vornia Limited for \$12 million, of which \$1 million was paid in 2019. Vornia Limited's principal activity is the design, development and fabrication of customized biomaterial solutions. The purchase price allocation primarily included \$8 million of intellectual property and \$4 million of goodwill and has been included within the Specialty Ingredients reportable segment.

NOTE D – DIVESTITURES

Composites and Marl facility

On November 15, 2018, Ashland announced that it had signed a definitive agreement to sell its Composites segment and Intermediates and Solvents Marl facility to INEOS Enterprises (INEOS) in a transaction valued at \$1.1 billion. Ashland was to retain the remaining Intermediates and Solvents facility in Lima, Ohio primarily for its own internal business use.

In late July of 2019, Ashland and INEOS agreed to certain additional changes to the sale agreement. As part of the proposed changes, the purchase price was adjusted to \$1.015 billion while Ashland retained the right to the Maleic business, including the retention of any subsequent sale proceeds.

On August 30, 2019 Ashland completed the previously announced sale of its Composites business (excluding the Maleic business) and butanediol manufacturing facility in Marl, Germany to INEOS. Net proceeds from the sale were approximately \$1 billion and were used primarily for debt reductions. Approximately \$0.9 billion of debt has been retired by September 30, 2019.

As a result of the sale, Ashland recognized a \$372 million after-tax gain within the Statement of Consolidated Comprehensive Income (Loss) within the income from discontinued operations caption.

Since this disposal group signifies a strategic shift in Ashland's business and had a major effect on Ashland's operations and financial results, the operating results and cash flows related to Composites and the Marl facility, including the Maleic business, have been reflected as discontinued operations in the Statements of Consolidated Comprehensive Income (Loss) and Statements of Consolidated Cash Flows. See Note E of the Notes to Condensed Consolidated Financial Statements for the results of operations for Composites and the Marl facility, including the Maleic business, for all periods presented.

Certain indirect corporate costs included within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss) that were previously allocated to the Composites segment and Marl facility do not qualify for classification within discontinued operations and are now reported as selling, general and administrative expense within continuing operations on a consolidated basis and within the Unallocated and other segment. These costs were \$41 million, \$46 million and \$36 million during the twelve months ended September 30, 2019, 2018, and 2017, respectively. Ashland is currently implementing plans to eliminate these costs as part of the global restructuring program.

Subsequent to the completion of the sale, Ashland is providing certain transition services to INEOS for a fee. While the transition services are expected to vary in duration depending upon the type of service provided, Ashland expects to reduce costs as the transition services are completed. Ashland recognized transition service fees of \$1 million during 2019 for the one month period since the completion of the divestiture.

Specialty Ingredients Facility

During 2017, Ashland committed to a plan to reorganize certain operations within the Specialty Ingredients reportable segment resulting in the closure of a manufacturing facility that was previously operational. As a result of this closure, Ashland recorded accelerated depreciation of \$13 million for the remaining value of the machinery and equipment related to this facility, as well as an additional \$1 million reserve for employee costs associated with the facility closure during 2017.

During 2018, Ashland entered into a definitive sale agreement to sell the facility and recognized a loss of \$2 million before tax. The loss was reported within the net loss on acquisitions and divestitures caption within the Statement of Consolidated Comprehensive Income (Loss) for 2018.

Ashland determined this transaction did not qualify for discontinued operations treatment since it did not represent a strategic shift that had or will have a major effect on Ashland's operations and financial results.

Specialty Ingredients Joint Venture

During September 2016, Ashland entered into a definitive sale agreement to sell its ownership interest in a Specialty Ingredients consolidated joint venture. Ashland recognized a loss of \$12 million before tax in 2016 to recognize the assets at fair value less cost to sell, using Level 2 nonrecurring fair value measurements.

During 2017, Ashland completed the transfer of its ownership interest in the joint venture and recognized an additional loss of \$4 million primarily related to a license fee and tax adjustments.

The loss in 2017 was reported within the net loss on acquisitions and divestitures caption within the Statements of Consolidated Comprehensive Income (Loss).

Ashland determined this transaction did not qualify for discontinued operations treatment since it did not represent a strategic shift that had or will have a major effect on Ashland's operations and financial results.

Other corporate assets

Ashland is currently in the process of pursuing options to divest several corporate assets, primarily related to land and buildings, that are expected to close within the next 12 months. The net property, plant and equipment value related to these sites was \$6 million at September 30, 2019 and \$9 million at September 30, 2018. During 2019, a \$5 million impairment charge was recorded within the selling, general and administrative expense caption of the Statement of Consolidated Comprehensive Income (Loss) for one of these corporate assets.

Held for sale classification

The assets and liabilities of Composites and the Marl facility, including the Maleic business, along with other corporate asset divestitures for current and prior periods have been reflected as assets and liabilities held for sale. As a result, in accordance with U.S. GAAP standards, depreciation and amortization were not being recorded within the Statements of Consolidated Comprehensive Income (Loss) and the Consolidated Balance Sheets. These assets and liabilities are comprised of the following components:

(In millions)	2019	2018
Accounts receivable, net (a)	\$ 5	\$ 159
Inventories	3	67
Net property, plant and equipment	34	—
Goodwill	14	—
Intangibles	—	—
Deferred income taxes	—	—
Other assets	3	14
Current assets held for sale	<u>\$ 59</u>	<u>\$ 240</u>
Net property, plant and equipment	\$ —	\$ 254
Goodwill	—	144
Intangibles	—	40
Deferred income taxes	—	7
Other assets	—	32
Noncurrent assets held for sale	<u>\$ —</u>	<u>\$ 477</u>
Trade and other payables	\$ 6	\$ 152
Employee benefit obligations	—	—
Accrued expenses and other liabilities	1	11
Other liabilities	—	—
Current liabilities held for sale	<u>\$ 7</u>	<u>\$ 163</u>
Employee benefit obligations	—	23
Other liabilities	—	3
Noncurrent liabilities held for sale	<u>\$ —</u>	<u>\$ 26</u>

(a) Accounts receivable included an allowance for doubtful accounts of \$3 million as of September 30, 2018.

NOTE E – DISCONTINUED OPERATIONS

Ashland has divested certain businesses that have qualified as discontinued operations. The operating results from these divested businesses and subsequent adjustments related to ongoing assessments and activities of certain retained liabilities and tax items have been recorded within the discontinued operations caption in the Statements of Consolidated Comprehensive Income (Loss) for all periods presented and are discussed further within this note.

As previously described in Note D, Ashland has completed the previously announced sale of its Composites business (excluding the Maleic business) and butanediol manufacturing facility in Marl, Germany to INEOS. Ashland determined that this disposal group qualified as a discontinued operation, in accordance with U.S. GAAP, since it represented a strategic shift for Ashland and had a major effect on Ashland's operations and financial results. Accordingly, the operating results and cash flows for the Composites business (including the Maleic business) and the Marl facility have been classified as discontinued operations within the Consolidated Financial Statements for all periods presented.

As previously discussed in Notes A and B, Ashland completed the distribution of its remaining 170 million shares of common stock of Valvoline Inc. on May 12, 2017. Ashland determined that the Valvoline separation qualified as a discontinued operation, in accordance with U.S. GAAP, since it represents a strategic shift for Ashland and has a major effect on Ashland's operations and financial results. Accordingly, Valvoline's operating results and cash flows for all periods presented have been classified as discontinued operations within the Consolidated Financial Statements. The activity during 2019 and 2018 generally represents subsequent adjustments that were made in conjunction with the Tax Matters Agreement.

Ashland is subject to liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims result primarily from indemnification obligations undertaken in 1990 in connection with the sale of Riley Stoker Corporation (Riley), a former subsidiary, which qualified as a discontinued operation and from the acquisition during 2009 of Hercules LLC (formerly Hercules Incorporated), an indirect wholly-owned subsidiary of Ashland. Adjustments to the recorded litigation reserves and related insurance receivables are recorded within the discontinued operations caption. See Note O for more information related to the adjustments on asbestos liabilities and receivables.

During 2014, Ashland completed the sale of the Ashland Water Technologies (Water Technologies) business. Ashland determined that this sale qualified as a discontinued operation, in accordance with U.S. GAAP, since Ashland does not have significant continuing involvement in the Water Technologies business. Ashland has made subsequent adjustments to the discontinued operations caption related to the sale.

During 2011, Ashland completed the sale of substantially all of the assets and certain liabilities of its global distribution business, which previously comprised the Ashland Distribution (Distribution) reportable segment. Ashland determined that this sale qualified as a discontinued operation, in accordance with U.S. GAAP, since Ashland does not have significant continuing involvement in the Distribution business. Ashland has made subsequent adjustments to the discontinued operations caption related to the sale.

Due to the ongoing assessment of certain matters associated with previous divestitures, subsequent adjustments to these divestitures may continue in future periods in the discontinued operations caption in the Statements of Consolidated Comprehensive Income (Loss). Components of amounts reflected in the Statements of Consolidated Comprehensive Income (Loss) related to discontinued operations are presented in the following table for each of the years ended September 30.

(In millions)	2019	2018	2017
Income (loss) from discontinued operations			
Composites/Marl facility	\$ 118	\$ 103	\$ 98
Valvoline	—	(1)	240
Asbestos-related litigation	—	14	(31)
Water Technologies	(1)	—	1
Distribution	18	(11)	(5)
Gain on disposal of discontinued operations			
Composites/Marl facility	423	—	—
Income before taxes	<u>558</u>	<u>105</u>	<u>303</u>
Income tax benefit (expense)			
Benefit (expense) related to income (loss) from discontinued operations			
Composites/Marl facility	(24)	(17)	(23)
Valvoline	—	—	(81)
Asbestos-related litigation	—	(1)	6
Water Technologies	2	3	1
Distribution	(4)	5	2
Expense related to gain on disposal of discontinued operations			
Composites/Marl facility	(51)	—	—
Income from discontinued operations (net of taxes)	<u>\$ 481</u>	<u>\$ 95</u>	<u>\$ 208</u>

Composites and Marl divestiture

The following table presents a reconciliation of the captions within Ashland's Statements of Consolidated Income (Loss) for the income (loss) from discontinued operations attributable to the Composites business and the Marl facility disposal group for each of the years ended September 30. Interest expense was allocated to discontinued operations based on Ashland's mandatory debt prepayments upon the disposition of the Composites business and the Marl facility. Although the Maleic business was not sold to INEOS, this business was operated under the Composites business and Marl facility disposal group and will continue to be reported in discontinued operations along with the Composites business and Marl facility.

(In millions)	2019	2018	2017
Income(loss) from discontinued operations attributable to Composites/Marl facility disposal group			
Sales	\$ 1,012	\$ 1,154	\$ 951
Cost of sales	(785)	(942)	(783)
Selling, general and administrative expense	(74)	(79)	(65)
Research and development expense	(11)	(12)	(10)
Equity and other income	3	4	4
Pretax operating income of discontinued operations	145	125	97
Net interest and other financing expense	(21)	(20)	(5)
Other net periodic benefit income (costs)	(6)	(2)	2
Net gain on acquisitions and divestitures	—	—	4
Pretax income of discontinued operations	118	103	98
Income tax expense	(24)	(17)	(23)
Income from discontinued operations	<u>\$ 94</u>	<u>\$ 86</u>	<u>\$ 75</u>

Valvoline Separation

The following table presents a reconciliation of the captions within Ashland's Statements of Consolidated Income for the income from discontinued operations attributable to Valvoline for the year ended September 30, 2017.

(In millions)	2017 (a)
Income from discontinued operations attributable to Valvoline	
Sales	\$ 1,237
Cost of sales	(750)
Selling, general and administrative expense	(234)
Research and development expense	(8)
Equity and other income	17
Operating income of discontinued operations	262
Net loss on acquisitions and divestitures	—
Net interest and other financing expense	(22)
Pretax income of discontinued operations	240
Income tax expense	(81)
Income from discontinued operations	<u>\$ 159</u>

(a) Results in 2017 reflect activity through May 12, 2017 when Valvoline was fully separated, as previously discussed.

NOTE F – RESTRUCTURING ACTIVITIES

Ashland periodically implements company-wide restructuring programs related to acquisitions, divestitures and other cost reduction programs in order to enhance profitability through streamlined operations and an improved overall cost structure.

Severance costs

During 2018, Ashland announced and initiated a company-wide restructuring program as a result of ongoing strategic asset plans and activities. As part of this restructuring program, Ashland announced a voluntary severance offer (VSO) to certain qualifying employees that were formally approved during 2018. Additionally, during 2018, an involuntary program for employees was also initiated as part of the restructuring program. The VSO and involuntary programs resulted in expense of \$6 million and \$36 million being recognized during 2019 and 2018, respectively, which were primarily recorded within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss). As of September 30, 2019, the severance reserve for the company-wide restructuring program was \$7 million, respectively.

Facility costs

Ashland incurred \$7 million and \$9 million of lease abandonment charges during 2019 and 2018, respectively due to the exit from certain office facilities in conjunction with the company-wide restructuring program. The costs related to this reserve were recorded within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss) and will be paid over the remaining lease terms. As of September 30, 2019, the remaining restructuring reserve for all qualifying facility costs totaled \$7 million.

The following table details at September 30, 2019, the amount of restructuring reserves related to the programs discussed above, and the related activity in these reserves during 2019. The severance reserves and facility cost reserves were primarily included in accrued expenses and other liabilities in the Consolidated Balance Sheet as of September 30, 2019.

(In millions)	Severance costs		Facility costs		Total
Balance as of September 30, 2018	\$	36	\$	7	\$ 43
Restructuring reserve		6		7	13
Utilization (cash paid)		(35)		(7)	(42)
Balance as of September 30, 2019	<u>\$</u>	<u>7</u>	<u>\$</u>	<u>7</u>	<u>\$ 14</u>

Impairments

During 2018, Ashland incurred \$16 million of asset impairment charges primarily related to restructuring activities which were recorded within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss). Of these impairment charges, \$12 million was related to the sale of an office facility. Consistent with historical policies and U.S. GAAP provisions, Ashland recognized the building at fair value using Level 2 nonrecurring fair value measurements.

Plant restructuring

During 2019, Specialty Ingredients committed to a cost reduction plan within an existing manufacturing facility. As a result, Ashland incurred restructuring charges of \$47 million as of September 30, 2019. These charges were recorded primarily within the cost of sales caption of the Statements of Consolidated Comprehensive Income (Loss) consisting of \$38 million of accelerated depreciation and amortization, \$5 million of severance and \$4 million of plant closure costs during 2019. As of September 30, 2019, there was a restructuring reserve of \$2 million related to the \$4 million of plant closure costs.

NOTE G – FAIR VALUE MEASUREMENTS

As required by U.S. GAAP, Ashland uses applicable guidance for defining fair value, the initial recording and periodic remeasurement of certain assets and liabilities measured at fair value and related disclosures for instruments measured at fair value. Fair value accounting guidance establishes a fair value hierarchy, which prioritizes the inputs to valuation techniques used to measure fair value into three broad levels. The fair value hierarchy gives the highest priority to quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). An instrument's categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the instrument's fair value measurement. The three levels within the fair value hierarchy are described as follows.

Level 1 – Observable inputs such as unadjusted quoted prices in active markets for identical assets or liabilities.

Level 2 – Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly. These include quoted prices for similar assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.

Level 3 – Unobservable inputs for the asset or liability for which there is little, if any, market activity at the measurement date. Unobservable inputs reflect Ashland's own assumptions about what market participants would use to price the asset or liability. The inputs are developed based on the best information available in the circumstances, which might include Ashland's own financial data such as internally developed pricing models, discounted cash flow methodologies, as well as instruments for which the fair value determination requires significant management judgment.

For assets that are measured using quoted prices in active markets (Level 1), the total fair value is the published market price per unit multiplied by the number of units held without consideration of transaction costs. Assets and liabilities that are measured using significant other observable inputs (Level 2) are primarily valued by reference to quoted prices of similar assets or liabilities in active markets, adjusted for any terms specific to that asset or liability. For all other assets and liabilities for which unobservable inputs are used (Level 3), fair value is derived through the use of fair value models, such as a discounted cash flow model or other standard pricing models that Ashland deems reasonable.

The following table summarizes financial instruments subject to recurring fair value measurements as of September 30, 2019. For additional information on fair value hierarchy measurements of pension plan asset holdings, see Note N.

(In millions)	Carrying value	Total fair value	Quoted prices		
			in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3
Assets					
Cash and cash equivalents	\$ 232	\$ 232	\$ 232	\$ —	\$ —
Restricted investments (a)	334	334	334	—	—
Investments of captive insurance company (b)	5	5	5	—	—
Foreign currency derivatives	2	2	—	2	—
Total assets at fair value	\$ 573	\$ 573	\$ 571	\$ 2	\$ —
Liabilities					
Foreign currency derivatives	\$ 2	\$ 2	\$ —	\$ 2	\$ —

(a) Included in restricted investments and \$24 million within other current assets in the Consolidated Balance Sheets.

(b) Included in other noncurrent assets in the Consolidated Balance Sheets.

The following table summarizes financial instruments subject to recurring fair value measurements as of September 30, 2018.

(In millions)	Carrying value	Total fair value	Quoted prices in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3
Assets					
Cash and cash equivalents	\$ 294	\$ 294	\$ 294	\$ —	\$ —
Restricted investments (a)	342	342	342	—	—
Investments of captive insurance company (b)	3	3	3	—	—
Foreign currency derivatives	11	11	—	11	—
Total assets at fair value	<u>\$ 650</u>	<u>\$ 650</u>	<u>\$ 639</u>	<u>\$ 11</u>	<u>\$ —</u>
Liabilities					
Foreign currency derivatives	\$ 3	\$ 3	\$ —	\$ 3	\$ —

(a) Included in restricted investments and \$30 million within other current assets in the Consolidated Balance Sheets.

(b) Included in other noncurrent assets in the Consolidated Balance Sheets.

Restricted investments

As discussed in Note A, Ashland maintains certain investments in a company restricted renewable annual trust for the purpose of paying future asbestos indemnity and defense costs. The investments are designated as available-for-sale securities, classified as Level 1 measurements within the fair value hierarchy. These securities were classified primarily as noncurrent restricted investment assets, with \$24 million classified within other current assets, in the Consolidated Balance Sheets. The current year included a portfolio rebalancing between equity and bond funds held within the portfolio resulting in significant purchases and sales of investment securities totaling \$348 million each. The following table provides a summary of the activity within the available-for-sale securities portfolio as of September 30, 2019 and 2018:

(In millions)	2019	2018
Original cost	\$ 335	\$ 335
Accumulated adjustments, net	(47)	(38)
Adjusted cost, beginning of year (a)	288	297
Investment income (b)	10	8
Net unrealized gain (c)	29	54
Realized gain (c)	32	6
Settlement funds	7	10
Disbursements	(32)	(33)
Fair value	<u>\$ 334</u>	<u>\$ 342</u>

(a) The adjusted cost of the demand deposit includes accumulated investment income, realized gains, disbursements and settlements recorded in previous periods.

(b) Investment income relates to the demand deposit and includes interest income as well as dividend income transferred from the equity and corporate bond mutual funds.

(c) Presented under the original cost method.

The following table presents gross unrealized gains and losses for the available-for-sale securities as of September 30, 2019 and 2018:

(In millions)	Adjusted Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value
As of September 30, 2019				
Demand Deposit	\$ 9	\$ —	\$ —	\$ 9
Equity Mutual Fund	120	24	(2)	142
Bond Mutual Fund	176	7	—	183
Fair value	<u>\$ 305</u>	<u>\$ 31</u>	<u>\$ (2)</u>	<u>\$ 334</u>
As of September 30, 2018				
Demand Deposit	\$ 20	\$ —	\$ —	\$ 20
Equity Mutual Fund	148	59	—	207
Bond Mutual Fund	120	—	(5)	115
Fair value	<u>\$ 288</u>	<u>\$ 59</u>	<u>\$ (5)</u>	<u>\$ 342</u>

The unrealized gains and losses of \$54 million, net of the related deferred income taxes of \$20 million, as of September 30, 2018, were reclassified from AOCI to retained earnings within the Consolidated Balance Sheets due to the new accounting guidance adopted in the first quarter of fiscal year 2019.

The following table presents the investment income, net unrealized gains and losses, realized gains and disbursements related to the investments within the portfolio during 2019, 2018 and 2017.

(In millions)	2019	2018	2017
Investment income	\$ 10	\$ 8	\$ 9
Net unrealized gains (losses) (a)	7	18	25
Realized gains (b)	—	6	2
Disbursements	(32)	(33)	(27)

(a) Ashland determined that all unrealized gains and losses were related to equity securities with readily determinable fair values. Due to the new accounting guidance adopted in the first quarter of fiscal year 2019, the net unrealized losses during the year ended September 30, 2019 were recorded within the net interest and other expense (income) caption in the Statements of Consolidated Income (Loss). In 2018 and 2017 these net unrealized gains (losses) were in AOCI.

(b) Relates only to the years ended September 30, 2018 and 2017 prior to adoption of the new accounting guidance for equity securities.

Foreign currency derivatives

Ashland conducts business in a variety of foreign currencies. Accordingly, Ashland regularly uses foreign currency derivative instruments to manage exposure on certain transactions denominated in foreign currencies to curtail potential earnings volatility effects of certain assets and liabilities, including short-term inter-company loans denominated in currencies other than Ashland's functional currency of an entity. These derivative contracts generally require exchange of one foreign currency for another at a fixed rate at a future date and generally have maturities of less than twelve months. All contracts are valued at fair value with net changes in fair value recorded within the selling, general and administrative expense caption. The impacts of these contracts were largely offset by gains and losses resulting from the impact of changes in exchange rates on transactions denominated in non-functional currencies. The following table summarizes the gains and losses recognized during 2019, 2018 and 2017 within the Statements of Consolidated Comprehensive Income (Loss).

(In millions)	2019	2018	2017
Foreign currency derivative gain (loss)	\$ 2	\$ (32)	\$ 3

The following table summarizes the fair values of the outstanding foreign currency derivatives as of September 30, 2019 and 2018 included in accounts receivable and accrued expenses and other liabilities of the Consolidated Balance Sheets.

(In millions)	2019		2018	
Foreign currency derivative assets	\$	2	\$	11
Notional contract values		271		1,209
Foreign currency derivative liabilities	\$	2	\$	3
Notional contract values		168		755

Other financial instruments

At September 30, 2019 and 2018, Ashland's long-term debt (including the current portion and excluding debt issuance cost discounts) had a carrying values of \$1,513 million and \$2,307 million, respectively, compared to a fair value of \$1,680 million and \$2,372 million, respectively. The fair values of long-term debt are based on quoted market prices or, if market prices are not available, the present values of the underlying cash flows discounted at Ashland's incremental borrowing rates, which are deemed to be Level 2 measurements within the fair value hierarchy.

NOTE H – PROPERTY, PLANT AND EQUIPMENT

The following table describes the various components of property, plant and equipment within the Consolidated Balance Sheets.

(In millions)	2019		2018	
Land	\$	148	\$	150
Buildings		461		496
Machinery and equipment		2,361		2,353
Construction in progress		195		173
Total property, plant and equipment (gross)		3,165		3,172
Accumulated depreciation		(1,588)		(1,526)
Total property, plant and equipment (net)	\$	<u>1,577</u>	\$	<u>1,646</u>

The following table summarizes various property, plant and equipment charges included within the Statements of Consolidated Comprehensive Income.

(In millions)	2019		2018		2017	
Depreciation	\$	203	\$	184	\$	185
Capitalized interest		—		—		1

Accelerated Depreciation

During 2019, Ashland committed to a cost reduction plan within an existing manufacturing facility. As a result, depreciation included \$38 million of accelerated depreciation for the remaining value of this facility primarily related to machinery and equipment. See Note F for additional information related to this facility. This charge related to the Specialty Ingredients reportable segment and was recorded primarily within the cost of sales caption of the Statement of Consolidated Comprehensive Income (Loss) for 2019.

During 2018 and 2017, the termination of a contract at a manufacturing facility resulted in \$6 million and \$1 million, respectively, of accelerated depreciation for the remaining value of the related machinery and equipment. These charges related to the Specialty Ingredients reportable segment and were recorded within the equity and other income (loss) caption of the Statements of Consolidated Comprehensive Income (Loss).

During 2017, Ashland committed to a plan to reorganize certain operations which resulted in the closure of a manufacturing facility that was previously operational. Due to this closure, depreciation included \$13 million of accelerated depreciation for the remaining value of this facility primarily related to machinery and equipment. See Note D for additional

information related to this facility. This charge related to the Specialty Ingredients reportable segment and was recorded within the cost of sales caption of the Statement of Consolidated Comprehensive Income (Loss) for 2017.

During 2019, 2018 and 2017, depreciation also included \$1 million, \$8 million and \$5 million, respectively, of accelerated depreciation within Unallocated and other and was recorded within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income.

NOTE I – GOODWILL AND OTHER INTANGIBLES

Goodwill

The following is a progression of goodwill by reportable segment for the years ended September 30, 2019 and 2018.

(In millions)	Specialty Ingredients	Intermediates and Solvents (a)	Total
Balance at September 30, 2017	\$ 2,315	\$ —	\$ 2,315
Acquisition (b)	5	—	5
Currency translation	(16)	—	(16)
Balance at September 30, 2018	2,304	—	2,304
Currency translation	(51)	—	(51)
Balance at September 30, 2019	<u>\$ 2,253</u>	<u>\$ —</u>	<u>\$ 2,253</u>

(a) As of September 30, 2019 and 2018, there was accumulated impairment of \$90 million related to the Intermediates and Solvents reportable segment.

(b) Relates to the acquisition of Pharmachem during 2017 and Vornia Limited during 2018. See Note C for more information.

Other intangible assets

Other intangible assets were comprised of the following as of September 30, 2019 and 2018.

(In millions)	2019			2018		
	Gross carrying amount	Accumulated amortization	Net carrying amount	Gross carrying amount	Accumulated amortization	Net carrying amount
Definite-lived intangible assets						
Trademarks and trade names	\$ 66	\$ (29)	\$ 37	\$ 66	\$ (25)	\$ 41
Intellectual property	712	(391)	321	721	(350)	371
Customer and supplier relationships	744	(292)	452	759	(264)	495
Total definite-lived intangible assets	<u>1,522</u>	<u>(712)</u>	<u>810</u>	<u>1,546</u>	<u>(639)</u>	<u>907</u>
Indefinite-lived intangible assets						
Trademarks and trade names	278	—	278	278	—	278
Total intangible assets	<u>\$ 1,800</u>	<u>\$ (712)</u>	<u>\$ 1,088</u>	<u>\$ 1,824</u>	<u>\$ (639)</u>	<u>\$ 1,185</u>

Intangible assets classified as definite-lived are amortized on a straight-line basis over their estimated useful lives. Useful lives range from 3 to 25 years for trademarks and trade names; 5 to 25 years for intellectual property; and 3 to 24 years for customer and supplier relationships.

Amortization expense recognized on intangible assets was \$86 million for 2019, \$93 million for 2018 and \$80 million for 2017, and is primarily included in the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income. As of September 30, 2019, all of Ashland's intangible assets that had a carrying value were being amortized except for certain trademarks and trade names that have been determined to have indefinite lives. Estimated amortization expense for future periods is \$86 million in 2020, \$85 million in 2021, \$85 million in 2022, \$85 million in 2023 and \$71 million in 2024. The amortization expense for future periods is an estimate. Actual amounts may change from such estimated amounts due to fluctuations in foreign currency exchange rates, additional intangible asset acquisitions and divestitures, potential impairment, accelerated amortization, or other events.

Impairment of long-lived (indefinite-lived) assets

Goodwill

Ashland reviews goodwill for impairment annually or when events and circumstances indicate an impairment may have occurred. This annual assessment is performed as of July 1 and consists of Ashland determining each reporting unit's current fair value compared to its current carrying value. Ashland tests goodwill either quantitatively or qualitatively for impairment.

For the qualitative approach, Ashland considers relevant events and circumstances such as macroeconomic conditions, industry and market considerations, overall financial performance and changes in management and business strategy, changes in carrying value, among others. Ashland considers how these relevant events and circumstances change between quantitative goodwill impairment tests. Ashland decides whether it is more likely than not that the fair value of its reporting units exceeds the carrying values. If not, a quantitative assessment must be performed.

For the quantitative approach, Ashland makes various estimates and assumptions in determining the estimated fair value of each reporting unit using a combination of discounted cash flow models and valuations based on earnings multiples for guideline public companies in each reporting unit's industry peer group, when externally quoted market prices are not readily available. Discounted cash flow models are highly reliant on various assumptions, including projected business results and future industry direction, long-term growth factors and weighted-average cost of capital. Significant management judgement is involved in estimating these variables, and they include inherent uncertainties since they are forecasting future events. Ashland performs sensitivity analyses by using a range of inputs to confirm reasonableness of these estimates. Additionally, Ashland compares the indicated equity value to Ashland's market capitalization, and implied control premium/discount, to determine if the estimated enterprise value is reasonable compared to external market indicators. If this comparison indicates that a reporting unit's estimated fair value is less than its carrying value, it is adjusted to its calculated fair value and the adjustment represents the impairment charge.

Ashland performed its annual goodwill impairment test using the quantitative approach as of July 1, 2019 and concluded that the reporting unit fair values far exceeded their carrying values. No impairment existed as of that date.

Other indefinite-lived intangible assets

Ashland reviews these intangible assets for possible impairment annually or whenever events or changes in circumstances indicate that carrying amounts may not be recoverable. If the carrying value of an individual indefinite-lived intangible asset exceeds its fair value, the asset is written down to its fair value and the amount of the write-down is the impairment charge. Similar to its annual assessment for goodwill, Ashland performs either a qualitative or quantitative test for impairment.

If a quantitative analysis is performed, Ashland tests these assets using a "relief-from-royalty" valuation method to determine the fair value. Significant assumptions inherent in the valuation methodologies include, but are not limited to, future projected business results, growth rates, the weighted-average cost of capital for a market participant, and royalty and discount rates. In conjunction with the July 1 annual assessment of indefinite-lived intangible assets, Ashland's models did not indicate any impairment, as each indefinite-lived intangible asset's fair value exceeded their carrying values.

Ashland performed its annual other intangibles impairment test using the quantitative approach as of July 1, 2019 and concluded that the assets fair values far exceeded their carrying values. No impairment existed as of that date.

Ashland's assessment of an impairment on any of these assets classified currently as having indefinite lives, including goodwill, could change in future periods if significant events happen and/or circumstances change that effect the previously mentioned assumptions such as: a significant change in projected business result, a divestiture decision, increase in Ashland's weighted-average cost of capital rates, decrease in growth rates or assumptions, economic deterioration that is more severe or of a longer duration than anticipated, or another significant economic event.

NOTE J – DEBT

The following table summarizes Ashland's current and long-term debt at September 30, 2019 and 2018.

(In millions)	2019	2018
4.750% notes, due 2022	\$ 1,080	\$ 1,083
Term loan B, due 2024	—	593
6.875% notes, due 2043	374	376
Term loan A, due 2022	—	195
Accounts receivable securitizations	144	195
6.50% junior subordinated notes, due 2029	54	52
Revolving credit facility	—	25
Medium-term notes, due 2019, interest of 9.35% at September 30, 2019	—	5
Other (a)	15	5
Total debt	1,667	2,529
Short-term debt (includes current portion of long-term debt)	(166)	(254)
Long-term debt (less current portion and debt issuance costs)	<u>\$ 1,501</u>	<u>\$ 2,275</u>

(a) Other includes \$12 million and \$21 million of debt issuance costs as of September 30, 2019 and 2018, respectively. Additionally, as of September 30, 2019 and 2018, Other included a European short-term loan facility with an outstanding balances of \$22 million and \$23 million, respectively.

At September 30, 2019, Ashland's total debt had an outstanding principal balance of \$1,726 million, discounts of \$47 million and debt issuance costs of \$12 million. The scheduled aggregate maturities of long-term debt for the next five fiscal years (including the current portion and excluding debt issuance costs) are as follows: zero in 2020, zero in 2021, \$1,083 million in 2022, zero in 2023 and zero in 2024.

Credit Agreements and Refinancing

2017 Credit Agreement

On May 17, 2017, in conjunction with the closing of the Pharmachem acquisition, Ashland entered into a secured credit agreement (the 2017 Credit Agreement) with a group of lenders. The 2017 Credit Agreement provided for (i) a \$250 million three-year term loan A facility (the Three-Year TLA Facility), (ii) a \$250 million five-year term loan A facility (the Five-Year TLA Facility and together with the Three-Year TLA Facility, the TLA Facilities) and (iii) a \$680 million five-year revolving credit facility (including a \$125 million letter of credit sublimit) (the 2017 Revolving Credit Facility). Proceeds of borrowings under the TLA Facilities were used solely to finance the acquisition of Pharmachem, while the proceeds of the 2017 Revolving Credit Facility were used to finance, in part, the acquisition of Pharmachem, to refinance the 2015 Senior Credit Agreement and for general corporate purposes. On May 19, 2017, Ashland entered into Amendment No. 1 to the 2017 Credit Agreement, which increased the aggregate commitments under the 2017 Revolving Credit Facility from \$680 million to \$800 million.

At Ashland's option, loans issued under the 2017 Credit Agreement bear interest at either LIBOR or an alternate base rate, in each case plus the applicable interest rate margin. Loans bear interest at LIBOR plus 1.75% per annum, in the case of LIBOR borrowings, or at the alternate base rate plus 0.75%, in the alternative, through and including the date of delivery of a quarterly compliance certificate and thereafter the interest rate will fluctuate between LIBOR plus 1.375% per annum and LIBOR plus 2.500% per annum (or between the alternate base rate plus 0.375% per annum and the alternate base rate plus 1.500% per annum), based upon Ashland's secured facilities ratings or the consolidated net leverage ratio (as defined in the 2017 Credit Agreement) (whichever yields a lower applicable interest rate margin) at such time. In addition, Ashland was required to pay fees of 0.25% per annum on the daily unused amount of the 2017 Revolving Credit Facility through and including the date of delivery of a compliance certificate, and thereafter the fee fluctuates between 0.175% and 0.40% per annum, based upon Ashland's secured facilities rating or the consolidated net leverage ratio (whichever yields a lower applicable rate). The TLA Facilities may be prepaid at any time without premium. The Three-Year TLA Facility will not amortize and had a due date of May 17, 2020. The Five-Year TLA Facility will not amortize in each of the first, second and third years and will amortize at a rate of 20% per annum in each of the fourth and fifth years (payable in equal quarterly installments), with the outstanding balance of the Five-Year TLA Facility to be paid on May 17, 2022.

On June 14, 2017, Ashland entered into Amendment No. 2 to the 2017 Credit Agreement, which provided for a new \$600 million seven-year senior secured term loan B facility (the 2017 TLB Facility). At Ashland's option, loans issued under the 2017 TLB Facility bear interest at either (x) LIBOR plus 2.00% per annum or (y) an alternate base rate plus 1.00% per annum. The 2017 TLB Facility may be prepaid at any time. The 2017 TLB Facility amortizes at a rate of 1.00% per annum (payable in equal quarterly installments) with the outstanding balance to be paid on May 17, 2024.

Ashland incurred \$15 million of new debt issuance costs in connection with the 2017 Credit Agreement, of which \$2 million was expensed immediately during 2017 within the net interest and other financing expense caption of the Statements of Consolidated Comprehensive Income (Loss). The remaining balance is amortized using the effective interest method. Additionally, as a result of the termination of the 2015 Senior Credit Agreement, Ashland recognized a \$5 million charge for the accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

The credit facilities under the 2017 Credit Agreement are guaranteed by Ashland Global Holdings Inc., Ashland Chemco Inc. and Ashland LLC's existing and future subsidiaries (other than certain immaterial subsidiaries, joint ventures, special purpose financing subsidiaries, regulated subsidiaries, foreign subsidiaries and certain other subsidiaries) and are secured by a first-priority security interest in substantially all of the personal property assets of Ashland and the guarantors, including all or a portion of the equity interests of certain of Ashland's domestic subsidiaries and first-tier foreign subsidiaries and, in certain cases, a portion of the equity interests of other foreign subsidiaries. The guarantees by Ashland's subsidiaries and pledge of security interests by such guarantors may, at Ashland's option, be released upon and during the occurrence of a Collateral Release Event (as defined in the 2017 Credit Agreement).

2018 financing activity related to the 2017 Credit Agreement

On May 22, 2018, Ashland entered into Amendment No. 3 to the 2017 Credit Agreement which provided for the re-pricing of the 2017 TLB Facility. Due to this amendment, loans issued under the 2017 TLB Facility bear interest at LIBOR plus 1.75% per annum (previously LIBOR plus 2.00% per annum). All other significant terms of the agreement remained unchanged. Ashland incurred \$1 million of new debt issuance costs in connection with the re-pricing, which was expensed during 2018 within the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

During 2018, Ashland utilized cash primarily from repatriations and borrowings from the accounts receivable securitization facilities to fully repay the \$250 million outstanding balance of the Three-Year TLA Facility and to repay \$55 million of the Five-Year TLA Facility. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of less than \$1 million during 2018, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

2019 financing activity related to the 2017 Credit Agreement

During 2019, Ashland utilized proceeds from the sale of its Composites business (excluding the Maleic business) and the Marl facility to repay the remaining principal balance of the TLA Facility and the TLB Facility. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$6 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Debt repayments and repurchases

Cash repatriation

During 2019 and 2018, Ashland repatriated approximately \$900 million and \$590 million, respectively, in cash that was primarily used to repay existing debt, principally the TLA Facility and TLB Facility in 2019 and the 2017 Revolving Credit Facility and the outstanding balance of the Three-Year TLA Facility (as previously discussed).

Repayment of the Term loan A due 2022

During 2019, Ashland repaid all of the outstanding principal balance of its term loan A for a total of \$195 million. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$1 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Repayment of the Term loan B due 2024

During 2019, Ashland repaid all of the outstanding principal balance of its term loan B for a total of \$593 million. As a result of these repayments, Ashland recognized accelerated amortization of previously capitalized debt issuance costs of \$5 million during 2019, which was included in the net interest and other expense caption of the Statements of Consolidated Comprehensive Income (Loss).

Redemption of 9.35% notes due 2019

During 2019, Ashland redeemed all of its outstanding 9.35% medium term notes due 2019, of which approximately \$5 million were outstanding. Cash on hand was used to pay for the redemption.

Redemption of 3.875% notes due 2018

During 2017, Ashland redeemed all of its outstanding 3.875% senior notes due 2018 (2018 Senior Notes), of which approximately \$659 million were outstanding. Proceeds of borrowings under the 2017 TLB Facility, together with cash on hand, were used to pay for the redemption. Ashland recognized a \$13 million charge related to premiums paid and accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss).

Open market repurchases of 4.750% notes due 2022, 3.875% notes due 2018 and 6.875% notes due 2043

During 2017, Ashland executed open market repurchases of its 4.750% notes due 2022 (2022 Senior Notes) and its 3.875% notes due 2018 (2018 Senior Notes). As a result of these repurchases, the carrying values of the 2022 and 2018 Senior Notes were reduced by \$39 million and \$41 million, respectively. Ashland recognized a \$3 million charge related to premiums paid in the open market repurchases and accelerated amortization of previously capitalized debt issuance costs during 2017, which is included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss). As previously discussed, the remaining outstanding amount of the 2018 Senior Notes was redeemed during 2017.

During 2019, Ashland executed open market repurchases of its 4.750% notes due 2022 (2022 Senior Notes) and its 6.875% notes due 2043 (2043 Senior Notes). As a result of these repurchases, the carrying values of the 2022 and 2043 Senior Notes were reduced by \$3 million and \$1 million, respectively.

6.50% junior subordinated notes due 2029

In December 2016, Hercules, an indirect wholly-owned subsidiary of Ashland, repurchased, through a cash tender offer, \$182 million of the aggregate principal par value amount of its 6.50% junior subordinated notes due 2029 (2029 Notes) for an aggregate purchase price of \$177 million. As a result, the carrying value of the 2029 Notes was reduced by \$90 million and Ashland recognized a \$92 million charge related to accelerated accretion of the recorded debt discount (compared to the total par value) and \$5 million of a net gain related to the repayment of the debt during 2017. The charge and net gain are included in the net interest and other expense caption of the Statement of Consolidated Comprehensive Income (Loss).

Accounts receivable securitizations

2018 accounts receivable securitization

During July 2018, Ashland entered into a €115 million accounts receivable securitization facility (the Program) for the transfer by certain subsidiaries of Ashland (the Sellers) directly or indirectly to Ester Finance Titrisation (the Purchaser), a wholly-owned subsidiary of Crédit Agricole Corporate and Investment Bank (the Arranger), of certain receivables and/or collections originated by the Sellers towards certain corporate debtors located in multiple European jurisdictions and denominated in multiple currencies. The Program originally had a term of two years, but was extended to August 2021 in September 2019.

Under the Program, each Seller will assign, on an ongoing basis, certain of its accounts receivable and the right to the collections on those accounts receivable to the Purchaser. Under the terms of the Program, the Sellers could, from time to time, obtain up to €115 million from the Purchaser through the sale of an undivided interest in such accounts receivable and collections. Ashland accounts for the securitization facility as secured borrowings, and the receivables sold pursuant to the facility are included in the Consolidated Balance Sheets as accounts receivable. Fundings under the Program will be repaid as

accounts receivable are collected, with new fundings being advanced (through daily advanced purchase price) as new accounts receivable are originated by the Sellers and assigned to the Purchaser, with settlement occurring monthly. Ashland classifies any borrowings under this facility as a short-term debt instrument within the Consolidated Balance Sheets. Once sold to the Purchaser, the accounts receivable and rights to collection described above are separate and distinct from each Sellers' own assets and are not available to its creditors should such Sellers become insolvent.

At September 30, 2019 and 2018, the outstanding amount of accounts receivable transferred by Ashland to the Purchaser was \$133 million and \$153 million, respectively, and there were \$94 million and \$109 million, respectively, of borrowings (denominated in multiple currencies) under the facility. The weighted-average interest rate for this instrument was 1.2% for 2019 and 1.8% for 2018.

2012 accounts receivable securitization

On August 31, 2012, Ashland entered into a \$350 million accounts receivable securitization facility pursuant to (i) a Sale Agreement, among Ashland and certain of its direct and indirect subsidiaries (each an Originator and collectively, the Originators) and CVG Capital III LLC, a wholly-owned "bankruptcy remote" special purpose subsidiary of the Originators (CVG) and (ii) a Transfer and Administration Agreement, among CVG, each Originator, Ashland, as Master Servicer, certain Conduit Investors, Uncommitted Investors, Letter of Credit Issuers, Managing Agents, Administrators and Committed Investors, and The Bank of Nova Scotia, as agent for various secured parties (the Agent). The Transfer and Administration Agreement had a term of three years, but was extendable at the discretion of Ashland and the Investors.

Under the Sale Agreement, each Originator transfers, on an ongoing basis, certain of its accounts receivable, certain related assets and the right to the collections on those accounts receivable to CVG. Ashland accounts for the securitization facility as secured borrowings, and the receivables sold pursuant to the facility are included in the Consolidated Balance Sheets as accounts receivable. Fundings under the Transfer and Administration Agreement will be repaid as accounts receivable are collected, with new fundings being advanced (through daily reinvestments) as new accounts receivable are originated by the Originators and transferred to CVG, with settlement generally occurring monthly. Ashland continues to classify any borrowings under this facility as a short-term debt instrument within the Consolidated Balance Sheets. Once sold to CVG, the accounts receivable, related assets and rights to collection described above are separate and distinct from each Originator's own assets and are not available to its creditors should such Originator become insolvent. Substantially all of CVG's assets have been pledged to the Agent in support of its obligations under the Transfer and Administration Agreement.

During 2016, the termination date of the commitments under the Transfer and Administration Agreement was extended from December 31, 2015, the previous termination extension date, to March 22, 2017. During March 2017, this facility was extended for an additional year with similar terms as the previous facility agreement. During March 2018, the termination date of the accounts receivable securitization facility was extended from March 2018 to March 2020. The available funding for qualified receivables under the accounts receivable securitization facility increased from \$100 million to \$115 million, however this was decreased back to \$100 million on August 30, 2019 in conjunction with the Composites and Marl facility divestiture. No other changes to the agreement are expected to have a significant impact to Ashland's results of operations and financial position.

At September 30, 2019 and 2018, the outstanding amount of accounts receivable transferred by Ashland to CVG was \$147 million and \$166 million, respectively. There were \$50 million of borrowings under the facility as of September 30, 2019, while Ashland had \$86 million of borrowings under the facility as of September 30, 2018. The weighted-average interest rate for this instrument was 3.3% for 2019 and 2.7% for 2018.

Other debt

At September 30, 2019 and 2018, Ashland held other debt totaling \$81 million and \$83 million, respectively, comprised primarily of a European short-term loan facility, the 6.50% notes due 2029 and other notes.

Available borrowing capacity

The borrowing capacity remaining under the Revolving Credit Facility was \$752 million due to an outstanding balance of zero, as well as a reduction of \$48 million for letters of credit outstanding at September 30, 2019. Ashland's total borrowing capacity at September 30, 2019 was \$800 million, which included \$48 million of available capacity under the two accounts receivable securitization facilities.

Covenants related to current Ashland debt agreements

Ashland's debt contains usual and customary representations, warranties and affirmative and negative covenants, including financial covenants for leverage and interest coverage ratios, limitations on liens, additional subsidiary indebtedness, restrictions on subsidiary distributions, investments, mergers, sale of assets and restricted payments and other customary limitations. As of September 30, 2019, Ashland was in compliance with all debt agreement covenant restrictions.

The maximum consolidated net leverage ratio permitted under Ashland's most recent credit agreement (the 2017 Credit Agreement) is 4.5. The 2017 Credit Agreement defines the consolidated net leverage ratio as the ratio of consolidated indebtedness minus unrestricted cash and cash equivalents to consolidated EBITDA (Covenant Adjusted EBITDA) for any measurement period. In general, the 2017 Credit Agreement defines Covenant Adjusted EBITDA as net income plus consolidated interest charges, taxes, depreciation and amortization expense, fees and expenses related to capital market transactions and proposed or actual acquisitions and divestitures, restructuring and integration charges, non-cash stock and equity compensation expense, and any other nonrecurring expenses or losses that do not represent a cash item in such period or any future period; less any non-cash gains or other items increasing net income. The computation of Covenant Adjusted EBITDA differs from the calculation of EBITDA and Adjusted EBITDA, which have been reconciled on page M-8. In general, consolidated indebtedness includes debt plus all purchase money indebtedness, banker's acceptances and bank guarantees, deferred purchase price of property or services, attributable indebtedness and guarantees. At September 30, 2019, Ashland's calculation of the consolidated net leverage ratio was 2.6.

The minimum required consolidated interest coverage ratio under the 2017 Credit Agreement is 3.0. The 2017 Credit Agreement defines the consolidated interest coverage ratio as the ratio of Covenant Adjusted EBITDA to consolidated interest charges for any measurement period. At September 30, 2019, Ashland's calculation of the consolidated interest coverage ratio was 6.1.

Guarantee of senior notes

Ashland Global Holdings Inc. fully and unconditionally guaranteed the 3.875% notes due 2018 (which were fully repaid during 2017), 4.750% notes due 2022 and 6.875% notes due 2043 and has no significant independent assets or operations.

Net interest and other expense (income)

(In millions)	2019	2018	2017
Interest expense (a)	\$ 114	\$ 116	\$ 227
Interest income	(2)	(4)	(4)
Investment securities income (b)	(17)	(14)	(11)
Other financing costs (c)	4	4	17
	<u>\$ 99</u>	<u>\$ 102</u>	<u>\$ 229</u>

(a) Includes \$6 million, \$1 million and \$101 million of accelerated accretion and/or amortization for original issue discounts and debt issuance costs during 2019, 2018 and 2017, respectively.

(b) Represents investment income related to the restricted investments discussed in Note G.

(c) Includes costs of \$16 million related to early redemption premium payments and bondholder consent fees for the 2022 and 2018 Senior Notes and a net gain of \$5 million related to the repayment of the 2029 Notes during 2017.

The following table details the debt issuance cost and original issue discount amortization included in interest expense during 2019, 2018 and 2017.

(In millions)	2019	2018	2017
Normal amortization	\$ 7	\$ 7	\$ 8
Accelerated amortization (a)	6	1	101
Total	<u>\$ 13</u>	<u>\$ 8</u>	<u>\$ 109</u>

(a) Fiscal year 2017 includes \$92 million of accelerated accretion of the recorded debt discount for the 2029 Notes, while the remaining amounts in each year related to the accelerated amortization of debt issuance costs.

NOTE K – OTHER NONCURRENT ASSETS AND LIABILITIES

The following table provides the components of other noncurrent assets in the Consolidated Balance Sheets as of September 30.

(In millions)	2019	2018
Deferred compensation investments	\$ 170	\$ 165
Tax and tax indemnity receivables	68	74
Life insurance policies	56	52
Manufacturing catalyst supplies	38	35
Defined benefit plan assets	33	35
Equity and other unconsolidated investments	6	8
Land use rights	6	11
Environmental insurance receivables	12	11
Debt issuance costs	4	6
Other	17	19
	<u>\$ 410</u>	<u>\$ 416</u>

Deferred compensation investments

Deferred compensation investments consist of insurance policies valued at cash surrender value. Gains and losses related to deferred compensation investments are immediately recognized within the selling, general and administrative expense caption on the Statements of Consolidated Comprehensive Income (Loss). The gains on these investments were \$7 million, \$10 million and \$11 million during 2019, 2018 and 2017, respectively.

The following table provides the components of other noncurrent liabilities in the Consolidated Balance Sheets as of September 30.

(In millions)	2019	2018
Tax liabilities	\$ 220	\$ 176
Environmental remediation reserves	143	147
Deferred compensation	42	47
Other	48	52
	<u>\$ 453</u>	<u>\$ 422</u>

NOTE L – LEASE COMMITMENTS

Ashland and its subsidiaries are lessees of office buildings, transportation equipment, warehouses and storage facilities, other equipment, facilities and properties under leasing agreements that expire at various dates. Capitalized lease obligations are not significant and are included in long-term debt while capital lease assets are included in property, plant and equipment. Future minimum rental payments at September 30, 2019 were \$28 million in 2020, \$25 million in 2021, \$33 million in 2022, \$13 million in 2023, \$11 million in 2024 and \$103 million in 2025 and later years. Rental expense under operating leases for continuing operations was as follows:

(In millions)	2019	2018	2017
Minimum rentals (including rentals under short-term leases)	\$ 42	\$ 46	\$ 40
Sublease rental income	(1)	(1)	(2)
	<u>\$ 41</u>	<u>\$ 45</u>	<u>\$ 38</u>

NOTE M – INCOME TAXES

Tax Law Changes

The Tax Cuts and Jobs Act (Tax Act) was enacted on December 22, 2017. The Tax Act reduces the U.S. federal corporate tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. At September 30, 2018, Ashland had not completed the internal accounting assessment for the tax effects of enactment of the Tax Act; however, Ashland determined a reasonable estimate of the effects on Ashland's existing deferred tax balances and the one-time transition tax. Due to the Tax Act, Ashland recognized a provisional amount during 2018, which is included as a component of income tax expense from continuing operations. Ashland recorded net unfavorable tax adjustments of \$2 million during 2018 primarily related to deferred tax rate changes and a one-time transition tax assessed on foreign cash and unremitted earnings. This adjustment included an expense of \$128 million related to the one-time transition tax, a benefit of \$139 million related to the tax deferred rate change and other tax expense of \$13 million. The one-time transition tax and deferred rate change associated with the Tax Act are discussed in greater detail below.

During 2019, Ashland completed its internal accounting assessment for the tax effects of enactment of the Tax Act and recorded adjustments to provisional amounts previously recorded. Ashland's final assessment resulted in net unfavorable tax adjustments of \$29 million during the twelve months ended September 30, 2019. These adjustments primarily related to the one-time transition tax assessed on foreign cash and unremitted earnings. There could be additional guidance issued subsequent to September 30, 2019 that could impact Ashland's interpretation of the Tax Act and such changes could affect the amounts recorded. The impact, if any, of further transitional tax guidance that may be issued by the U.S. Treasury would be reflected in the Company's provision for income tax in the period such guidance is effective.

Provisional amounts - Deferred tax assets and liabilities

Ashland remeasured certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21%. The provisional amount recorded related to the remeasurement of the deferred tax balance was a favorable tax adjustment of \$139 million during 2018.

Provisional amounts - Foreign tax effects

The one-time transition tax is based on Ashland's total post-1986 earnings and profits (E&P) of foreign subsidiaries that were previously deferred from U.S. income taxes. Ashland recorded a provisional amount for this one-time transition tax of \$128 million during 2018, which includes the one-time transition tax expense of \$187 million, a foreign tax credit benefit of \$46 million, a reversal of uncertain tax position benefits of \$9 million, state tax expense of \$2 million and a benefit for other miscellaneous items of \$6 million. Ashland completed its calculation of the total post-1986 E&P for these foreign subsidiaries and recorded an additional unfavorable \$29 million adjustment in 2019. No additional income taxes have been provided for any remaining undistributed foreign earnings not subject to the transition tax, or any additional outside basis difference inherent in these entities, as management intends to indefinitely reinvest all foreign earnings. Ashland determined that estimating the amount of unrecognized deferred tax liability related to any remaining undistributed foreign earnings not subject to the

transition tax and additional outside basis difference in these entities (i.e., basis difference in excess of that subject to the one-time transition tax) is not practicable at this time.

Global Intangible Low-Taxed Income

Regarding new Global Intangible Low-Taxed Income (GILTI) tax rules, Ashland has made an accounting policy election to treat taxes due on future GILTI exclusions in U.S. taxable income as a current period expense when incurred.

Income Tax Provision

A summary of the provision for income taxes related to continuing operations follows.

(In millions)	2019	2018	2017
Current			
Federal	\$ (2)	\$ 20	\$ (26)
State	(7)	(2)	(1)
Foreign	35	74	37
	26	92	10
Deferred	20	(100)	(26)
Income tax expense (benefit)	<u>\$ 46</u>	<u>\$ (8)</u>	<u>\$ (16)</u>

Foreign net operating loss carryforwards primarily relate to certain European and Asian Pacific operations and generally may be carried forward. U.S. state net operating loss carryforwards relate to losses within certain states and generally may be carried forward. Temporary differences that give rise to significant deferred tax assets and liabilities as of September 30 are presented in the following table.

(In millions)	2019	2018
Deferred tax assets		
Foreign net operating loss carryforwards (a)	\$ 36	\$ 39
Employee benefit obligations	29	28
Environmental, self-insurance and litigation reserves (net of receivables)	114	119
State net operating loss carryforwards (net of unrecognized tax benefits) (b)	38	48
Compensation accruals	28	31
Credit carryforwards (net of unrecognized tax benefits) (c)	10	10
Other items	38	32
Valuation allowances (d)	(83)	(79)
Total deferred tax assets	210	228
Deferred tax liabilities		
Goodwill and other intangibles (e)	243	269
Property, plant and equipment	207	217
Unremitted earnings	1	—
Total deferred tax liabilities	451	486
Net deferred tax liability	<u>\$ (241)</u>	<u>\$ (258)</u>

(a) Gross net operating loss carryforwards of \$133 million will expire in future years beyond 2021 or have no expiration.

(b) Apportioned net operating loss carryforwards generated of \$0.9 billion will expire in future years as follows: \$48 million in 2020, \$57 million in 2021 and the remaining balance in other future years.

(c) Credit carryforwards consist primarily of foreign tax credits of \$4 million expiring in future years beyond 2020, and miscellaneous tax credits that will expire in 2024 or other future years.

(d) Valuation allowances primarily relate to certain state and foreign net operating loss carryforwards.

(e) The total gross amount of goodwill as of September 30, 2019 expected to be deductible for tax purposes is \$8 million.

The U.S. and foreign components of income from continuing operations before income taxes and a reconciliation of the statutory federal income tax with the provision for income taxes follow. The foreign components of income from continuing operations disclosed in the following table exclude any allocations of certain corporate expenses incurred in the U.S.

(In millions)	2019	2018	2017
Income (loss) from continuing operations before income taxes			
United States	\$ (76)	\$ (214)	\$ (433)
Foreign	146	225	237
Income (loss) from continuing operations before income taxes	<u>\$ 70</u>	<u>\$ 11</u>	<u>\$ (196)</u>
Income taxes computed at U.S. statutory rate (a)	\$ 15	\$ 3	\$ (69)
Increase (decrease) in amount computed resulting from			
Tax reform (b)	29	44	—
Uncertain tax positions	10	(13)	12
Foreign dividends, deemed inclusions and other restructuring (c)	11	48	125
Foreign tax credits	(17)	(54)	(29)
Valuation allowance changes (d)	14	(2)	(3)
Research and development credits	(6)	(5)	(6)
State taxes (e)	(5)	(3)	(16)
International rate differential	(30)	(50)	(57)
Other items (f)	25	24	27
Income tax expense (benefit)	<u>\$ 46</u>	<u>\$ (8)</u>	<u>\$ (16)</u>

(a) The domestic tax rates are 35% for 2017 and 24.5% for 2018. For 2019 and forward, the domestic tax rate is expected to be 21%.

(b) 2019 includes an expense of \$29 million related to a return to provision adjustment for transition tax. 2018 includes expense of \$187 million related to the one-time transition tax, a benefit of \$139 million related to the deferred rate change and a benefit of \$4 million related to tax reform in a foreign jurisdiction. Foreign tax credits of \$46 million related to the transition tax were included within the foreign tax credits caption. Other items related to the transition tax or other U.S. tax reform offset to immaterial amounts within the state taxes, uncertain tax positions and other captions and net to zero in the aggregate. In summary, total U.S. tax reform expense was \$2 million related to transition tax expense of \$187 million, a deferred rate change benefit of \$139 million and a foreign tax credit benefit of \$46 million. Ashland completed its calculation of the total post-1986 E&P for these foreign subsidiaries and recorded an additional unfavorable \$29 million adjustment in 2019.

(c) 2018 includes a gain recognition of \$6 million, deemed inclusions of \$13 million and tax restructuring costs of \$23 million.

(d) 2019 includes \$5 million related to state tax NOL's and \$9 million related to a foreign jurisdiction. 2018 includes a \$5 million benefit for the release of a foreign tax credit valuation allowance; 2017 includes \$25 million of benefit for the release of a foreign tax credit valuation allowance and \$22 million of expense for state, foreign and domestic federal deferred tax asset valuation allowances net of a NOL write-off offset.

(e) 2018 includes a \$27 million tax benefit for a valuation reserve release against state net operating losses and \$26 million of tax expense for state tax rate changes; 2017 includes \$6 million of benefit for state tax rate changes primarily related to the final distribution of Valvoline.

(f) 2019 includes \$19 million primarily related to GILTI permanent adjustments. 2018 includes \$22 million related to foreign withholding taxes; 2017 includes \$7 million of expense related to foreign withholding taxes, \$5 million of expense for the write-off of a prepaid asset related to an intercompany transaction with a Valvoline legal entity, \$4 million of expense for non-deductible transaction costs primarily related to the Valvoline spin-off and \$6 million of benefit for certain other domestic permanent items.

The 2019 effective tax rate was impacted by jurisdictional income mix, restructuring activities, and the impact of U.S. tax reform.

The 2018 effective tax rate was impacted by jurisdictional income mix and restructuring activities, while U.S. tax reform and other items netted together to have an insignificant tax impact.

The 2017 effective tax rate was impacted by jurisdictional income mix, tax expense related to deemed dividend inclusions and a tax benefit for the reversal of a valuation allowance related to the utilization of foreign tax credits.

Unrecognized tax benefits

U.S. GAAP prescribes a recognition threshold and measurement attribute for the accounting and financial statement disclosure of tax positions taken or expected to be taken in a tax return. The evaluation of a tax position is a two-step process. The first step requires Ashland to determine whether it is more likely than not that a tax position will be sustained upon examination based on the technical merits of the position. The second step requires Ashland to recognize in the financial statements each tax position that meets the more likely than not criteria, measured at the amount of benefit that has a greater than 50% likelihood of being realized. Ashland had \$165 million and \$164 million of unrecognized tax benefits at September 30, 2019 and 2018, respectively. As of September 30, 2019, the total amount of unrecognized tax benefits that, if recognized, would affect the tax rate for continuing and discontinued operations was \$155 million. The remaining unrecognized tax benefits relate to tax positions for which ultimate deductibility is highly certain but for which there is uncertainty as to the timing of such deductibility. Recognition of these tax benefits would not have an impact on the effective tax rate.

Ashland recognizes interest and penalties related to uncertain tax positions as a component of income tax expense (benefit) in the Statements of Consolidated Comprehensive Income. Such interest and penalties totaled a \$5 million expense in 2019, \$1 million benefit in 2018 and \$3 million expense in 2017. Ashland had \$26 million and \$25 million in interest and penalties related to unrecognized tax benefits accrued as of September 30, 2019 and 2018, respectively.

Changes in unrecognized tax benefits were as follows:

(In millions)	
Balance at September 30, 2017 (a)	\$ 194
Increases related to positions taken on items from prior years	5
Decreases related to positions taken on items from prior years	(40)
Increases related to positions taken in the current year	14
Lapse of statute of limitations	(5)
Settlement of uncertain tax positions with tax authorities	(4)
Balance at September 30, 2018 (a)	164
Increases related to positions taken on items from prior years	1
Decreases related to positions taken on items from prior years	(5)
Increases related to positions taken in the current year	21
Lapse of statute of limitations	(10)
Disposition of Composites and Marl facility	(6)
Balance at September 30, 2019	<u>\$ 165</u>

(a) Ashland has indemnity receivables from Valvoline and Pharmachem for \$32 million and \$39 million of the gross unrecognized tax benefits at September 30, 2019 and 2018, respectively.

From a combination of statute expirations and audit settlements in the next twelve months, Ashland expects a decrease in the amount of accrual for uncertain tax positions of between \$1 million and \$2 million for continuing operations. For the remaining balance as of September 30, 2019, it is reasonably possible that there could be material changes to the amount of uncertain tax positions due to activities of the taxing authorities, settlement of audit issues, reassessment of existing uncertain tax positions or the expiration of applicable statute of limitations; however, Ashland is not able to estimate the impact of these items at this time.

Ashland or one of its subsidiaries files income tax returns in the U.S. federal jurisdiction and various state and foreign jurisdictions. Foreign taxing jurisdictions significant to Ashland include Brazil, Canada, China, Germany, Mexico, Netherlands, Spain, Switzerland and United Kingdom. Ashland is subject to U.S. federal income tax examinations by tax authorities for periods after September 30, 2013 and U.S. state income tax examinations by tax authorities for periods after September 30, 2010. With respect to countries outside of the United States, with certain exceptions, Ashland's foreign subsidiaries are subject to income tax audits for years after 2008.

NOTE N – EMPLOYEE BENEFIT PLANS

Pension plans

Ashland and its subsidiaries have several contributory and noncontributory qualified defined benefit pension plans that generally cover international employees and a small portion of certain U.S. manufacturing union employees. Pension obligations for applicable employees of non-U.S. consolidated subsidiaries are provided for in accordance with local practices and regulations of the respective countries. The majority of these foreign pension plans are closed to new participants while those that remain open relate to areas where jurisdictions require plans to operate within the applicable country.

Benefits for those eligible for Ashland's U.S. pension plans generally are based on employees' years of service and compensation during the years immediately preceding their retirement. The remaining U.S. plans are still open for enrollment for qualifying union employees within certain manufacturing sites.

Other postretirement benefit plans

Ashland and its subsidiaries maintain limited health care for certain eligible employees in the U.S. who are retired or disabled. Ashland shares the costs of providing health care coverage with certain eligible retired employees through premiums, deductibles and coinsurance provisions. Ashland funds its share of the costs of the postretirement benefit plans as the benefits are paid. This benefit obligation was significantly reduced due to the transfer of a substantial portion to Valvoline.

Postretirement health care plans include a limit on Ashland's share of costs for recent and future retirees. The assumed pre-65 health care cost increase trend rate as of September 30, 2019 was 6.6% and continues to be reduced to 4.5% in 2037 and thereafter. The assumptions used to project the liability anticipate future cost-sharing changes to the written plans that are consistent with the increase in health care costs.

Plan Amendments and Remeasurements

During 2019, Ashland settled a non-U.S. plan, which required the plan to be remeasured. This remeasurement resulted in a curtailment gain of \$18 million recorded within the other net periodic benefit (costs) caption of the Statements of Consolidated Comprehensive Income.

During 2017, Ashland discontinued certain post-employment health and life insurance benefits which resulted in a remeasurement gain of \$2 million within the Statements of Consolidated Comprehensive Income.

Plan Transfers

During August 2019, Ashland transferred a substantial portion of its non-qualified non-U.S. pension plans to INEOS as part of the sale of its Composites business (excluding the Maleic business) and the Marl facility. As of September 30, 2019, the net pension and other postretirement plan liabilities that transferred to INEOS totaled \$27 million.

The disclosures within this footnote exclude these amounts that were transferred and only relate to plans Ashland currently records within continuing operations.

Net periodic benefit costs (income) allocation

Consistent with Ashland's historical accounting policies, service cost for continuing operations is proportionately allocated to each reportable segment, excluding the Unallocated and other segment, while all other costs for continuing operations are recorded within the Unallocated and other segment.

The following table summarizes the components of pension and other postretirement benefit costs for continuing operations and the assumptions used to determine net periodic benefit costs (income) for the plans.

(In millions)	Pension benefits			Other postretirement benefits		
	2019	2018	2017	2019	2018	2017
Net periodic benefit costs (income)						
Service cost (a)	\$ 6	\$ 9	\$ 8	\$ 1	\$ 1	\$ 1
Interest cost (b)	10	10	8	2	1	2
Curtailment, settlement and other (b)	(18)	—	—	—	—	—
Expected return on plan assets (b)	(10)	(12)	(12)	—	—	—
Amortization of prior service credit (b)	—	—	—	—	—	—
Actuarial (gain) loss (b)	18	(14)	2	(7)	—	6
	<u>\$ 6</u>	<u>\$ (7)</u>	<u>\$ 6</u>	<u>\$ (4)</u>	<u>\$ 2</u>	<u>\$ 9</u>
Weighted-average plan assumptions (c)						
Discount rate for service cost	2.40%	2.54%	1.93%	4.37%	3.93%	3.93%
Discount rate for interest cost	3.02%	2.55%	2.25%	3.91%	3.13%	2.86%
Rate of compensation increase	2.52%	2.53%	2.81%			
Expected long-term rate of return on plan assets	3.44%	3.36%	3.44%			

(a) Service cost was not impacted by new accounting guidance adopted in 2018 and is therefore still classified within the selling, general and administrative expense and cost of sales captions on the Statements of Consolidated Comprehensive Income (Loss). See Note A for additional information.

(b) These components are now classified within the other net periodic benefit income (costs) caption on the Statements of Consolidated Comprehensive Income (Loss) due to the adoption of new accounting guidance in 2018. See Note A for additional information.

(c) The plan assumptions discussed are a blended weighted-average rate for Ashland's U.S. and non-U.S. plans.

There were no changes in prior service credit recognized in accumulated other comprehensive income during both 2019 and 2018. At September 30, 2019, Ashland expects to recognize less than \$1 million of the prior service credit in accumulated other comprehensive income as net periodic benefit cost (income) during the next fiscal year.

At September 30, 2019 and 2018, the amounts included in accumulated other comprehensive income are shown in the following table.

(In millions)	Pension		Postretirement	
	2019	2018	2019	2018
Prior service credit	\$ 3	\$ (4)	\$ —	\$ —

Obligations and funded status

Actuarial valuations are performed for the pension and other postretirement benefit plans to determine Ashland's obligation for each plan. In accordance with U.S. GAAP, Ashland recognizes the unfunded status of the plans as a liability in the Consolidated Balance Sheets. Summaries of the change in benefit obligations, plan assets, funded status of the plans, amounts recognized in the balance sheet, and assumptions used to determine the benefit obligations for 2019 and 2018 are as follows.

(In millions)	Pension plans		Other postretirement benefit plans	
	2019	2018	2019	2018
Change in benefit obligations				
Benefit obligations at October 1	\$ 404	\$ 428	\$ 58	\$ 62
Service cost	5	8	1	1
Interest cost	10	10	2	1
Participant contributions	1	1	—	—
Benefits paid	(16)	(14)	(2)	(6)
Actuarial (gain) loss	65	(14)	(7)	—
Curtailments	(18)	—	—	—
Foreign currency exchange rate changes	(18)	(6)	—	—
Other	(1)	(1)	—	—
Settlements	(27)	(8)	—	—
Benefit obligations at September 30	\$ 405	\$ 404	\$ 52	\$ 58
Change in plan assets				
Value of plan assets at October 1	\$ 341	\$ 349	\$ —	\$ —
Actual return on plan assets	50	10	—	—
Employer contributions	5	9	—	—
Participant contributions	1	1	—	—
Benefits paid	(16)	(14)	—	—
Foreign currency exchange rate changes	(15)	(6)	—	—
Settlements	(27)	(8)	—	—
Other	(2)	—	—	—
Value of plan assets at September 30	\$ 337	\$ 341	\$ —	\$ —
Unfunded status of the plans	\$ (68)	\$ (63)	\$ (52)	\$ (58)
Amounts recognized in the balance sheet				
Noncurrent benefit assets	\$ 33	\$ 35	\$ —	\$ —
Current benefit liabilities	(3)	(3)	(3)	(4)
Noncurrent benefit liabilities	(98)	(95)	(49)	(54)
Net amount recognized	\$ (68)	\$ (63)	\$ (52)	\$ (58)
Weighted-average plan assumptions				
Discount rate	1.96%	2.97%	3.11%	4.24%
Rate of compensation increase	2.52%	2.53%		

The accumulated benefit obligation for all pension plans was \$400 million at September 30, 2019 and \$394 million at September 30, 2018. All Ashland pension plans are either qualified U.S. or non-US plans. Information for pension plans with an accumulated benefit obligation in excess of plan assets follows:

(In millions)	2019	2018
Projected benefit obligation	\$ 207	\$ 227
Accumulated benefit obligation	202	217
Fair value of plan assets	106	129

Plan assets

The expected long-term rate of return on pension plan assets was 3.44% and 3.36% for 2019 and 2018, respectively. The basis for determining the expected long-term rate of return is a combination of future return assumptions for various asset classes in Ashland's investment portfolio, historical analysis of previous returns, market indices and a projection of inflation.

The following table summarizes the various investment categories that the pension plan assets are invested in and the applicable fair value hierarchy that the financial instruments are classified within these investment categories as of September 30, 2019. For additional information and a detailed description of each level within the fair value hierarchy, see Note G.

(In millions)	Total fair value	Quoted prices in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3
Cash and cash equivalents	\$ 5	\$ 5	\$ —	\$ —
U.S. Government securities	29	—	29	—
Non-U.S. Government securities	73	—	73	—
Corporate debt instruments	145	—	145	—
Listed real assets	11	—	11	—
Asset-backed securities	22	—	22	—
Corporate stocks	29	—	29	—
Insurance contracts	23	—	23	—
Total assets at fair value	<u>\$ 337</u>	<u>\$ 5</u>	<u>\$ 332</u>	<u>\$ —</u>

The following table summarizes the various investment categories that the pension plan assets are invested in and the applicable fair value hierarchy that the financial instruments are classified within these investment categories as of September 30, 2018.

(In millions)	Total fair value	Quoted prices in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3
Cash and cash equivalents	\$ 6	\$ 6	\$ —	\$ —
U.S. Government securities	19	—	19	\$ —
Non-U.S. Government securities	56	—	56	—
Corporate debt instruments	147	—	147	—
Listed real assets	10	—	10	—
Asset-backed securities	22	—	22	—
Corporate stocks	31	—	31	—
Insurance contracts	50	—	50	—
Total assets at fair value	<u>\$ 341</u>	<u>\$ 6</u>	<u>\$ 335</u>	<u>\$ —</u>

Ashland's pension plan holds a variety of investments designed to diversify risk. Investments classified as a Level 1 fair value measure principally represent marketable securities priced in active markets. Cash and cash equivalents and public equity and debt securities are well diversified and invested in U.S. and international small-to-large companies across various asset managers and styles. Investments classified as a Level 2 fair value measure principally represents fixed-income securities and other investment grade corporate bonds and debt obligations.

Investments and Strategy

In developing an investment strategy for its defined benefit plans, Ashland has considered the following factors: the nature of the plans' liabilities, the allocation of liabilities between active, deferred and retired members, the funded status of the plans, the applicable investment horizon, the respective size of the plans and historical and expected capital market returns. Ashland's U.S. pension plan assets are managed by outside investment managers, which are monitored against investment return benchmarks and Ashland's established investment strategy. Investment managers are selected based on an analysis of, among other things, their investment process, historical investment results, frequency of management turnover, cost structure and assets under management. Assets are periodically reallocated between investment managers to maintain an appropriate asset mix and diversification of investments and to optimize returns.

The current target asset allocation for the U.S. plans is 49% fixed income securities, 38% equity securities and 13% other securities. Fixed income securities primarily includes cash and cash equivalents, long duration corporate debt obligations and U.S. government debt obligations. In addition, Ashland's non-U.S. plan fixed income securities include insurance contracts. Equity securities are comprised solely of traditional public equity investments. Investment managers may employ a limited use of derivatives to gain efficient exposure to markets.

Ashland's investment strategy and management practices relative to plan assets of non-U.S. plans generally are consistent with those for U.S. plans, except in those countries where investment of plan assets is dictated by applicable regulations. Although the investment allocation may vary based on funding percentages and whether plans are still accruing additional liabilities, the weighted-average asset allocations for Ashland's U.S. and non-U.S. plans at September 30, 2019 and 2018 by asset category follow.

(In millions)	Target	Actual at September 30	
		2019	2018
Plan assets allocation			
Equity securities	5 - 45%	9%	9%
Fixed income securities	55 - 95%	88%	88%
Other	0 - 5%	3%	3%
		100%	100%

Cash flows

During 2019 and 2018, Ashland contributed \$1 million to its U.S. pension plans each year and \$4 million and \$8 million, respectively, to its non-U.S. pension plans. Ashland expects to contribute approximately \$1 million to its U.S. pension plans and \$5 million to its non-U.S. pension plans during 2020.

The following benefit payments, which reflect future service expectations, are projected to be paid from plan assets in each of the next five years and in aggregate for five years thereafter.

(In millions)	Pension benefits		Other postretirement benefits	
2020	\$	18	\$	3
2021		18		3
2022		18		3
2023		19		4
2024		19		4
2025 - 2029		99		18

Other plans

Ashland sponsors savings plans to assist eligible employees in providing for retirement or other future needs. Under such plans, company contributions amounted to \$26 million in 2019, \$25 million in 2018 and \$26 million in 2017. Ashland also sponsors various other employee benefit plans, some of which are required by different countries. The total noncurrent liabilities associated with these plans were \$3 million and \$7 million as of September 30, 2019 and 2018, respectively.

NOTE O – LITIGATION, CLAIMS AND CONTINGENCIES

Asbestos litigation

Ashland and Hercules have liabilities from claims alleging personal injury caused by exposure to asbestos. To assist in developing and annually updating independent reserve estimates for future asbestos claims and related costs given various assumptions, Ashland retained third party actuarial experts. Prior to 2018, Ashland retained Hamilton, Rabinovitz & Associates, Inc. (HR&A). During 2018, Ashland transitioned these responsibilities to Nathan Associates, Inc. (Nathan). The processes and methodologies used by Nathan are consistent with the ones historically employed by HR&A. The methodology used by Nathan to project future asbestos costs is based largely on recent experience, including claim-filing and settlement rates, disease mix, enacted legislation, open claims and litigation defense. The claim experience of Ashland and Hercules are separately compared to the results of previously conducted third party epidemiological studies estimating the number of people likely to develop asbestos-related diseases. Those studies were undertaken in connection with national analyses of the population expected to have been exposed to asbestos. Using that information, Nathan estimates a range of the number of future claims that may be filed, as well as the related costs that may be incurred in resolving those claims. Changes in asbestos-related liabilities and receivables are recorded on an after-tax basis within the discontinued operations caption in the Statements of Consolidated Comprehensive Income (Loss).

Ashland asbestos-related litigation

The claims alleging personal injury caused by exposure to asbestos asserted against Ashland result primarily from indemnification obligations undertaken in 1990 in connection with the sale of Riley, a former subsidiary. The amount and timing of settlements and number of open claims can fluctuate from period to period. A summary of Ashland asbestos claims activity, excluding Hercules claims, follows.

(In thousands)	2019	2018	2017
Open claims - beginning of year	53	54	57
New claims filed	2	2	2
Claims settled	(1)	(1)	(1)
Claims dismissed	(1)	(2)	(4)
Open claims - end of year	<u>53</u>	<u>53</u>	<u>54</u>

Ashland asbestos-related liability

From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs, which generally approximates the mid-point of the estimated range of exposure from model results. Ashland reviews this estimate and related assumptions quarterly and annually updates the results of a non-inflated, non-discounted approximate 50-year model developed with the assistance of Nathan.

During the most recent update completed during 2019, it was determined that the liability for Ashland asbestos-related claims should be increased by \$1 million. Total reserves for asbestos claims were \$352 million at September 30, 2019 compared to \$380 million at September 30, 2018.

A progression of activity in the asbestos reserve is presented in the following table.

(In millions)	2019	2018	2017
Asbestos reserve - beginning of year	\$ 380	\$ 419	\$ 415
Reserve adjustment	1	(8)	36
Amounts paid	(29)	(31)	(32)
Asbestos reserve - end of year (a)	<u>\$ 352</u>	<u>\$ 380</u>	<u>\$ 419</u>

(a) Included \$28 million and \$30 million classified in accrued expenses and other liabilities on the Consolidated Balance Sheets as of September 30, 2019 and 2018, respectively.

Ashland asbestos-related receivables

Ashland has insurance coverage for certain litigation defense and claim settlement costs incurred in connection with its asbestos claims, and coverage-in-place agreements exist with the insurance companies that provide substantially all of the coverage that will be accessed.

For the Ashland asbestos-related obligations, Ashland has estimated the value of probable insurance recoveries associated with its asbestos reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage, including an assumption that all solvent insurance carriers remain solvent. Substantially all of the estimated receivables from insurance companies are expected to be due from domestic insurers, all of which are solvent.

At September 30, 2019, Ashland's receivable for recoveries of litigation defense and claim settlement costs from insurers amounted to \$123 million (excluding the Hercules receivable for asbestos claims). Receivables from insurers amounted to \$140 million at September 30, 2018. During 2019, the annual update of the model used for purposes of valuing the asbestos reserve and its impact on valuation of future recoveries from insurers, was completed. This model update resulted in a \$5 million decrease in the receivable for probable insurance recoveries.

A progression of activity in the Ashland insurance receivable is presented in the following table.

(In millions)	2019	2018	2017
Insurance receivable - beginning of year	\$ 140	\$ 155	\$ 151
Receivable adjustment	(5)	(5)	15
Insurance settlement	—	—	(5)
Amounts collected	(12)	(10)	(6)
Insurance receivable - end of year (a)	<u>\$ 123</u>	<u>\$ 140</u>	<u>\$ 155</u>

(a) Included \$15 million classified in accounts receivable on the Consolidated Balance Sheets as of September 30, 2019 and 2018.

Hercules asbestos-related litigation

Hercules has liabilities from claims alleging personal injury caused by exposure to asbestos. Such claims typically arise from alleged exposure to asbestos fibers from resin encapsulated pipe and tank products which were sold by one of Hercules' former subsidiaries to a limited industrial market. The amount and timing of settlements and number of open claims can fluctuate from period to period. A summary of Hercules' asbestos claims activity follows.

(In thousands)	2019	2018	2017
Open claims - beginning of year	13	12	15
New claims filed	1	2	1
Claims dismissed	(1)	(1)	(4)
Open claims - end of year	<u>13</u>	<u>13</u>	<u>12</u>

Hercules asbestos-related liability

From the range of estimates, Ashland records the amount it believes to be the best estimate of future payments for litigation defense and claim settlement costs, which generally approximates the mid-point of the estimated range of exposure from model results. Ashland reviews this estimate and related assumptions quarterly and annually updates the results of a non-inflated, non-discounted approximate 50-year model developed with the assistance of Nathan. As a result of the most recent annual update of this estimate, completed during 2019, it was determined that the liability for Hercules asbestos-related claims should be decreased by \$10 million. Total reserves for asbestos claims were \$252 million at September 30, 2019 compared to \$282 million at September 30, 2018.

A progression of activity in the asbestos reserve is presented in the following table.

(In millions)	2019	2018	2017
Asbestos reserve - beginning of year	\$ 282	\$ 323	\$ 321
Reserve adjustments	(10)	(19)	16
Amounts paid	(20)	(22)	(14)
Asbestos reserve - end of year (a)	<u>\$ 252</u>	<u>\$ 282</u>	<u>\$ 323</u>

(a) Included \$21 million and \$20 million classified in accrued expenses and other liabilities on the Consolidated Balance Sheets as of September 30, 2019 and 2018, respectively.

Hercules asbestos-related receivables

For the Hercules asbestos-related obligations, certain reimbursement obligations pursuant to coverage-in-place agreements with insurance carriers exist. As a result, any increases in the asbestos reserve have been partially offset by probable insurance recoveries. Ashland has estimated the value of probable insurance recoveries associated with its asbestos reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage, including an assumption that all solvent insurance carriers remain solvent. The estimated receivable consists exclusively of solvent domestic insurers.

As of September 30, 2019 and 2018, the receivables from insurers amounted to \$49 million and \$54 million, respectively. During 2019, the annual update of the model used for purposes of valuing the asbestos reserve and its impact on valuation of future recoveries from insurers was completed. This model update resulted in a \$5 million decrease in the receivable for probable insurance recoveries.

A progression of activity in the Hercules insurance receivable is presented in the following table.

(In millions)	2019	2018	2017
Insurance receivable - beginning of year	\$ 54	\$ 68	\$ 63
Receivable adjustment	(5)	(14)	5
Insurance receivable - end of year	<u>\$ 49</u>	<u>\$ 54</u>	<u>\$ 68</u>

Asbestos litigation cost projection

Projecting future asbestos costs is subject to numerous variables that are extremely difficult to predict. In addition to the significant uncertainties surrounding the number of claims that might be received, other variables include the type and severity of the disease alleged by each claimant, the long latency period associated with asbestos exposure, mortality rates, dismissal rates, costs of medical treatment, the impact of bankruptcies of other companies that are co-defendants in claims, uncertainties surrounding the litigation process from jurisdiction to jurisdiction and from case to case, and the impact of potential changes in legislative or judicial standards. Furthermore, any predictions with respect to these variables are subject to even greater uncertainty as the projection period lengthens. In light of these inherent uncertainties, Ashland believes that the asbestos reserves for Ashland and Hercules represent the best estimate within a range of possible outcomes. As a part of the process to develop these estimates of future asbestos costs, a range of long-term cost models was developed. These models are based on national studies that predict the number of people likely to develop asbestos-related diseases and are heavily influenced by assumptions regarding long-term inflation rates for indemnity payments and legal defense costs, as well as other variables mentioned previously. Ashland has currently estimated in various models ranging from approximately 40 to 50 year periods that it is reasonably possible that total future litigation defense and claim settlement costs on an inflated and undiscounted basis

could range as high as approximately \$550 million for the Ashland asbestos-related litigation (current reserve of \$352 million) and approximately \$390 million for the Hercules asbestos-related litigation (current reserve of \$252 million), depending on the combination of assumptions selected in the various models. If actual experience is worse than projected, relative to the number of claims filed, the severity of alleged disease associated with those claims or costs incurred to resolve those claims, or actuarial refinement or improvements to the assumptions used within these models are initiated, Ashland may need to further increase the estimates of the costs associated with asbestos claims and these increases could be material over time.

Environmental remediation and asset retirement obligations

Ashland is subject to various federal, state and local environmental laws and regulations that require environmental assessment or remediation efforts (collectively environmental remediation) at multiple locations. At September 30, 2019, such locations included 80 waste treatment or disposal sites where Ashland has been identified as a potentially responsible party under Superfund or similar state laws, 113 current and former operating facilities and about 1,225 service station properties, of which 29 are being actively remediated.

Ashland's reserves for environmental remediation and related environmental litigation amounted to \$186 million at September 30, 2019 compared to \$187 million at September 30, 2018, of which \$143 million at September 30, 2019 and \$147 million at September 30, 2018 were classified in other noncurrent liabilities on the Consolidated Balance Sheets. The remaining reserves were classified in accrued expenses and other liabilities on the Consolidated Balance Sheets.

The following table provides a reconciliation of the changes in the environmental remediation reserves during 2019 and 2018.

(In millions)		2019		2018
Environmental remediation reserve - beginning of year	\$	187	\$	163
Disbursements		(32)		(37)
Revised obligation estimates and accretion		31		61
Environmental remediation reserve - end of year	\$	<u>186</u>	\$	<u>187</u>

The total reserves for environmental remediation reflect Ashland's estimates of the most likely costs that will be incurred over an extended period to remediate identified conditions for which the costs are reasonably estimable, without regard to any third-party recoveries. Engineering studies, probability techniques, historical experience and other factors are used to identify and evaluate remediation alternatives and their related costs in determining the estimated reserves for environmental remediation. Ashland continues to discount certain environmental sites and regularly adjusts its reserves as environmental remediation continues. Ashland has estimated the value of its probable insurance recoveries associated with its environmental reserve based on management's interpretations and estimates surrounding the available or applicable insurance coverage. At September 30, 2019 and 2018, Ashland's recorded receivable for these probable insurance recoveries was \$13 million and \$12 million, respectively, of which \$12 million and \$11 million, respectively, were classified in other noncurrent assets in the Consolidated Balance Sheets.

During 2019, Ashland recognized \$30 million of expense for certain environmental liabilities related to normal ongoing remediation cost estimate updates for sites, which is consistent with Ashland's historical environmental accounting policy.

During 2018, Ashland recognized \$60 million of expense for certain environmental liabilities. Of that amount, \$18 million related to one site where, after significant research and analysis as part of Ashland's normal process and protocol for these matters, the estimated cost for the ongoing remediation was finalized. As such, Ashland recorded the expense for this remediation project during 2018 since a reasonable estimate that is in accordance with U.S. GAAP provisions could be determined. The remaining charges in 2018 related to normal ongoing remediation cost estimate updates for sites, which is consistent with Ashland's historical environmental accounting policy.

Components of environmental remediation expense included within the selling, general and administrative expense caption of the Statements of Consolidated Comprehensive Income (Loss) are presented in the following table for the years ended September 30, 2019, 2018 and 2017.

(In millions)	2019	2018	2017
Environmental expense	\$ 30	\$ 60	\$ 17
Accretion	1	1	1
Legal expense	6	6	8
Total expense	37	67	26
Insurance receivable	(3)	(2)	(2)
Total expense, net of receivable activity (a)	\$ 34	\$ 65	\$ 24

(a) Net expense of \$7 million, \$5 million and \$3 million for the fiscal years ended September 30, 2019, 2018 and 2017, respectively, related to divested businesses which qualified for treatment as discontinued operations and for which certain environmental liabilities were retained by Ashland. These amounts are classified within the income from discontinued operations caption of the Statements of Consolidated Comprehensive Income (Loss).

Environmental remediation reserves are subject to numerous inherent uncertainties that affect Ashland's ability to estimate its share of the costs. Such uncertainties involve the nature and extent of contamination at each site, the extent of required cleanup efforts under existing environmental regulations, widely varying costs of alternate cleanup methods, changes in environmental regulations, the potential effect of continuing improvements in remediation technology, and the number and financial strength of other potentially responsible parties at multiparty sites. Although it is not possible to predict with certainty the ultimate costs of environmental remediation, Ashland currently estimates that the upper end of the reasonably possible range of future costs for identified sites could be as high as approximately \$440 million. The largest reserve for any site is 14% of the remediation reserve.

Other legal proceedings and claims

In addition to the matters described above, there are other various claims, lawsuits and administrative proceedings pending or threatened against Ashland and its current and former subsidiaries. Such actions are with respect to commercial matters, product liability, toxic tort liability, and other environmental matters, which seek remedies or damages, some of which are for substantial amounts. While Ashland cannot predict with certainty the outcome of such actions, it believes that adequate reserves have been recorded and losses already recognized with respect to such actions were immaterial as of September 30, 2019 and 2018. There is a reasonable possibility that a loss exceeding amounts already recognized may be incurred related to these actions; however, Ashland believes that such potential losses were immaterial as of September 30, 2019 and 2018.

NOTE P – EQUITY ITEMS

Stock repurchase programs

During March 2018, Ashland's Board of Directors approved a new \$1 billion stock repurchase program. Under the new program, Ashland's common shares may be repurchased in open market transactions, privately negotiated transactions or pursuant to one or more accelerated stock repurchase programs or Rule 10b5-1 plans. As of September 30, 2019, \$800 million remained available for repurchase under the 2018 stock repurchase program.

Stock repurchase program agreements

In May 2019, under the 2018 stock repurchase program, Ashland announced that it entered into an accelerated share repurchase agreement (2019 ASR Agreement). Under the 2019 ASR Agreement, Ashland paid an initial purchase price of \$200 million and received an initial delivery of 2.2 million shares of common stock during May 2019. The bank exercised its early termination option under the 2019 ASR Agreement in August 2019, and an additional 400 thousand shares were repurchased, bringing the total shares repurchased upon settlement to 2.6 million. This was the first stock repurchase under the 2018 stock repurchase program.

Stockholder dividends

Ashland paid dividends per common share of \$1.05, \$0.95 and \$1.23 during 2019, 2018 and 2017, respectively.

In May 2019, the Board of Directors of Ashland announced a quarterly cash dividend of 27.5 cents per share to eligible stockholders at record, which represented an increase from the previous quarterly cash dividend of 25.0 cents per share. This dividend was paid in the third and fourth quarters of fiscal 2019.

In May 2018, the Board of Directors of Ashland announced a quarterly cash dividend of 25 cents per share to eligible stockholders at record, which represented an increase from the previous quarterly cash dividend of 22.5 cents per share. This dividend was paid in the third and fourth quarters of fiscal 2018.

During May 2017, subsequent to the final distribution of Valvoline Inc.'s common stock, the Board of Directors announced a quarterly cash dividend of 22.5 cents per share to eligible shareholders at record, which was paid for quarterly dividends in the first and second quarters of fiscal 2018 and the third and fourth quarters of fiscal 2017. This represented a reduction from the previous quarterly dividend of 39 cents per share paid during the first and second quarters of fiscal 2017.

Shares reserved for issuance

At September 30, 2019, 14.8 million common shares were reserved for issuance under stock incentive and deferred compensation plans.

Other comprehensive income (loss)

Components of other comprehensive income (loss) recorded in the Statements of Consolidated Comprehensive Income (Loss) are presented in the following table, before tax and net of tax effects.

(In millions)	Before tax	Tax (expense) benefit	Net of tax
Year ended September 30, 2019			
Other comprehensive income (loss)			
Unrealized translation loss	\$ (80)	\$ —	\$ (80)
Pension and postretirement obligation adjustment	(7)	2	(5)
Total other comprehensive loss	<u>\$ (87)</u>	<u>\$ 2</u>	<u>\$ (85)</u>
Year ended September 30, 2018			
Other comprehensive income (loss)			
Unrealized translation loss	\$ (82)	\$ —	\$ (82)
Net change in investment securities:			
Unrealized gain on investment securities (a)	24	(7)	17
Reclassification adjustment for gains included in net income	(6)	2	(4)
Total other comprehensive loss	<u>\$ (64)</u>	<u>\$ (5)</u>	<u>\$ (69)</u>
Year ended September 30, 2017			
Other comprehensive income (loss)			
Unrealized translation loss	\$ 80	\$ 1	\$ 81
Amortization of unrecognized prior service credits included in net income	(7)	3	(4)
Net change in investment securities:			
Unrealized gain on investment securities (a)	24	(8)	16
Reclassification adjustment for gains included in net income	(2)	1	(1)
Total other comprehensive income	<u>\$ 95</u>	<u>\$ (3)</u>	<u>\$ 92</u>

(a) Due to the adoption of new accounting guidance in fiscal 2019, unrealized gains and losses on Ashland's equity securities are now recognized in net income rather than other comprehensive income. See Notes A and G for more information.

Summary of Stockholders' Equity

A reconciliation of changes in stockholders' equity are as follows:

(In millions)	2019	2018	2017
Common stock and paid in capital			
Balance, beginning of period	\$ 947	\$ 932	\$ 924
Common shares issued under stock incentive and other plans (a)	10	15	8
Common shares purchased under repurchase program (b)	(200)	—	—
Balance, end of period	757	947	932
Retained earnings			
Balance, beginning of period	2,750	2,696	2,704
Adoption of new accounting pronouncements (c)	34	—	—
Net income	505	114	1
Regular dividends	(65)	(60)	(77)
Distribution of Valvoline Inc. (d)	—	—	68
Balance, end of period	3,224	2,750	2,696
Accumulated other comprehensive income (loss)			
Balance, beginning of period	(291)	(222)	(281)
Adoption of new accounting pronouncements (c)	(34)	—	—
Unrealized translation gain (loss)	(80)	(82)	81
Distribution of Valvoline Inc. (d)	—	—	(33)
Net change in investment securities	—	13	15
Pension and postretirement obligation adjustment	(5)	—	(4)
Balance, end of period	(410)	(291)	(222)
Noncontrolling interest			
Balance, beginning of period	—	—	(182)
Net income	—	—	27
Distribution of Valvoline Inc. (d)	—	—	152
Other	—	—	7
Distributions to noncontrolling interest	—	—	(4)
Balance, end of period	—	—	—
Total stockholders' equity	\$ 3,571	\$ 3,406	\$ 3,406
Cash dividends declared per common share	\$ 1.05	\$ 0.95	\$ 1.23

(a) Common shares issued were 336,188, 360,468 and 42,861 for 2019, 2018 and 2017, respectively.

(b) Common shares repurchased were 2,637,054 for 2019.

(c) Represents the cumulative-effect adjustment related to the adoption of the new guidance related to the accounting for equity securities and tax effects of intercompany transfers during fiscal 2019. See Note A for more information.

(d) See Note B for discussion of the noncontrolling interest and the initial public offering and distribution of Valvoline Inc.

NOTE Q – STOCK INCENTIVE PLANS

Ashland has stock incentive plans under which key employees or directors are granted stock appreciation rights (SARs), performance share awards or nonvested stock awards. Each program is typically a long-term incentive plan designed to link employee compensation with increased shareholder value or reward superior performance and encourage continued employment with Ashland. Ashland recognizes compensation expense for the grant date fair value of stock-based awards over the applicable vesting period and accounts for forfeitures when they occur across all stock-based awards.

The components of Ashland's pretax stock-based awards (net of forfeitures) and associated income tax benefits are as follows:

(In millions)	2019 (a)	2018 (b)	2017 (c)
SARs	\$ 7	\$ 7	\$ 5
Nonvested stock awards	18	24	15
Performance share awards	1	13	8
	<u>\$ 26</u>	<u>\$ 44</u>	<u>\$ 28</u>
Income tax benefit	<u>\$ 6</u>	<u>\$ 14</u>	<u>\$ 11</u>

(a) The year ended September 30, 2019 included \$5 million and zero of expense related to cash-settled nonvested restricted stock awards and cash-settled performance units, respectively.

(b) The year ended September 30, 2018 included \$9 million and \$8 million of expense related to cash-settled nonvested restricted stock awards and cash-settled performance units, respectively.

(c) The year ended September 30, 2017 included \$5 million and \$3 million of expense related to cash-settled nonvested restricted stock awards and cash-settled performance units, respectively.

Conversion of Equity Awards Outstanding from Valvoline Distribution

On May 12, 2017, the date of the final distribution of Valvoline common stock, certain of Ashland's outstanding equity awards held by Valvoline Inc. employees were converted to equivalent equity awards, as applicable, with respect to Valvoline Inc.'s common stock. These modified awards otherwise retained substantially the same terms and conditions, including term and vesting provisions, as the existing Ashland equity awards had at the time of conversion. Ashland transferred all Valvoline awards and will not incur any future compensation cost related to the conversion of Ashland equity awards held by Valvoline Inc. employees and directors in connection with the final Valvoline Inc. distribution.

Additionally, in connection with this transaction, Ashland proportionately adjusted the number and exercise prices of SARs, nonvested stock awards and performance awards granted to Ashland employees and directors that were outstanding at the time of this transaction to maintain the approximate aggregate intrinsic value of such awards. To calculate the exchange ratio for all outstanding stock based compensation awards, Ashland utilized a 10-day volume weighted average stock price (VWAP), using the 10 consecutive trading days following the distribution. The ratio used to adjust these awards differs slightly from the exchange ratio that would have resulted had the ratio been calculated based on Ashland's stock price immediately following the transaction.

On the date of the final distribution, and in accordance with U.S. GAAP, Ashland reassessed all outstanding equity awards to determine if additional compensation expense had been incurred due to the transaction causing a modification to the outstanding equity awards. The additional stock compensation expense as a result of this modification and assessment performed during 2017 for all outstanding equity awards was not significant.

Stock Appreciation Rights

SARs are granted to employees or directors at a price equal to the fair market value of the stock on the date of grant and typically become exercisable over periods of one to three years. Unexercised SARs lapse ten years after the date of grant. Ashland estimates the fair value of SARs granted using the Black-Scholes option-pricing model. This model requires several assumptions, which Ashland has developed and updates based on historical trends and current market observations. The accuracy of these assumptions is critical to the estimate of fair value for these equity instruments. The following table illustrates the weighted-average of key assumptions used within the Black-Scholes option-pricing model. The risk-free interest rate assumption was based on the U.S. Treasury yield curve in effect at the time of the grant for the expected term of the instrument. The dividend yield reflects the assumption that the current dividend payout will continue with no anticipated increases. The volatility assumption was calculated by utilizing peer companies because historical volatility was not considered reflective of future volatility as a result of the Valvoline IPO discussed in Note B. The expected life is based on the mid-point of the weighted average time to vest and contractual term.

(In millions except per share data)	2019	2018	2017
Weighted-average fair value per share of SARs granted (a)	\$ 21.95	\$ 19.62	\$ 21.25
Assumptions (weighted-average)			
Risk-free interest rate	3.0%	2.1%	1.8%
Expected dividend yield	1.2%	1.3%	1.4%
Expected volatility	25.9%	31.8%	22.8%
Expected life (in years)	6	6	5

(a) The weighted-average fair values per share are as of the grant date and have not been adjusted for the Valvoline separation if the SARs were granted prior to the final distribution on May 12, 2017.

A progression of activity and various other information relative to SARs and previously issued and vested stock options is presented in the following table.

(In thousands except per share data)	2019		2018		2017	
	Number of common shares	Weighted-average exercise price per share	Number of common shares	Weighted-average exercise price per share	Number of common shares	Weighted-average exercise price per share
Outstanding - beginning of year	2,263	\$ 53.21	2,261	\$ 47.98	1,511	\$ 83.64
Granted	299	82.34	470	67.16	422	109.15
Exercised	(380)	46.15	(421)	40.10	(330)	70.55
Forfeitures and expirations	(80)	71.38	(47)	58.73	(70)	105.98
Transfer to Valvoline Inc. (a)	—	—	—	—	(352)	94.28
Conversion adjustment (b)	—	—	—	—	1,080	—
Outstanding - end of year (c)	<u>2,102</u>	<u>57.94</u>	<u>2,263</u>	<u>53.21</u>	<u>2,261</u>	<u>47.98</u>
Exercisable - end of year	1,579	53.04	1,472	47.76	1,456	42.10

(a) Represents the transfer of SARs held by Valvoline Inc. employees at the time of the final Valvoline Inc. distribution in 2017.

(b) The number and exercise prices of SARs outstanding at the time of the final Valvoline Inc. distribution in 2017 were proportionately adjusted to maintain the aggregate intrinsic value before and after the transaction.

(c) Exercise prices per share for SARs outstanding at September 30, 2019 ranged from \$20.02 to \$29.5 for 172 thousand shares, from \$37.37 to \$47.63 for 350 thousand shares, from \$57.96 to \$59.95 for 871 thousand shares, and from \$62.33 to \$82.34 for 709 thousand shares. The weighted-average remaining contractual life of outstanding SARs and stock options was 6.2 years and exercisable SARs and stock options was 5.4 years.

The total intrinsic value of SARs exercised was \$12 million in 2019, \$15 million in 2018 and \$14 million in 2017. The actual tax benefit realized from the exercised SARs was \$3 million in 2019, \$5 million in 2018 and \$2 million in 2017. The total grant date fair value of SARs that vested during 2019, 2018 and 2017 was \$8 million, \$4 million and \$8 million, respectively. As of September 30, 2019, there was \$6 million of total unrecognized compensation costs related to SARs. That cost is expected to be recognized over a weighted-average period of 1.6 years. As of September 30, 2019, the aggregate intrinsic value of outstanding SARs was \$42 million and exercisable SARs was \$38 million.

Nonvested stock awards

Nonvested stock awards are granted to employees or directors at a price equal to the fair market value of the stock on the date of grant and generally vest over a one-to-five-year period. However, such shares or units are subject to forfeiture upon termination of service before the vesting period ends. Beginning in 2016, these awards were primarily granted as stock units that will convert to shares upon vesting, while the grants in prior years were generally made in nonvested shares. Only nonvested stock awards granted in the form of shares entitle employees or directors to vote the shares. Dividends on nonvested stock awards granted are in the form of additional units or shares of nonvested stock awards, which are subject to vesting and forfeiture provisions.

A progression of activity and various other information relative to nonvested stock awards is presented in the following table.

	2019		2018		2017	
	Number of common shares	Weighted-average grant date fair value	Number of common shares	Weighted-average grant date fair value	Number of common shares	Weighted-average grant date fair value
(In thousands except per share data)						
Nonvested - beginning of year	291	\$ 66.98	219	\$ 59.16	293	\$ 109.12
Granted	96	81.31	192	71.36	92	105.10
Vested	(151)	66.24	(107)	59.46	(189)	99.69
Forfeitures	(21)	73.63	(13)	62.22	(24)	104.19
Transfer to Valvoline Inc. (a)	—	—	—	—	(71)	111.97
Conversion adjustment (b)	—	—	—	—	118	—
Nonvested - end of year	<u>215</u>	<u>73.26</u>	<u>291</u>	<u>66.98</u>	<u>219</u>	<u>59.16</u>

(a) Represents the transfer of nonvested stock awards held by Valvoline Inc. employees at the time of the final Valvoline Inc. distribution in 2017.

(b) The number and exercise prices of nonvested stock awards outstanding at the time of the final Valvoline Inc. distribution in 2017 were proportionately adjusted to maintain the aggregate intrinsic value before and after the transaction.

The total fair value of nonvested stock awards that vested during 2019, 2018 and 2017 was \$10 million, \$6 million and \$19 million, respectively. As of September 30, 2019, there was \$6 million of total unrecognized compensation costs related to nonvested stock awards. That cost is expected to be recognized over a weighted-average period of 1.9 years.

Executive performance incentive and retention program

During 2016, certain executives were granted 260 thousand performance-based restricted shares of Ashland in order to provide an incentive to remain employed in the period after the full separation of Ashland and Valvoline. At September 30, 2019, total nonvested shares outstanding were 30 thousand shares, which include forfeitures and the cumulative value of forfeitable dividends. The expense recognition for these awards commenced upon completing the full separation of Valvoline which occurred on May 12, 2017, as discussed further in Note B, and resulted in expense of \$3 million, \$6 million and \$3 million during 2019, 2018 and 2017, respectively. As of September 30, 2019, there was less than \$1 million of total unrecognized compensation costs related to these awards.

Cash-settled nonvested stock awards

Certain nonvested stock awards are granted to employees and are settled in cash upon vesting. As of September 30, 2019, 95 thousand cash-settled nonvested stock awards were outstanding. The value of these cash-settled nonvested stock awards changes in connection with changes in the fair market value of the Ashland Common Stock. These awards generally vest over a period of three years. The expense recognized related to cash-settled nonvested stock awards was \$5 million, \$9 million, and \$5 million during 2019, 2018 and 2017, respectively.

Performance awards

Ashland sponsors a long-term incentive plan that awards performance shares/units to certain key employees that are tied to Ashland's overall financial performance relative to the financial performance of selected industry peer groups and/or internal targets. Awards are granted annually, with each award covering a three-year vesting period. Nonvested performance shares/units do not entitle employees to vote the shares or to receive any dividends thereon.

For awards granted in 2019, 2018 and 2017, upon vesting, each performance unit will be settled in stock or cash based on the fair market value of Ashland common stock. The awards granted in 2019 and 2018 are settled in stock and recorded as a component of stockholders' equity while the awards granted in 2017 are settled in cash and recorded within the other liabilities caption in the Consolidated Balance Sheets. For these awards, the performance measure used to determine the actual number of performance units issuable upon vesting is the financial performance of Ashland compared to award targets. The financial performance award metric is considered a performance condition under applicable U.S. GAAP. Additionally, the actual number of performance units issuable upon vesting can be potentially increased or decreased based on a total shareholder return (TSR) performance modifier relative to peers for Ashland.

The following table shows the performance shares/units granted for all plans that award Ashland Common Stock or cash.

(In thousands)	Vesting period	Target shares/units granted (a)		Weighted-average fair value per share/unit (a)
Fiscal Year 2019	October 1, 2018 - September 30, 2021	78	\$	84.93
Fiscal Year 2018	October 1, 2017 - September 30, 2020	101	\$	68.93
Fiscal Year 2017	October 1, 2016 - September 30, 2019	56	\$	103.72

(a) At the end of the performance period, the actual number of shares/units awarded can range from zero to 200% of the target shares/units granted, which is assumed to be 100%. Both the shares granted and weighted-average fair value per share/unit are as of the grant date and have not been adjusted for the Valvoline separation that occurred during 2017.

For awards granted in 2016, the fair value of the ROI portion of the performance share awards is equal to the fair market value of Ashland's Common Stock on the date of the grant discounted for the dividends forgone during the vesting period of the three-year performance cycle. For awards granted in 2018 and 2017, the fair value of the performance unit awards is equal to the fair market value of Ashland's Common Stock as of the end of each reporting period. Compensation cost is recognized over the requisite service period if it is probable that the performance condition will be satisfied.

The fair values of the TSR portion of the performance share awards and TSR modifier of the performance unit awards are calculated using a Monte Carlo simulation valuation model using key assumptions included in the following table. Compensation cost is recognized over the requisite service period regardless of whether the market condition is satisfied.

	2019	2018	2017
Risk-free interest rate	2.9	1.6% - 1.8%	1.3% - 1.4%
Expected dividend yield	1.3%	1.4%	1.4%
Expected life (in years)	3	3	3
Expected volatility	24.6%	25.0%	25.1%

The following table shows changes in nonvested performance shares/units for all plans that award Ashland Common Stock or cash.

	2019		2018		2017	
	Shares/ Units	Weighted- average grant date fair value	Shares/ Units	Weighted- average grant date fair value	Shares/ Units	Weighted- average grant date fair value
(In thousands except per share data)						
Nonvested - beginning of year	260	\$ 64.55	268	\$ 63.00	199	\$ 106.91
Granted (a)	78	84.93	101	68.93	71	99.86
Vested (a)	(68)	61.67	(104)	65.53	(69)	85.86
Forfeitures (b)	(10)	65.16	(5)	66.24	(54)	75.52
Transfer to Valvoline Inc. (c)	—	—	—	—	(21)	115.68
Conversion adjustment (d)	—	—	—	—	142	—
Nonvested - end of year	<u>260</u>	<u>76.59</u>	<u>260</u>	<u>64.55</u>	<u>268</u>	<u>63.00</u>

(a) 2017 includes 15 thousand additional shares from the fiscal year 2014 since a portion of the payouts for this plan was in excess of the initial 100% target.

(b) During 2017, Ashland determined that zero percent of the TSR portion of the fiscal year 2016 plan will be paid out upon vesting which resulted in the forfeiture of 35 thousand shares.

(c) Represents the transfer of performance shares from the fiscal year 2016 plans held by Valvoline Inc. employees at the time of the final Valvoline Inc. distribution in 2017.

(d) The number and exercise prices of performance shares/units outstanding at the time of the final Valvoline Inc. distribution in 2017 were proportionately adjusted to maintain the aggregate intrinsic value before and after the transaction.

As of September 30, 2019, there was \$3 million of total unrecognized compensation costs related to nonvested performance share/unit awards. That cost is expected to be recognized over a weighted-average period of approximately 1.5 years.

NOTE R – REVENUE

Effective October 1, 2018, Ashland adopted accounting guidance outlining a single comprehensive five step model for entities to use in accounting for revenue arising from contracts with customers (ASC 606 Revenue from Contracts with Customers). As a result of the adoption, there was no material impact to Ashland's Consolidated Financial Statements. The additional disclosures that Ashland is required to disclose on an annual basis are contained within this Note R.

Revenue recognition

Ashland's revenue is measured as the amount of consideration it expects to receive in exchange for transferring goods or providing services and is recognized when performance obligations are satisfied under the terms of contracts with customers. Ashland generally utilizes standardized language for the terms of contracts, unless a separate agreement has been entered into with a customer that supersedes the standard language.

A performance obligation is deemed to be satisfied by Ashland when control of the product or service is transferred to the customer. The transaction price of a contract, or the amount Ashland expects to receive upon satisfaction of all performance obligations, is determined by reference to the contract's terms and includes adjustments, if applicable, for any variable consideration, such as volume discounts, rebates, refunds and rights to return. Where a contract contains more than one distinct performance obligation, the transaction price is allocated to each performance obligation based on the standalone selling price of each performance obligation, although these situations do not occur frequently and are generally not included within Ashland's contracts. Any unsatisfied performance obligations were not material. Standalone selling prices are based on prices Ashland charges to customers, which in some cases are based on established market prices. Ashland generally collects the cash from its customers within 60 days of the product delivery date. Sales and other similar taxes collected from customers on behalf of third parties are excluded from the contract price.

All of Ashland's revenue is derived from contracts with customers, and nearly all contracts with customers contain one performance obligation for the transfer of goods where such performance obligation is satisfied at a point in time. Control of a product is deemed to be transferred to the customer generally upon shipment or delivery. Costs for shipping and handling

activities, whether performed before or after the customer obtains control of the goods, are accounted for as fulfillment costs when not reimbursed.

Costs incurred to obtain contracts with customers have historically not been significant and are expensed immediately as the period of performance is generally one year or less. Ashland records bad debt expense in specific situations when it is determined that the customer is unable to meet its financial obligation.

Practical expedients

Upon adoption, Ashland utilized the following applicable practical expedients, as permitted by ASC 606, Revenue from Contracts with Customers:

- Sales and other similar taxes collected from customers on behalf of third parties are excluded from the contract price;
- Costs for shipping and handling activities, whether performed before or after the customer obtains control of the goods, are accounted for as fulfillment costs when not reimbursed; and
- Costs incurred to obtain contracts with customers are expensed immediately when the amortization period is one year or less.

Trade receivables

Trade receivables are defined as receivables arising from contracts with customers and are recorded within the accounts receivable caption within the Condensed Consolidated Balance Sheets. Ashland's trade receivables were \$435 million and \$482 million as of September 30, 2019 and September 30, 2018, respectively.

Disaggregation of revenue

Ashland disaggregates its revenue from contracts with customers by segment, geographical region and product category, as Ashland believes these categories best depict how management reviews the financial performance of its operations for the twelve months ended September 30, 2019, 2018 and 2017. Ashland includes only U.S. and Canada in its North America designation. See the following tables for details:

(In millions) Geography	Sales by geography			Intermediates and Solvents		
	2019	2018	2017	2019	2018	2017
Twelve Months Ended						
North America	\$ 945	\$ 988	\$ 883	\$ 58	\$ 58	\$ 34
Europe	779	806	683	23	24	21
Asia Pacific	458	454	432	25	31	32
Latin America & other	200	222	218	5	6	6
	<u>\$ 2,382</u>	<u>\$ 2,470</u>	<u>\$ 2,216</u>	<u>\$ 111</u>	<u>\$ 119</u>	<u>\$ 93</u>

Sales by product category

(In millions)	2019	2018	2017
Twelve Months Ended			
Specialty Ingredients			
Cellulosics	\$ 839	\$ 837	\$ 794
Poly-vinyl pyrrolidones	413	422	402
Adhesives	345	351	336
Actives	156	153	128
Vinyl ethers	106	139	139
Pharmachem	231	248	104
Other (a)	292	320	313
	<u>\$ 2,382</u>	<u>\$ 2,470</u>	<u>\$ 2,216</u>
Intermediates and Solvents			
Derivatives	\$ 92	\$ 99	\$ 77
Butanediol	19	20	16
	<u>\$ 111</u>	<u>\$ 119</u>	<u>\$ 93</u>
Total	<u>\$ 2,493</u>	<u>\$ 2,589</u>	<u>\$ 2,309</u>

(a) Other includes no product category in excess of 10% of sales.

NOTE 5 – REPORTABLE SEGMENT INFORMATION

Ashland determines its reportable segments based on how operations are managed internally for the products and services sold to customers, including how the results are reviewed by the chief operating decision maker, which includes determining resource allocation methodologies used for reportable segments. Operating income is the primary measure on the Statements of Consolidated Comprehensive Income (Loss) that is reviewed by the chief operating decision maker in assessing each reportable segment's financial performance. Ashland does not aggregate operating segments to arrive at these reportable segments.

Change in Reportable Segments

Ashland's reportable segments were impacted in the current year due to the disposal of the Composites reportable segment and Intermediates and Solvents Marl facility and reclassification to discontinued operations. As a result, Ashland's operations are managed by the chief operating decision maker within the following two reportable segments: Specialty Ingredients and Intermediates and Solvents.

Reportable segment business descriptions

Specialty Ingredients offers industry-leading products, technologies and resources for solving formulation and product-performance challenges. Using natural, synthetic and semisynthetic polymers derived from cellulose ethers, vinyl pyrrolidones, acrylic polymers, polyester and polyurethane-based adhesives, and plant and seed extract, Specialty Ingredients offers comprehensive and innovative solutions for consumer and industrial applications.

Key customers include pharmaceutical companies; makers of personal care products, food and beverages manufacturers; makers of nutraceuticals and supplements; manufacturers of paint, coatings and construction materials; packaging and converting; and oilfield service companies.

Intermediates and Solvents is a leading producer of 1,4 butanediol and related derivatives, including n-methylpyrrolidone. These products are used as chemical intermediates in the production of engineering polymers and polyurethanes, and as specialty process solvents in a wide array of applications including electronics, pharmaceuticals, water filtration membranes and more. Butanediol is also supplied to Ashland's Specialty Ingredients business for use as a raw material at cost.

On August 30, 2019, Ashland completed the sale of its Composites segment (excluding the Maleic business) and Intermediates and Solvents Marl facility. As a result, the financial information for Intermediates and Solvents excludes the activity from the Marl facility due to the divestiture and have been restated in prior periods.

Unallocated and Other generally includes items such as certain significant company-wide restructuring activities, including internal separation costs, and legacy costs or adjustments that relate to divested businesses that are no longer operated by Ashland.

Results of Ashland's reportable segments are presented based on its management and internal accounting structure. The structure is specific to Ashland; therefore, the financial results of Ashland's reportable segments are not necessarily comparable with similar information for other comparable companies. Ashland allocates all significant costs to its reportable segments except for certain significant company-wide restructuring activities, including stranded costs, and other costs or adjustments that relate to former businesses that Ashland no longer operates. The service cost component of pension and other postretirement benefits costs is allocated to each reportable segment on a ratable basis; while the remaining components of pension and other postretirement benefits costs are recorded within the other net periodic benefit income caption on the Statements of Consolidated Comprehensive Income (Loss). Ashland refines its expense allocation methodologies to the reportable segments from time to time as internal accounting practices are improved, more refined information becomes available and the industry or market changes. Significant revisions to Ashland's methodologies are adjusted for all segments on a retrospective basis.

International data

Information about Ashland's domestic and international operations follows. Ashland has no operations in any individual international country or single customer that represented more than 10% of sales in 2019, 2018 or 2017.

(In millions)	Sales to external customers			Net assets (liabilities)		Property, plant and equipment - net	
	2019	2018	2017	2019	2018	2019	2018
United States	\$ 959	\$ 997	\$ 880	\$ 1,789	\$ 1,142	\$ 1,231	\$ 1,250
International	1,534	1,592	1,429	1,782	2,264	346	396
	<u>\$ 2,493</u>	<u>\$ 2,589</u>	<u>\$ 2,309</u>	<u>\$ 3,571</u>	<u>\$ 3,406</u>	<u>\$ 1,577</u>	<u>\$ 1,646</u>

Reportable segment results

The following tables present various financial information for each reportable segment for the years ended September 30, 2019, 2018 and 2017 and as of September 30, 2019, 2018 and 2017. Results of Ashland's reportable segments are presented based on its management and internal accounting structure. The structure is specific to Ashland; therefore, the financial results of Ashland's reportable segments are not necessarily comparable with similar information for other comparable companies. Ashland allocates all costs to its reportable segments except for certain significant company-wide restructuring activities and other costs or adjustments that relate to former businesses that Ashland no longer operates. The service cost component of pension and other postretirement benefits costs is allocated to each reportable segment on a ratable basis; while the remaining components of pension and other postretirement benefits costs are recorded to Unallocated and other. Ashland refines its expense allocation methodologies to the reportable segments from time to time as internal accounting practices are improved, more refined information becomes available and the industry or market changes. Significant revisions to Ashland's methodologies are adjusted for all segments on a retrospective basis.

Ashland determined that disclosing sales by specific product was impracticable due to the highly customized and extensive portfolio of products offered to customers and since no one product or a small group of products could be aggregated together to represent a majority of revenue within a reportable segment. As such, see Note S for sales by product category for each reportable segment.

The following table presents various financial information for each reportable segment. The operating results of divested divisions and assets during 2019, 2018 and 2017 that did not qualify for discontinued operations accounting treatment are included in the financial information until the date of sale.

Ashland Global Holdings Inc. and Consolidated Subsidiaries

Reportable Segment Information

Years Ended September 30

(In millions)

	2019	2018	2017
Sales			
Specialty Ingredients	\$ 2,382	\$ 2,470	\$ 2,216
Intermediates and Solvents	111	119	93
	<u>\$ 2,493</u>	<u>\$ 2,589</u>	<u>\$ 2,309</u>
Equity income			
Specialty Ingredients	\$ —	\$ 1	\$ —
Intermediates and Solvents	—	—	—
	—	1	—
Other income (expense)			
Specialty Ingredients	\$ (1)	\$ (5)	\$ (2)
Intermediates and Solvents	—	—	—
Unallocated and other	5	8	5
	4	3	3
Equity and other income	<u>\$ 4</u>	<u>\$ 4</u>	<u>\$ 3</u>
Operating income (loss)			
Specialty Ingredients	\$ 272	\$ 314	\$ 233
Intermediates and Solvents	16	17	(6)
Unallocated and other	(122)	(229)	(178)
	<u>\$ 166</u>	<u>\$ 102</u>	<u>\$ 49</u>
Assets			
Specialty Ingredients	\$ 5,705	\$ 5,955	\$ 6,050
Intermediates and Solvents	185	192	188
Unallocated and other	1,361	2,112	2,380
	<u>\$ 7,251</u>	<u>\$ 8,259</u>	<u>\$ 8,618</u>
Depreciation and amortization			
Specialty Ingredients	\$ 273	\$ 252	\$ 243
Intermediates and Solvents	13	14	14
Unallocated and other	3	11	8
	<u>\$ 289</u>	<u>\$ 277</u>	<u>\$ 265</u>
Property, plant and equipment - net			
Specialty Ingredients	\$ 1,377	\$ 1,434	\$ 1,470
Intermediates and Solvents	78	83	90
Unallocated and other	122	129	157
	<u>\$ 1,577</u>	<u>\$ 1,646</u>	<u>\$ 1,717</u>
Additions to property, plant and equipment			
Specialty Ingredients	\$ 137	\$ 138	\$ 148
Intermediates and Solvents	7	5	5
Unallocated and other	10	14	15
	<u>\$ 154</u>	<u>\$ 157</u>	<u>\$ 168</u>

NOTE T – SUBSEQUENT EVENTS

On October 8, 2019, Ashland announced that the Board of Directors elected Guillermo Novo as chairman and CEO of Ashland, effective December 31, 2019. William A. Wulfsohn will continue to serve as chairman and CEO through the end of this calendar year. Costs associated with this transition will be incurred in the first quarter of fiscal 2020.

On November 19, 2019, Ashland received notice that it was named as one of seventeen defendants in a lawsuit seeking roughly \$100 million in monetary damages related to a plant fire at an Israeli facility. This claim allegedly relates to a product of Ashland's now divested Composites business. Ashland is currently in the process of retaining outside counsel, reviewing the merits of the claim, and reviewing its contractual rights and obligations under the Stock and Asset Purchase Agreement with respect to this matter. No reserves have been established for this lawsuit at this time.

QUARTERLY FINANCIAL INFORMATION (UNAUDITED)

The following table presents quarterly financial information and per share data relative to Ashland's Common Stock.

Quarters ended (In millions except per share data)	December 31		March 31		June 30		September 30	
	2018	2017	2019	2018	2019	2018	2019 (a)	2018 (b)
Sales	\$ 576	\$ 581	\$ 667	\$ 672	\$ 641	\$ 668	\$ 609	\$ 667
Cost of sales	424	402	469	449	434	439	400	436
Gross profit as a percentage of sales	26.4%	30.8%	29.7%	33.2%	32.3%	34.3%	34.3%	34.6%
Operating income (loss)	(7)	5	44	63	43	30	85	4
Income (loss) from continuing operations	(71)	(32)	45	42	23	11	27	(2)
Net income (loss)	(48)	(4)	76	73	66	36	411	9
Basic earnings per share								
Continuing operations	\$ (1.14)	\$ (0.51)	\$ 0.72	\$ 0.66	\$ 0.38	\$ 0.18	\$ 0.45	\$ (0.03)
Net income (loss) attributable to Ashland	\$ (0.76)	\$ (0.07)	\$ 1.21	\$ 1.17	\$ 1.06	\$ 0.57	6.80	0.15
Diluted earnings per share								
Continuing operations	\$ (1.14)	\$ (0.51)	\$ 0.71	\$ 0.65	\$ 0.37	\$ 0.18	\$ 0.44	\$ (0.03)
Net income (loss) attributable to Ashland	(0.76)	(0.07)	1.19	1.15	1.05	0.56	6.71	0.15
Regular cash dividends per share	\$ 0.250	\$ 0.225	\$ 0.250	\$ 0.225	\$ 0.275	\$ 0.250	\$ 0.275	\$ 0.250

(a) Fourth quarter results for 2019 included pre-tax key items of \$11 million related to the loss on pension and postretirement benefit plan remeasurements, \$6 million debt refinancing costs, \$5 million gain on securities, \$1 million related to restructuring, separation and other costs, and \$1 million favorable true-up related to proxy costs. In addition, a \$372 million (net of tax) gain on sale was recorded for the completed sale of the Composites segment (excluding the Maleic business) and the Marl facility within net income. Income tax expense for the fourth quarter included \$11 million of net unfavorable tax specific key items.

(b) Fourth quarter results for 2018 included pre-tax key items of \$50 million related to restructuring, separation and other costs, \$16 million of asset impairment charges, \$14 million related to the gain on pension and postretirement benefit plan remeasurements and \$5 million of tax indemnity expense. Income tax benefit for the fourth quarter included \$1 million of net unfavorable tax specific key items.

Ashland Global Holdings Inc. and Consolidated Subsidiaries
Five-Year Selected Financial Information (unaudited)
Years Ended September 30

(In millions except per share data) (a)	2019	2018	2017	2016	2015
Summary of operations					
Sales	\$ 2,493	\$ 2,589	\$ 2,309	\$ 2,179	\$ 2,403
Cost of sales	1,726	1,726	1,580	1,463	1,657
Gross profit	767	863	729	716	746
Selling, general and administrative expense	539	692	610	705	514
Research and development expense	66	73	73	77	87
Equity and other income (loss)	4	4	3	2	7
Operating income (loss)	166	102	49	(64)	152
Net interest and other financing expense	99	102	229	173	174
Other net periodic benefit income (costs)	5	15	(6)	(62)	(129)
Net gain (loss) on acquisitions and divestitures	(2)	(4)	(10)	(8)	(89)
Income (loss) from continuing operations before income taxes	70	11	(196)	(307)	(240)
Income tax expense (benefit)	46	(8)	(16)	(46)	(172)
Income (loss) from continuing operations	24	19	(180)	(261)	(68)
Income from discontinued operations	481	95	208	233	377
Net income (loss)	505	114	28	(28)	309
Net income attributable to noncontrolling interest	—	—	27	1	—
Net income (loss) attributable to Ashland	<u>\$ 505</u>	<u>\$ 114</u>	<u>\$ 1</u>	<u>\$ (29)</u>	<u>\$ 309</u>
Balance sheet information (as of September 30)					
Current assets	\$ 1,433	\$ 1,712	\$ 1,904	\$ 2,888	\$ 3,095
Current liabilities	757	1,076	968	1,238	1,444
Working capital	<u>\$ 676</u>	<u>\$ 636</u>	<u>\$ 936</u>	<u>\$ 1,650</u>	<u>\$ 1,651</u>
Total assets	\$ 7,251	\$ 8,259	\$ 8,618	\$ 10,000	\$ 10,068
Short-term debt	\$ 166	\$ 254	\$ 235	\$ 170	\$ 381
Long-term debt	1,501	2,275	2,584	2,325	3,348
Equity	3,571	3,406	3,406	3,165	3,037
Cash flow information					
Cash flows provided (used) by operating activities from continuing operations	\$ 228	\$ 241	\$ 174	\$ 291	\$ (366)
Additions to property, plant and equipment	154	157	168	205	192
Cash dividends	64	60	77	97	98
Common stock information					
Basic earnings per share					
Income (loss) from continuing operations	\$ 0.39	\$ 0.30	\$ (2.90)	\$ (4.16)	\$ (1.00)
Net income (loss) attributable to Ashland	8.15	1.82	0.01	(0.47)	4.54
Diluted earnings per share					
Income (loss) from continuing operations	0.39	0.29	(2.90)	(4.16)	(1.00)
Net income (loss) attributable to Ashland	8.03	1.79	0.01	(0.47)	4.54
Dividends	1.05	0.95	1.23	1.56	1.46

(a) As a result of the final Valvoline Inc. distribution on May 12, 2017 and the Composites and Marl facility divestiture (including the Maleic business), these assets, liabilities, operating results and cash flows for all periods presented have been classified as discontinued operations within the Consolidated Financial Statements. See Note B and D within the Notes to Consolidated Financial Statements for more information.

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Board of Directors

Brendan M. Cummins^(1, 2)
Former Chief Executive Officer,
Ciba Specialty Chemicals

William G. Dempsey^(1, 3)
Former Executive Vice President,
Global Pharmaceuticals,
Abbott Laboratories

Jay V. Ihlenfeld^(1, 2, c)
Former Sr. Vice President,
3M Company

Susan L. Main^(1, 3)
Sr. Vice President and
Chief Financial Officer,
Teledyne Technologies
Incorporated

Guillermo Novo⁽²⁾
Incoming Chairman and
Chief Executive Officer, Ashland

Jerome A. Peribere^(3, 4)
Former President and
Chief Executive Officer,
Sealed Air Corporation

Craig A. Rogerson^(2, 4)
Chairman, President and Chief
Executive Officer, Hexion Inc.

Mark C. Rohr^(3, 4)
Former Chairman and
Chief Executive Officer,
Celanese Corporation

Janice J. Teal, Ph.D.^(2, 4)
Former Group Vice President
and Chief Scientific Officer,
Avon Products Inc.

Kathleen Wilson-Thompson^(4, 3)
Executive Vice President and Global
Chief Human Resources Officer,
Walgreens Boots Alliance Inc.

William A. Wulfsohn^b
Chairman and Chief Executive
Officer, Ashland

Committees

- (1) Audit
- (2) Environmental, Health, Safety and Quality
- (3) Governance and Nominating
- (4) Compensation
 - ^a Committee chair
 - ^b Officer/Director
 - ^c Lead Independent Director

Executive Officers

William A. Wulfsohn
Chairman and
Chief Executive Officer

Guillermo Novo
Incoming Chairman and
Chief Executive Officer

Peter J. Ganz
Sr. Vice President, General
Counsel and Secretary; Chief Legal
and Compliance Officer

Anne T. Schumann
Sr. Vice President, Chief Human
Resources and Information
Technology Officer

J. Kevin Willis
Sr. Vice President and
Chief Financial Officer

Vito J. Consiglio
Sr. Vice President, Chief
Commercial Officer

Osama M. Musa
Sr. Vice President, Chief Technology
Officer

Keith C. Silverman, PhD
Sr. Vice President, Global
Operations, Quality and
Environmental,
Health and Safety

J. William Heitman
Vice President and Controller

Corporate Officers

Eric N. Boni
Vice President, Finance

John P. Goswell
Vice President, Internal Audit

Scott A. Gregg
Vice President, Tax

John W. Joy
Vice President, Corporate
Development

William C. Whitaker
Vice President and Treasurer

Corporate Governance

Ashland is governed by an 11-member board of directors, 9 of whom are independent directors under New York Stock Exchange (NYSE) guidelines. The board conducted 13 meetings in fiscal 2019. During fiscal 2019, the board operated the following committees, all of which consisted entirely of outside directors: Audit; Environmental, Health, Safety and Quality; Governance and Nominating; and Compensation. These four committees met a total of 27 times. This included quarterly meetings of the Audit Committee to review Ashland's quarterly financial performance, associated news releases, and Form 10-Q and Form 10-K filings with the U.S. Securities and Exchange Commission. Ashland's Chief Executive Officer (CEO) and Chief Financial Officer have each submitted certifications concerning the accuracy of financial and other information in Ashland's annual report on Form 10-K, as required by Section 302(a) of the Sarbanes-Oxley Act of 2002. The certifications are filed as exhibits to Ashland's 2019 annual report on Form 10-K. In addition, the NYSE requires that the CEO of listed companies annually certify that he or she is not aware of any violation by the company of NYSE corporate governance listing standards. Ashland's Chairman and CEO, William A. Wulfsohn, certified Ashland's compliance with the NYSE corporate governance listing standards on February 25, 2019.

*This Annual Report includes certain non-GAAP measures. Such measurements are not prepared in accordance with U.S. GAAP and should not be construed as an alternative to reported results determined in accordance with U.S. GAAP. Management believes the use of such non-GAAP measures assists investors in understanding the ongoing operating performance of the company and its segments. The non-GAAP information provided may not be consistent with the methodologies used by other companies. All non-GAAP amounts have been reconciled with reported U.S. GAAP results, which are included in the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section of this Annual Report.

Forward-Looking Statements: This Annual Report includes forward-looking statements, as described in the enclosed Form 10-K.

Shareholder information

CORPORATE HEADQUARTERS

Ashland Global Holdings Inc.
50 East RiverCenter Boulevard
Covington, KY 41011
Tel +1 859 815 3333

*Effective in 2020 Ashland's corporate headquarters will be moving to

8145 Blazer Drive
Wilmington, DE 19808

FINANCIAL INFORMATION

Ashland's annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports, as well as any beneficial ownership reports of officers and directors filed electronically on Forms 3, 4 and 5, are available at ashland.com.

Paper copies also are available upon request and at no charge. Requests for these and other stockholder and security analyst inquiries should be directed to:

Seth A. Mrozek
Director, Investor Relations
Ashland
8145 Blazer Drive
Wilmington, DE 19808
Tel +1 302 594 5010
samrozek@ashland.com

TICKER SYMBOL: ASH

Fiscal 2019 closing stock prices per common share:

High:	\$84.21	10/01/18
Low:	\$65.28	12/24/18
Year-end:	\$77.05	09/30/19

ANNUAL MEETING

Notice of the annual meeting and availability of proxy materials is mailed to shareholders in December, along with instructions for viewing proxy materials online. Stockholders may also request printed copies of the proxy statement and annual report by following the instructions included in the Notice.

STOCK INFORMATION

Ashland Global Holdings Inc. is incorporated under the laws of Delaware. Ashland common stock is listed on the New York Stock Exchange and also has trading privileges on NASDAQ.

Questions regarding shareholder accounts, dividends or the dividend reinvestment plan should be directed to Ashland's transfer agent and registrar:

EQ Shareowner Services
1110 Centre Pointe Curve, Suite 101
Mendota Heights, MN 55120

Mailing Address:
EQ Shareowner Services
P.O. Box 64874
St. Paul, MN 55164
Tel +1 855 598 5486 toll-free (U.S.)
+1 651 450 4064 (non-U.S.)
www.shareowneronline.com

DIVIDENDS

Ashland's current quarterly cash dividend is 27.5 cents per share. Ashland's historical practice has been to pay dividends on the 15th day of March, June, September and December if declared by the board of directors. Ashland's board of directors has declared a dividend every quarter since December 1936.

Ashland offers electronic deposit of dividend checks. For more information, please contact EQ Shareowner Services at +1 855 598 5486 +1 651 450 4064 (outside the U.S.)

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

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MEDIA INQUIRIES

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