ECOLAB INC.
Form 10-K
March 01, 2019
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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2018
OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission File No. 1-9328

ECOLAB INC.

(Exact name of registrant as specified in its charter)

Delaware	41-0231510
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

1 Ecolab Place, St. Paul, Minnesota 55102
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: 1-800-232-6522

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

Title of each class	Name of each exchange on which registered
Common Stock, $1.00 par value	New York Stock Exchange, Inc.
2.625% Euro Notes due 2025	New York Stock Exchange, Inc.
1.000% Euro Notes due 2024	New York Stock Exchange, Inc.

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

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 Exchange Act).
YES NO

Aggregate market value of voting and non-voting common equity held by non-affiliates of registrant on June 29, 2018, the last business day of the Registrant's most recently completed second fiscal quarter: $40,354,321,454 (see Item 12, under Part III hereof), based on a closing price of registrant's Common Stock of $140.33 per share.

The number of shares of registrant's Common Stock, par value $1.00 per share, outstanding as of January 31, 2019: 287,853,232 shares.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for the Annual Meeting of Stockholders to be held May 2, 2019, and to be filed within 120 days after the registrant's fiscal year ended December 31, 2018 (hereinafter referred to as "Proxy Statement"), are incorporated by reference into Part III.

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ECOLAB INC.

FORM 10-K

For the Year Ended December 31, 2018

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PART I

Except where the context otherwise requires, references in this Form 10-K to (i) "Ecolab," "Company," "we" and "our" are to Ecolab Inc. and its subsidiaries, collectively; (ii) "Nalco", "Nalco Company" and "Nalco Champion" are to Nalco Company LLC, a wholly-owned subsidiary of the Company; (iii) "Nalco transaction" are to the merger of Ecolab and Nalco Holding Company completed in December 2011; and (iv) "Champion transaction" are to our acquisition of privately held Champion Technologies and its related company Corsicana Technologies in April 2013.

Item 1. Business.

General Development of Business.

Ecolab was incorporated as a Delaware corporation in 1924. Our fiscal year is the calendar year ending December 31. International subsidiaries are included in the financial statements on the basis of their U.S. GAAP (accounting principles generally accepted in the United States of America) November 30 fiscal year-ends to facilitate the timely inclusion of such entities in our consolidated financial reporting.

We continued to invest in and build our business through various acquisitions that complement our strategic vision. See Part II, Item 8, Note 4 of this Form 10-K for additional information about the acquisitions and divestitures of the Company.

Narrative Description of Business.

General

With 2018 sales of $14.7 billion, we are the global leader in water, hygiene and energy technologies and services that protect people and vital resources. We deliver comprehensive programs, products and services to promote safe food, maintain clean environments, optimize water and energy use, and develop and improve operating efficiencies for customers in the food, healthcare, energy, hospitality and industrial markets in more than 170 countries around the world. Our cleaning and sanitizing programs and products, and pest elimination services, support customers in the foodservice, food and beverage processing, hospitality, healthcare, government and education, retail, textile care and commercial facilities management sectors. Our products and technologies are also used in water treatment, pollution control, energy conservation, oil production and refining, primary metals manufacturing, papermaking, mining and other industrial processes.

We pursue a "Circle the Customer – Circle the Globe" strategy by providing an array of innovative programs, products and services designed to meet the specific operational and sustainability needs of our customers throughout the world. Through this strategy and our varied product and service mix, one customer may utilize the offerings of several of our operating segments.

The following description of our business is based upon our reportable segments as reported in our consolidated financial statements for the year ended December 31, 2018, which are located in Item 8 of Part II of this Form 10-K. Operating segments that share similar economic characteristics and future prospects, nature of the products and production processes, end-use markets, channels of distribution and regulatory environment have been aggregated into three reportable segments: Global Industrial, Global Institutional and Global Energy. Operating segments that do not meet the quantitative criteria to be separately reported have been combined into the Other segment. We provide similar information for Other as compared to our three reportable segments as we consider the information regarding its underlying operating segments as useful in understanding our consolidated results.

Global Industrial

This reportable segment consists of the Water, Food & Beverage, Paper, Life Sciences and Textile Care operating segments, which provide water treatment and process applications, and cleaning and sanitizing solutions, primarily to large industrial customers within the manufacturing, food and beverage processing, transportation, chemical, primary metals and mining, power generation, pulp and paper, pharmaceutical and commercial laundry industries. The underlying operating segments exhibit similar manufacturing processes, distribution methods and economic characteristics. Descriptions of the five operating segments which comprise our Global Industrial reportable segment follow below.

Water

Water serves customers across industrial and institutional markets, with the exception of the pulp and paper industry which is serviced by Paper and the energy industries which are served by Energy. Within Water, our light industry markets include food and beverage, manufacturing and transportation, and institutional clients including commercial buildings, hospitals, universities and hotels. Heavy industries served include power, chemicals and primary metals and mining.

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Water provides water treatment products and water technologies programs for cooling water, waste water, boiler water and process water applications. Our cooling water treatment programs are designed to control challenges associated with cooling water systems — corrosion, scale and microbial fouling and contamination — in open recirculating, once-through and closed systems. Our wastewater products and programs focus on improving overall plant economics, addressing compliance issues, optimizing equipment efficiency and improving operator capabilities and effectiveness. We provide integrated chemical solutions, process improvements and mechanical component modifications to optimize boiler performance and control corrosion and scale build-up. Our programs assist in the use of water for plant processes by optimizing the performance of treatment chemicals and equipment in order to minimize costs and maximize returns on investment.

Our offerings include specialty products such as scale and corrosion inhibitors, antifoulants, pre-treatment solutions, membrane treatments, coagulants and flocculants, and anti-foams, as well as our 3D TRASARTM technology, which combines chemistry, remote services and monitoring and control. We provide products and programs for water treatment and process applications aimed at combining environmental benefits with economic gains for our customers. Typically, water savings, energy savings, maintenance and capital expenditure avoidance are among our primary sources of value creation for our customers, with product quality and production enhancement improvements also providing key differentiating features for many of our offerings. Our offerings are sold primarily by our corporate account and field sales employees.

We believe we are one of the leading suppliers world-wide among suppliers of products and programs for chemical applications within the industrial water treatment industry.

Food & Beverage

Food & Beverage addresses cleaning and sanitation to facilitate the processing of products for human consumption. Food & Beverage provides detergents, cleaners, sanitizers, lubricants and animal health products, as well as cleaning systems, electronic dispensers and chemical injectors for the application of chemical products, primarily to dairy plants, dairy farms, breweries, soft-drink bottling plants, and meat, poultry and other food processors. Food & Beverage is also a leading developer and marketer of antimicrobial products used in direct contact with meat, poultry, seafood and produce during processing in order to reduce microbial contamination. Food & Beverage also designs, engineers and installs CIP ("clean in place") process control systems and facility cleaning systems for its customer base. Products for use in processing facilities are sold primarily by our corporate account and field sales employees, while products for use on farms are sold through dealers and independent, third-party distributors.

We believe we are one of the leading suppliers world-wide of cleaning and sanitizing products to the dairy plant, dairy farm, food, meat and poultry, and beverage/brewery processor industries.

Paper

Paper provides water and process applications for the pulp and paper industries, offering a comprehensive portfolio of programs that are used in all principal steps of the papermaking process and across all grades of paper, including graphic grades, board and packaging, and tissue and towel. Paper provides its customers similar types of products and programs for water treatment and wastewater treatment as those offered by Water. Also, Paper offers two specialty programs that differentiate its offerings from Water—pulp applications and paper applications. Our pulp applications maximize process efficiency and increase pulp cleanliness and brightness in bleaching operations, as well as predict and monitor scaling potential utilizing on-line monitoring to design effective treatment programs and avoid costly failures. Our paper process applications focus on improving our customers' operational efficiency. Advanced sensing, monitoring and automation combine with innovative chemistries and detailed process knowledge to provide a broad range of customer solutions. Specialty products include flocculants, coagulants, dewatering aids, and digester yield additives. Our offerings are sold primarily by our corporate account and field sales employees.

We believe we are one of the leading suppliers world-wide of water treatment products and process aids to the pulp and papermaking industry.

Life Sciences

Life Sciences provides contamination control, cleaning and sanitizing solutions to personal care and pharmaceutical manufacturers. Life Sciences provides detergents, cleaners, sanitizers, disinfectants, as well as cleaning systems, electronic dispensers and chemical injectors for the application of chemical products. Additionally, we sell sterile alcohols, sterile biocides, residue removal and dilution solutions, surface wipes, dispensing equipment and aerosol sprays, which are primarily for application within clean room environments. Products and programs are sold primarily through our field sales personnel and corporate account personnel, and to a lesser extent through distributors.

Life Sciences is comprised of customers and accounts related to manufacturing in the following industries: pharmaceutical, animal health and medicine, biologic products, cosmetics and medical device. Our tailored, comprehensive solutions and technical know-how focus on ensuring product quality and safety while improving operational efficiency in customers' cleaning, sanitation and disinfection processes.

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Textile Care

Textile Care provides products and services that manage the entire wash process through custom designed programs, premium products, dispensing equipment, water and energy management, and real time data management for large scale, complex commercial laundry operations including uniform rental, hospitality, linen rental and healthcare laundries. Textile Care's programs are designed to meet our customers' needs for exceptional cleaning, while extending the useful life of linen and reducing our customers' overall operating costs. Products and programs are marketed primarily through our field sales employees and, to a lesser extent, through distributors.

We believe we are one of the leading suppliers world-wide in the laundry markets in which we compete.

Global Institutional

This reportable segment consists of the Institutional, Specialty and Healthcare operating segments, which provide specialized cleaning and sanitizing products to the foodservice, hospitality, lodging, healthcare, government, education and retail industries. The underlying operating segments exhibit similar manufacturing processes, distribution methods and economic characteristics. Descriptions of the three operating segments which comprise our Global Institutional reportable segment follow below.

Institutional

Institutional sells specialized cleaners and sanitizers for washing dishes, glassware, flatware, foodservice utensils and kitchen equipment ("warewashing"), plus specialized cleaners for various applications throughout food service operations, for on-premise laundries (typically used by hotel and healthcare customers) and for general housekeeping functions. We also sell food safety products and equipment, water filters, dishwasher racks and related kitchen sundries to the foodservice, lodging, educational and healthcare industries. Institutional also provides pool and spa treatment programs for hospitality and other commercial customers, as well as a broad range of janitorial cleaning and floor care products and programs to customers in hospitality, healthcare and commercial facilities. Institutional develops various chemical dispensing systems which are used by our customers to efficiently and safely dispense our cleaners and sanitizers. In addition, Institutional markets a lease program comprised of energy-efficient dishwashing machines, detergents, rinse additives and sanitizers, including full machine maintenance. Through our EcoSure Food Safety Management business, Institutional also provides customized on-site evaluations, training and quality assurance services to foodservice operations.

Institutional sells its products and programs primarily through its field sales and corporate account sales personnel. Corporate account sales personnel establish relationships and negotiate contracts with larger multi-unit or "chain" customers. We also utilize independent, third-party foodservice, broad-line and janitorial distributors to provide logistics to end customers for accounts that prefer to work through these distributors. Many of these distributors also participate in marketing our product and service offerings to the end customers. Through our field sales personnel, we generally provide the same customer support to end-use customers supplied by these distributors as we do to direct customers.

We believe we are one of the leading global suppliers of warewashing and laundry products and programs to the food service, hospitality and lodging markets.

Specialty

Specialty supplies cleaning and sanitizing chemical products and related items primarily to regional, national and international quick service restaurant (“QSR”) chains and food retailers (i.e., supermarkets and grocery stores). Its products include specialty and general purpose hard surface cleaners, degreasers, sanitizers, polishes, hand care products and assorted cleaning tools and equipment which are primarily sold under the “Ecolab” and “Kay” brand names. Specialty’s cleaning and sanitation programs are customized to meet the needs of the market segments it serves and are designed to provide highly effective cleaning performance, promote food safety, reduce labor costs and enhance user and guest safety. A number of dispensing options are available for products in the core product range. Specialty supports its product sales with training programs and technical support designed to meet the special needs of its customers.

Both Specialty’s QSR business and its food retail business utilize their corporate account sales force which manages relationships with customers at the corporate and regional office levels (and, in the QSR market segment, at the franchisee level) and their field sales force which provides program support at the individual restaurant or store level. QSR customers are primarily supplied through third party distributors while most food retail customers utilize their own distribution networks. While Specialty’s customer base has broadened over the years, Specialty’s business remains largely dependent upon a limited number of major QSR chains and franchisees and large food retail customers.

We believe we are one of the leading suppliers of cleaning and sanitizing products to the global QSR market and a leading supplier of cleaning and sanitizing products to the global food retail market.

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Healthcare

Healthcare provides infection prevention and surgical solutions to acute care hospitals, surgery centers and medical device Original Equipment Manufacturers (“OEM”). Healthcare’s proprietary infection prevention and surgical solutions (hand hygiene, hard surface disinfection, instrument cleaning, patient drapes, equipment drapes and surgical fluid warming and cooling systems) are sold primarily under the "Ecolab", "Microtek" and “Anios” brand names to various departments within the acute care environment (Infection Control, Environmental Services, Central Sterile and Operating Room). Healthcare sells its products and programs primarily through its field sales personnel and corporate account personnel but also sells through healthcare distributors.

We believe we are a leading supplier of infection prevention and surgical solutions in the United States and Europe.

Global Energy

This reportable segment, which operates primarily under the Nalco Champion name, consists of the Energy operating segment, which serves the process chemicals and water treatment needs of the global petroleum and petrochemical industries in both upstream and downstream applications.

Energy provides on-site, technology-driven solutions to the global drilling and completion, oil and gas production and refining and petrochemical industries. Our product portfolio includes: additives for drilling and well stimulation, corrosion inhibitors, oil and water separation, scale control, paraffin and asphaltene control, biocides, hydrate control, hydrogen sulfide removal, oil dispersants, foamers and anti-foamers, flow improvers, anti-foulants, crude desalting, monomer inhibitors, anti-oxidants, fuel and lubricant additives, and traditional water treatment.

The Energy operating segment operates under an upstream group composed primarily of our WellChem and Oil Field Chemicals businesses and a downstream refinery and petrochemical processing group. Our upstream group provides solutions to the oil and gas production sector, including crude oil and natural gas production, pipeline gathering/transmission systems, gas processing, heavy oil and bitumen upgrading, water management and enhanced oil recovery. Upstream also supplies chemicals for the cementing, drilling, fracturing and acidizing phases of well drilling and stimulation. Our priority is to safely manage the critical challenges facing today’s oil and gas producers throughout the life cycle of their assets, with such an approach helping our customers minimize risk, achieve their production targets and maximize profitability. Our downstream group provides products and programs for process and water treatment applications specific to the petroleum refining and fuels industry, enabling our customers to profitably refine and upgrade hydrocarbons. Our heavy oil upgrading programs minimize operational costs and mitigate fouling, corrosion, foaming and the effects of heavy metals during the refining process. We also offer fuel additives, including corrosion inhibitors, to protect engine fuel systems and pre-market underground storage tanks and piping. Our customers include many of the largest publicly traded oil and gas companies, as well as national oil and gas companies and large independent oil and gas companies and service companies. Our Energy offerings are sold primarily by our corporate account and field sales employees and, to a lesser extent, through distributors, sales agents and joint ventures.

We believe we are one of the leading global providers of specialty chemicals to the upstream oil and gas industry, and downstream refineries and petrochemical operations.

Other

Other consists of the Pest Elimination, Colloidal Technologies Group and (prior to its sale in November 2017) Equipment Care, operating segments. These operating segments do not meet the quantitative criteria to be separately aggregated. We disclose these operating segments within Other as we consider the information useful in understanding our consolidated results.

Pest Elimination

Pest Elimination provides services designed to detect, eliminate and prevent pests, such as rodents and insects, in restaurants, food and beverage processors, educational and healthcare facilities, hotels, quick service restaurant and grocery operations and other institutional and commercial customers. The services of Pest Elimination are sold and performed by our field sales and service personnel.

Pest Elimination continues to expand its geographic coverage. In addition to the United States, which constitutes the largest operation, we operate in various countries in Asia Pacific, Western Europe, Latin America and South Africa, with the largest operations in France, the United Kingdom and Greater China.

We believe Pest Elimination is a leading supplier of pest elimination programs to the commercial, hospitality and institutional markets in the geographies it serves.

Colloidal Technologies Group

Effective in the first quarter of 2018, we established the Colloidal Technologies Group (“CTG”) operating segment. CTG produces and sells colloidal silica, which is comprised of nano-sized particles of silica in water. These products and associated programs are used primarily for binding and polishing applications. CTG serves customers across various industries, including semiconductor manufacturing, catalyst manufacturing, chemicals, and aerospace component manufacturing.

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CTG incorporates strong collaboration with customers to develop customized solutions that meet the technical demands of their operations. Our silica-based applications are widely used for polishing of silicon wafers, semiconductor substrates and the precision surface finishing of optics, watch crystals and other glass components. We offer a variety of silica-based particles that can be used as binders in heterogeneous catalyst systems and as silica nutrients for manufacturing specialty zeolites. Our silica products are used worldwide as a binder for precision investment casting slurries, which ultimately facilitate the manufacture of near net-shape metal parts such as turbine blades and golf club heads.

Our products are sold primarily by our corporate account employees. We believe we are one of the leading global suppliers of colloidal silica.

Equipment Care

Prior to its sale in November 2017, Equipment Care provided equipment repair, maintenance and preventive maintenance services for the commercial food service industry. Repair services were offered for in-warranty repair, acting as the manufacturer’s authorized service agent, as well as after-warranty repair. In addition, Equipment Care operated as a parts distributor to repair service companies and end-use customers. Operations were solely in the United States.

Additional Information

International Operations

We directly operate in approximately 100 countries outside of the United States through wholly-owned subsidiaries or, in some cases, through a joint venture with a local partner. In certain countries, selected products are sold by our export operations to distributors, agents or licensees, although the volume of those sales is not significant in terms of our overall revenues. In general, our businesses conducted outside the United States are similar to those conducted in the United States.

Our business operations outside the United States are subject to the usual risks of foreign operations, including possible changes in trade and foreign investment laws, international business laws and regulations, tax laws, currency exchange rates and economic and political conditions. The profitability of our international operations is generally lower than the profitability of our businesses in the United States, due to (i) the additional cost of operating in numerous and diverse foreign jurisdictions with varying laws and regulations, (ii) higher costs of importing certain raw materials and finished goods in some regions, (iii) the smaller scale of international operations where certain operating locations are smaller in size, and (iv) the additional reliance on distributors and agents in certain countries which can negatively impact our margins. Proportionately larger investments in sales and technical support are also necessary in certain geographies in order to facilitate the growth of our international operations.

Competition

In general, the markets in which the businesses in our Global Industrial reportable segment compete are led by a few large companies, with the rest of the market served by smaller entities focusing on more limited geographic regions or a smaller subset of products and services. Our businesses in this segment compete on the basis of their demonstrated value, technical expertise, chemical formulations, customer support, detection equipment, monitoring capabilities, and dosing and metering equipment.

The businesses in our Global Institutional reportable segment and Other have two significant classes of competitors. First, we compete with a small number of large companies selling directly or through distributors on a national or international scale. Second, we have numerous smaller regional or local competitors which focus on more limited geographies, product lines and/or end-use customer segments. We compete principally by providing superior value, premium customer support and differentiated products to help our customers protect their brand reputation.

Our Global Energy reportable segment competes with a limited number of multinational companies, with the remainder of the market comprised of smaller, regional niche companies focused on limited geographic areas. We compete in this business on the basis of our product quality, technical expertise, chemical formulations, effective global supply chain, strong customer service and emphasis on safety and environmental leadership.

Sales

Products, systems and services are primarily marketed in domestic and international markets by our Company-trained field sales personnel who also advise and assist our customers in the proper and efficient use of the products and systems in order to meet a full range of cleaning and sanitation, water treatment and process chemistry needs. Independent, third-party distributors and, to a lesser extent, sales agents, are utilized in several markets, as described in the segment descriptions found above.

Number of Employees

We had 49,000 employees as of December 31, 2018.

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Customers and Classes of Products

We believe our business is not materially dependent upon a single customer. Additionally, although we have a diverse customer base and no customer or distributor constitutes 10 percent or more of our 2018 consolidated revenues, we do have customers and independent, third-party distributors, the loss of which could have a material adverse effect on results of operations for the affected earnings periods; however, we consider it unlikely that such an event would have a material adverse impact on our financial position. No material part of our business is subject to renegotiation or termination at the election of a governmental unit.

We sold one class of products within the Global Institutional reportable segment which comprised 10% or more of consolidated net sales in the last three years. Sales of warewashing products were approximately 11% of consolidated net sales in 2018, 2017 and 2016.

Patents and Trademarks

We own and license a number of patents, trademarks and other intellectual property. While we have an active program to protect our intellectual property by filing for patents or trademarks and pursuing legal action, when appropriate, to prevent infringement, except for the items listed below, we do not believe our overall business is materially dependent on any individual patent or trademark.

- Patents related to our TRASAR and 3D TRASAR technology, which are material to our Global Industrial reportable segment. U.S. and foreign patents protect aspects of our key TRASAR and 3D TRASAR technology until at least 2024.

- Trademarks related to Ecolab, Nalco and 3D TRASAR, which collectively are material to all of our reportable segments. The Ecolab, Nalco and 3D TRASAR trademarks are registered or applied for in all of our key markets, and we anticipate maintaining them indefinitely.

Seasonality

We experience variability in our quarterly operating results due to seasonal sales volume and business mix fluctuations in our operating segments. Part II, Item 8, Note 19, entitled “Quarterly Financial Data” of this Form 10-K is incorporated herein by reference.

Investments in Equipment

We have no unusual working capital requirements. We have invested in the past, and will continue to invest in the future, in process control and monitoring equipment consisting primarily of systems used by customers to dispense our products as well as to monitor water systems. The investment in such equipment is discussed under the heading "Investing Activities" in Management's Discussion and Analysis of Financial Condition and Results of Operations of this Form 10-K.

Manufacturing and Distribution

We manufacture most of our products and related equipment in Company-operated manufacturing facilities. Some products are also produced for us by third-party contract manufacturers. Other products and equipment are purchased from third-party suppliers. Additional information on product/equipment sourcing is found in the segment discussions above and additional information on our manufacturing facilities is located under Part I, Item 2. “Properties,” of this Form 10-K.

Deliveries to customers are made from our manufacturing plants and a network of distribution centers and third-party logistics service providers. We use common carriers, our own delivery vehicles, and distributors for transport. Additional information on our plant and distribution facilities is located under Part I, Item 2. “Properties,” of this Form 10-K.

Raw Materials

Raw materials purchased for use in manufacturing our products are inorganic chemicals, including alkalis, acids, biocides, phosphonates, phosphorous materials, silicates and salts; and organic chemicals, including acids, alcohols, amines, fatty acids, surfactants, solvents, monomers and polymers. Healthcare purchases plastic films and parts to manufacture medical devices that serve the surgical and infection prevention markets. Pesticides used by Pest Elimination are purchased as finished products under contract or purchase order from the producers or their distributors. We also purchase packaging materials for our manufactured products and components for our specialized cleaning equipment and systems. We purchase more than 10,000 raw materials, with the largest single raw material representing less than 3% of raw material purchases. Our raw materials, with the exception of a few specialized chemicals which we manufacture, are generally purchased on an annual contract basis and are ordinarily available in adequate quantities from a diverse group of suppliers globally. When practical, global sourcing is used so that purchasing or production locations can be shifted to control product costs at globally competitive levels.

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Research and Development

Our research and development program consists principally of developing and validating the performance of new products, processes, techniques and equipment, improving the efficiency of those already existing, improving service program content, evaluating the environmental compatibility of products and technical support. Key disciplines include analytical and formulation chemistry, microbiology, process and packaging engineering, remote monitoring engineering and product dispensing technology. Substantially all of our principal products have been developed by our research, development and engineering personnel.

We believe continued research and development activities are critical to maintaining our leadership position within the industry and will provide us with a competitive advantage as we seek additional business with new and existing customers.

Joint Ventures

Over time, we have entered into partnerships or joint ventures in order to meet local ownership requirements, to achieve quicker operational scale, to expand our ability to provide our customers a more fully integrated offering or to provide other benefits to our business or customers. During 2018, the impact on our consolidated net income of our joint ventures, in the aggregate, was less than three percent. The table below identifies our most significant consolidated and non-consolidated joint ventures, summarized by the primary purpose of the joint venture.

Local Ownership Requirements / Geographic Expansion		
Joint Venture	Location	Segment
Nalco Saudi Co. Ltd.	Saudi Arabia	Global Energy, Global Industrial
Nalco Angola Prestação de Serviços, Limitada	Angola	Global Energy
RauanNalco LLP	Kazakhstan	Global Energy
Nalco Champion EG Sarl	Equatorial Guinea	Global Energy
Emirates National Chemical Company LLC	United Arab Emirates	Global Energy
Malaysian Energy Chemical & Services Sdn. Bhd.	Malaysia	Global Energy
Arpal Gulf, LLC		

	United Arab Emirates	Global Institutional
Nalco Champion Dai-ichi India Private Limited	India	Global Energy
Nalco Champion Ghana Limited	Ghana	Global Energy

Operational Scale / Geographic Critical Mass

Joint Venture	Location	Segment
Katayama Nalco Inc.	Japan	Global Industrial

Technology / Expanded Product Offering / Manufacturing Capability

Joint Venture	Location	Segment
Aquatech International, LLC	United States	Global Industrial
Treated Water Outsourcing	United States	Global Industrial
Derypol, S.A.	Spain	Global Industrial
Century LLC	United States	Global Institutional
Kogalym Chemicals Plant LLC	Russia	Global Energy
Petrochem Performance Products	Azerbaijan	Global Energy
HanSteel Nalco Water Treatment (Handan) Co., Limited	China	Global Industrial

We will continue to evaluate the potential for partnerships and joint ventures that can assist us in increasing our geographic, technological and product reach.

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Environmental and Regulatory Considerations

Our businesses are subject to various legislative enactments and regulations relating to the protection of the environment and public health. While we cooperate with governmental authorities and take commercially practicable measures to meet regulatory requirements and avoid or limit environmental effects, some risks are inherent in our businesses. Among the risks are costs associated with transporting and managing hazardous materials and waste disposal and plant site clean up, fines and penalties if we are found to be in violation of law, as well as modifications, disruptions or discontinuation of certain operations or types of operations including product recalls and reformulations. Similarly, the need for certain of our products and services is dependent upon or might be limited by governmental laws and regulations. Changes in such laws and regulations, including among others, air pollution regulations and regulations relating to oil and gas production (including those related to hydraulic fracturing), could impact the sales of some of our products or services. In addition to an increase in costs of manufacturing and delivering products, a change in production regulations or product regulations could result in interruptions to our business and potentially cause economic or consequential losses should we be unable to meet the demands of our customers for products.

Additionally, although we are not currently aware of any such circumstances, there can be no assurance that future legislation or enforcement policies will not have a material adverse effect on our consolidated results of operations, financial position or cash flows. Environmental and regulatory matters most significant to us are discussed below.

Ingredient Legislation: Various laws and regulations have been enacted by state, local and foreign jurisdictions pertaining to the sale of products which contain phosphorous, volatile organic compounds, or other ingredients that may impact human health or the environment. Under California Proposition 65, for example, label disclosures are required for certain products containing chemicals listed by California. Chemical management initiatives that promote pollution prevention through research and development of safer chemicals and safer chemical processes are being advanced by certain states, including California, Maine, Maryland, Massachusetts, Minnesota, Oregon and South Carolina.

Environmentally preferable purchasing programs for cleaning products have been enacted in nine states to date, and in recent years have been considered by several other state legislatures. Cleaning product ingredient disclosure legislation has been introduced in the U.S. Congress in each of the past few years but has not passed, and several states are considering further regulations in this area. In 2017, California passed the Cleaning Product Right to Know Act of 2017, that will require ingredient transparency on-line and on-label by 2020 and 2021, respectively. New York has published ingredient disclosure guidance based on existing regulation but final compliance has been delayed due to litigation. The U.S. Government is monitoring “green chemistry” initiatives through a variety of initiatives, including its “Design for the Environment” (“DfE”)/“Safer Choice” program. DfE/Safer Choice has three broad areas of work (recognition of safer products on a DfE/Safer Choice label, development of best practices for industrial processes and evaluation of safer chemicals), and we are involved in these to varying degrees. Our Global Institutional and Global Industrial cleaning products are subject to the regulations and may incur additional stay-in-market expenses associated with conducting the required alternatives analyses for chemicals of concern. To date, we generally have been able to comply with such legislative requirements by reformulation or labeling modifications. Such legislation has not had a material adverse effect on our consolidated results of operations, financial position or cash flows to date.

TSCA: The nation's primary chemicals management law, the Toxic Substances Control Act ("TSCA"), was updated for the first time in 40 years with the passage of the Frank R. Lautenberg Chemical Safety for the 21st Century Act ("LCSA") in 2016. The LCSA modernizes the original 1976 legislation, aiming to establish greater public confidence in the safety of chemical substances in commerce, improve the U.S. Environmental Protection Agency's ("EPA") capability and authority to regulate existing and new chemical substances, and prevent further state action or other notification programs like REACH (see below). For Ecolab, the TSCA changes mainly impact testing and submission costs for new chemical substances in the United States. In addition, the EPA likely will be more aggressively using the existing TSCA tools to manage chemicals of concern. We anticipate that compliance with new requirements under TSCA could be similar to the costs associated with REACH in the European Union, which is discussed below.

REACH: The European Union has enacted a regulatory framework for the Registration, Evaluation and Authorization of Chemicals ("REACH"). It established a new European Chemicals Agency ("ECHA") in Helsinki, Finland, which is responsible for evaluating data to determine hazards and risks and to manage this program for authorizing chemicals for sale and distribution in Europe. We met the pre-registration requirements of REACH, and the 2010, 2013 and 2018 registration deadlines. To help manage this program, we have been simplifying our product lines and working with chemical suppliers to comply with registration requirements. In addition, Korea, Taiwan, Turkey and other countries are implementing similar requirements. Potential costs to us are not yet fully quantifiable but are not expected to have a material adverse effect on our consolidated results of operations or cash flows in any one reporting period or on our financial position.

GHS: In 2003, the United Nations adopted a standard on hazard communication and labeling of chemical products known as the Globally Harmonized System of Classification and Labeling of Chemicals ("GHS"). GHS is designed to facilitate international trade and increase safe handling and use of hazardous chemicals through a worldwide system that classifies chemicals based on their intrinsic hazards and communicates information about those hazards through standardized product labels and safety data sheets ("SDSs"). Most countries in which we operate will adopt GHS-related legislation by 2020, and numerous countries already have done so. The primary cost of compliance revolves around reclassifying products and revising SDSs and product labels. We met the 2015 deadlines in the U.S. and European Union and are working toward a phased-in approach to mitigate the costs of GHS implementation in other countries (e.g., Australia, Canada, Thailand). Potential costs to us are not expected to have a material adverse effect on our consolidated results of operations or cash flows in any one reporting period or on our financial position.

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Pesticide and Biocide Legislation: Various international, federal and state environmental laws and regulations govern the manufacture and/or use of pesticides. We manufacture and sell certain disinfecting, sanitizing and material preservation products that kill or reduce microorganisms (bacteria, viruses, fungi) on hard environmental surfaces, in process fluids and on certain food products. Such products constitute “pesticides” or “antimicrobial pesticides” under the current definitions of the Federal Insecticide, Fungicide, and Rodenticide Act (“FIFRA”), as amended by the Food Quality Protection Act of 1996, the principal federal statute governing the manufacture, labeling, handling and use of pesticides. We maintain several hundred product registrations with the U.S. Environmental Protection Agency (“EPA”). Registration entails the necessity to meet certain efficacy, toxicity and labeling requirements and to pay on-going registration fees. In addition, each state in which these products are sold requires registration and payment of a fee. In general, the states impose no substantive requirements different from those required by FIFRA. However, California and certain other states have adopted additional regulatory programs, and California imposes a tax on total pesticide sales in that state. While the cost of complying with rules as to pesticides has not had a material adverse effect on our consolidated results of operations, financial condition, or cash flows to date, the costs and delays in receiving necessary approvals for these products continue to increase. Total fees paid to the EPA and the states to obtain or maintain pesticide registrations are not expected to significantly affect our consolidated results of operations or cash flows in any one reporting period or our financial position.

In Europe, the Biocidal Product Directive and the more recent Biocidal Products Regulation established a program to evaluate and authorize marketing of biocidal active substances and products. We are working with suppliers and industry groups to manage these requirements and have met the first relevant deadline of the program by the timely submission of dossiers for active substances. Anticipated registration costs, which will be incurred through the multi-year phase-in period, will be significant; however, these costs are not expected to significantly affect our consolidated results of operations or cash flows in any one reporting period or our financial position. The same is true for emerging biocide regulations in Asia.

In addition, Pest Elimination applies restricted-use pesticides that it generally purchases from third parties. That business must comply with certain standards pertaining to the use of such pesticides and to the licensing of employees who apply such pesticides. Such regulations are enforced primarily by the states or local jurisdictions in conformity with federal regulations. We have not experienced material difficulties in complying with these requirements.

FDA Antimicrobial Product Requirements: Various laws and regulations have been enacted by federal, state, local and foreign jurisdictions regulating certain products manufactured and sold by us for controlling microbial growth on humans, animals and foods. In the United States, these requirements generally are administered by the U.S. Food and Drug Administration ("FDA"). However, the U.S. Department of Agriculture and EPA also may share in regulatory jurisdiction of antimicrobials applied to food. The FDA codifies regulations for these product categories in order to ensure product quality, safety and effectiveness. The FDA also has been expanding requirements applicable to such products, including proposing regulations for over-the-counter antiseptic drug products, which may impose additional requirements associated with antimicrobial hand care products and associated costs when finalized by the FDA. FDA regulations associated with the Food Safety Modernization Act may impose additional requirements related to safety product lines. To date, such requirements have not had a material adverse effect on our consolidated results of operations, financial position or cash flows.

Medical Device and Drug Product Requirements: As a manufacturer, distributor and marketer of medical devices and human drugs, we also are subject to regulation by the FDA and corresponding regulatory agencies of the state, local and foreign governments in which we sell our products. These regulations govern the development, testing, manufacturing, packaging, labeling, distribution and marketing of medical devices and medicinal products. We also are required to register with the FDA as a medical device and drug manufacturer, comply with post-market reporting (e.g., Adverse Event Reporting, MDR and Recall) requirements, and to comply with the FDA's current Good Manufacturing Practices and Quality System Regulations which require that we have a quality system for the design and production of our products intended for commercial distribution in the United States and satisfy recordkeeping requirements with respect to our manufacturing, testing and control activities. Countries in the European Union require that certain products being sold within their jurisdictions obtain a "CE mark", an international symbol of adherence to quality assurance standards, and be manufactured in compliance with certain requirements (e.g., Medical Device Directive 93/42/EE and ISO 13485). We have CE mark approval to sell various medical device and medicinal products in Europe. Our other international non-European operations also are subject to government regulation and country-specific rules and regulations. Regulators at the federal, state and local level have imposed, are currently considering and are expected to continue to impose regulations on medical devices and drug products. No prediction can be made of the potential effect of any such future regulations, and there can be no assurance that future legislation or regulations will not increase the costs of our products or prohibit the sale or use of certain products.

Equipment: Ecolab's products are dispensed by equipment that is subject to state and local regulatory requirements, as well as being subject to UL, NSF, and other approval requirements. We have both dedicated manufacturing facilities and third-party production of our equipment. We are developing processes to monitor and manage changing regulatory regimes and assist with equipment systems compliance. To date, such requirements have not had a material adverse effect on our consolidated results of operations, financial position or cash flows.

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Other Environmental Legislation: Our manufacturing plants are subject to federal, state, local or foreign jurisdiction laws and regulations relating to discharge of hazardous substances into the environment and to the transportation, handling and disposal of such substances. The primary federal statutes that apply to our activities in the United States are the Clean Air Act, the Clean Water Act and the Resource Conservation and Recovery Act. We are also subject to the Superfund Amendments and Reauthorization Act of 1986, which imposes certain reporting requirements as to emissions of hazardous substances into the air, land and water. The products we produce and distribute into Europe are also subject to directives governing electrical waste (WEEE Directive 2012/19/EU) and restrictive substances (RoHS Directive 2011/65/EU). Similar legal requirements apply to Ecolab's facilities globally. We make capital investments and expenditures to comply with environmental laws and regulations, to promote employee safety and to carry out our announced environmental sustainability principles. To date, such expenditures have not had a significant adverse effect on our consolidated results of operations, financial position or cash flows. Our capital expenditures for environmental, health and safety projects worldwide were approximately $60 million in 2018 and $70 million in 2017. Approximately $60 million has been budgeted globally for projects in 2019.

Climate Change: Various laws and regulations pertaining to climate change have been implemented or are being considered for implementation at the international, national, regional and state levels, particularly as they relate to the reduction of greenhouse gas ("GHG") emissions. None of these laws and regulations directly apply to Ecolab at the present time; however, as a matter of corporate policy, we support a balanced approach to reducing GHG emissions while sustaining economic growth.

Furthermore, climate-related risks are assessed within our Enterprise Risk Management process and Annual Business Significance Risks Assessment, which is aligned with recommendations of the Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosures (TCFD). Ecolab is evaluating further application of the recommendations of the TCFD over the next three to five years, in alignment with the recommended timeline from the TCFD.

Our current global sustainability targets were established in 2016. They include a 25 percent reduction in water withdrawals and a 10 percent reduction in GHG emissions by 2020. In addition to our internal sustainability performance, we partner with customers at more than three million customer locations around the world to reduce energy and GHG emissions through our high-efficiency solutions in cleaning and sanitation, water, paper and energy services. We also introduced a customer impact goal for the first time. By partnering with our customers to help them do more with less through the use of our solutions, we aim to help our customers conserve more than 300 billion gallons of water annually by 2030.

Environmental Remediation and Proceedings: Along with numerous other potentially responsible parties ("PRP"), we are currently involved with waste disposal site clean up activities imposed by the federal Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") or state equivalents at 28 sites in the United States. Additionally, we have similar liability at seven sites outside the United States. In general, under CERCLA, we and each other PRP that actually contributed hazardous substances to a Superfund site are jointly and severally liable for the costs associated with cleaning up the site. Customarily, the PRPs will work with the EPA to agree and implement a plan for site remediation.

Based on an analysis of our experience with such environmental proceedings, our estimated share of all hazardous materials deposited on the sites referred to in the preceding paragraph, and our estimate of the contribution to be made by other PRPs which we believe have the financial ability to pay their shares, we have accrued our best estimate of our probable future costs relating to such known sites. In establishing accruals, potential insurance reimbursements are not included. The accrual is not discounted. It is not feasible to predict when the amounts accrued will be paid due to the uncertainties inherent in the environmental remediation and associated regulatory processes.

The prosecution office of Liu He district, Nanjing City, Jingsu Province, China, brought charges alleging violation of environmental laws relating to waste disposal against the Company's Nalco subsidiary in Nanjing City, China on November 26, 2018. Prior to these charges being alleged, related charges were brought against certain individual employees of the subsidiary. The case, which is seeking to assess monetary penalties, is pending for trial before the People's Court of Liu He District. The subsidiary could also be subject to a separate civil penalty. We anticipate that this matter will not have a material adverse effect on our consolidated results of operations, financial position or cash flows.

We have also been named as a defendant in lawsuits where our products have not caused injuries, but the claimants wish to be monitored for potential future injuries. We cannot predict with certainty the outcome of any such tort claims or the involvement we or our products might have in such matters in the future, and there can be no assurance that the discovery of previously unknown conditions will not require significant expenditures. In each of these chemical exposure cases, our insurance carriers have accepted the claims on our behalf (with or without reservation) and our financial exposure should be limited to the amount of our deductible; however, we cannot predict the number of claims that we may have to defend in the future and we may not be able to continue to maintain such insurance.

We have also been named as a defendant in a number of lawsuits alleging personal injury due to exposure to hazardous substances, including multi-party lawsuits alleging personal injury in connection with our products and services. While we do not believe that any of these suits will be material to us based upon present information, there can be no assurance that these environmental matters could not have, either individually or in the aggregate, a material adverse effect on our consolidated results of operations, financial position or cash flows.

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Our worldwide net expenditures for contamination remediation were approximately $3 million in 2018 and $6 million in 2017. Our worldwide accruals at December 31, 2018 for probable future remediation expenditures, excluding potential insurance reimbursements, totaled approximately $17 million. We review our exposure for contamination remediation costs periodically and our accruals are adjusted as considered appropriate. While the final resolution of these issues could result in costs below or above current accruals and, therefore, have an impact on our consolidated financial results in a future reporting period, we believe the ultimate resolution of these matters will not have a material effect on our consolidated results of operations, financial position or cash flows.

Iran Threat Reduction and Syria Human Rights Act of 2012

Under the Iran Threat Reduction and Syria Human Rights Act of 2012, which added Section 13(r) of the Securities Exchange Act of 1934, the Company is required to disclose in its periodic reports if it or any of its affiliates knowingly engaged in certain activities, transactions or dealings relating to Iran or with entities or individuals designated pursuant to certain Executive Orders. Disclosure is required even where the activities are conducted outside the U.S. by non-U.S. affiliates in compliance with applicable law, and even if the activities are not covered or prohibited by U.S. law. After the easing of certain sanctions by the United States against Iran in January 2016 pursuant to the Joint Comprehensive Plan of Action relating to Iran's nuclear program (JCPOA), and in compliance with the economic sanctions regulations administered by U.S. Treasury's Office of Foreign Assets Control (OFAC) and U.S. export control laws, a wholly-owned non-U.S. subsidiary of the Company conducting business in our Energy operating segment has completed sales relating to Iran pursuant to and in compliance with the terms and conditions of OFAC's General License H, including sales of products used for process and water treatment applications in (i) upstream oil and gas production and (ii) petrochemical plants. The Company has reported these sales in its previous reports on Form 10-Q and Form 10-K.

On May 8, 2018, the President announced his decision to cease the United States' participation in the JCPOA, and to begin reimposing, following a wind-down period, the sanctions that were lifted to effectuate the JCPOA sanctions relief. In conjunction with this announcement, the President issued a National Security Presidential Memorandum (NSPM) directing the Secretary of State and the Secretary of the Treasury to prepare immediately for the reimposition of all of the U.S. sanctions lifted or waived in connection with the JCPOA, to be accomplished as expeditiously as possible and in no case later than 180 days from the date of the NSPM. On June 27, 2018, OFAC revoked General License H and issued a wind-down general license that authorized, through November 4, 2018, the wind down of activities involving Iran that were previously authorized pursuant to General License H. Our non-U.S. subsidiary timely completed the winding down of its business activities in Iran pursuant to the wind-down license. For its fiscal year 2018, through the completion of the wind-down period, our non-U.S. subsidiary completed the following sales related to businesses in our Energy operating segment to a distributor in Dubai and two distributors in Iran: sales of products used for process and water treatment applications in (i) upstream oil and gas production and (ii) petrochemical plants totaling $4.7 million. The net profit before taxes associated with these sales is estimated to be $0.9 million.

In addition to the foregoing, as authorized by OFAC, a non-U.S. subsidiary of the Company completed sales of products used for process and water treatment applications in upstream oil and gas production related to the operation of and production from the Rhum gas field off the Scottish coast (Rhum) totaling $0.6 million during the subsidiary’s fiscal year ended November 30, 2018, and additional sales of such products totaling $0.1 million were completed during December 2018. The net profit before taxes associated with these sales for each period were nominal. Rhum was previously jointly owned by BP Exploration Operating Company Limited (BP) and Iranian Oil Company (U.K.) Limited. BP completed the sale of its ownership stake in the Rhum joint arrangement and transferred its role as operator to Serica Energy plc on November 30, 2018. Our non-U.S. subsidiary intends to continue the Rhum-related activities, consistent with a specific license obtained from OFAC by its customers, and such activities may require additional disclosure pursuant to the abovementioned statute.

Available Information.

We file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains a website that contains reports, proxy and information statements, and other information regarding issuers, including the Company, that file electronically with the SEC at https://www.sec.gov.

General information about us, including our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, as well as any amendments and exhibits to those reports, are available free of charge through our website at https://investor.ecolab.com as soon as reasonably practicable after we file them with, or furnish them to, the SEC.

In addition, the following governance materials are available on our web site at https://investor.ecolab.com/corporate-governance: (i) charters of the Audit, Compensation, Finance, Governance and Safety, Health and Environment Committees of our Board of Directors; (ii) our Board's Corporate Governance Principles; and (iii) our Code of Conduct.

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Executive Officers.

The persons listed in the following table are our current executive officers. Officers are elected annually. There is no family relationship among any of the directors or executive officers and no executive officer has been involved during the past ten years in any legal proceedings described in applicable Securities and Exchange Commission regulations.

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Name	Age	Office	Positions Held Since Jan. 1, 2014
Douglas M. Baker, Jr.	60	Chairman of the Board and Chief Executive Officer	Jan. 2014 – Present
Christophe Beck	51	Executive Vice President and President – Industrial	May 2018 – Present
		Executive Vice President and President – Global Nalco Water	May 2017 – May 2018
		Executive Vice President and President – Global Water & Process Services	May 2015 – May 2017
		Executive Vice President and President – Regions	Jan. 2014 – May 2015
Larry L. Berger	58	Executive Vice President and Chief Technical Officer	Jan. 2014 – Present
Alex N. Blanco	58	Executive Vice President and Chief Supply Chain Officer	Jan. 2014 – Present
Darrell R. Brown	55	Executive Vice President and President – Energy Services	Jan. 2018 – Present
		Executive Vice President, Global Downstream and WellChem	Apr. 2017 – Dec. 2017
		Executive Vice President and President – Europe	Feb. 2014 – Mar. 2017
		Executive Vice President and President – Asia Pacific	Jan. 2014
Angela M. Busch	52	Executive Vice President – Corporate & Business Development	Aug. 2018 - Present
		Senior Vice President – Corporate Development	Jan. 2014 – Aug. 2018
Thomas W. Handley	64	President and Chief Operating Officer	Jan. 2014 – Present
Michael A. Hickey	57	Executive Vice President – Special Initiatives	Oct. 2018 – Present
		Executive Vice President and President – Global Institutional	

			Jan. 2014 – Sept. 2018
Roberto Inchaustegui	63	Executive Vice President and President – Global Services and Specialty	Jan. 2014 – Present
Bruno Lavandier	52	Senior Vice President and Corporate Controller	May 2017 – Present
		Senior Vice President, Ecolab Catalyst Program	Mar. 2017 – Apr. 2017
		Senior Vice President of Finance, Global Supply Chain	Jan. 2015 – Feb. 2017
		Vice President of Finance, Global Supply Chain	Aug. 2014 – Dec. 2014
		President TIORCO and Vice President of Nalco EOR (Enhanced Oil Recovery) Solutions	Jan. 2014 – July 2014
Laurie M. Marsh	55	Executive Vice President – Human Resources	Jan. 2014 – Present
Michael C. McCormick	56	Executive Vice President, General Counsel and Secretary	Oct. 2017 – Present
		Executive Vice President, General Counsel and Assistant Secretary	Mar. 2017 – Sep. 2017
		Chief Compliance Officer, Deputy General Counsel and Assistant Secretary	June 2016 – Feb. 2017
		Chief Compliance Officer and Assistant Secretary	Mar. 2014 – May 2016
		Corporate Compliance Officer, Associate General Counsel and Assistant Secretary	Jan. 2014 – Feb. 2014
Timothy P. Mulhere	56	Executive Vice President and President – Global Institutional	July 2018 – Present
		Executive Vice President and President – Regions	May 2015 – June 2018
		Executive Vice President and President – Global Water and Process Services	Jan. 2014 – May 2015
Daniel J. Schmechel	59	Chief Financial Officer and Treasurer	Jan. 2017 – Present
		Chief Financial Officer	Jan. 2014 – Dec. 2016

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Name	Age	Office	Positions Held Since Jan. 1, 2014
Elizabeth A. Simermeyer	54	Executive Vice President – Global Marketing & Communications and Life Sciences	July 2015 - Present
		Senior Vice President – Global Marketing & Communications	Feb. 2014 – July 20151
Jill S. Wyant	47	Executive Vice President and President – Global Regions and Global Healthcare	Jan. 2018 – Present
		Executive Vice President and President – Global Food & Beverage, Healthcare and Life Sciences	May 2016 – Dec. 2017
		Executive Vice President and President – Global Food & Beverage	Jan. 2014 – Apr. 2016

1. Prior to joining Ecolab in February 2014, Ms. Simermeyer was employed by S. C. Johnson & Son, Inc., most recently as Senior Vice President – Home Cleaning.

Forward-Looking Statements

This Form 10-K, including Part I, Item 1, entitled “Business”, and the MD&A within Part II, Item 7, contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. These statements include expectations concerning items such as:

- amount, funding and timing of cash expenditures relating to our restructuring and other initiatives
- future cash flows, access to capital, targeted credit rating metrics and impact of credit rating downgrade
- uses for cash, including dividends, share repurchases, debt repayments, capital investments and strategic business acquisitions
- global market risk
- impact of oil price fluctuations, comparative performance and prospects of businesses in our Global Energy segment
- long-term potential of our business
- impact of changes in exchange rates and interest rates
- customer retention rate
- bad debt experience, non-performance of counterparties and losses due to concentration of credit risk
- disputes, claims and litigation
- environmental contingencies

- impact and cost of complying with laws and regulations
- sustainability targets
- returns on pension plan assets
- contributions to pension and postretirement healthcare plans
- amortization expense
- impact of new accounting pronouncements
  - income taxes, including valuation allowances, loss carryforwards, unrecognized tax benefits, uncertain tax positions and deductibility of goodwill
- recognition of share-based compensation expense
- payments under operating leases
- future benefit plan payments
- market position
- doing business relating to Iran
- anticipated spin-off of the upstream group of our Energy business, including form of transaction, timing and tax effects

Without limiting the foregoing, words or phrases such as “will likely result,” “are expected to,” “will be”, “will continue,” “is anticipated,” “we believe,” “we expect,” “estimate,” “project” (including the negative or variations thereof), “intends,” “could” similar terminology, generally identify forward-looking statements. Forward-looking statements may also represent challenging goals for us. These statements, which represent the Company’s expectations or beliefs concerning various future events, are based on current expectations that involve a number of risks and uncertainties that could cause actual results to differ materially from those of such forward-looking statements. We caution that undue reliance should not be placed on such forward-looking statements, which speak only as of the date made. For a further discussion of these and other factors which could cause results to differ from those expressed in any forward-looking statement, see Item 1A of this Form 10-K, entitled “Risk Factors”. Except as may be required under applicable law, we undertake no duty to update our forward-looking statements.

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Item 1A. Risk Factors.

The following are important factors which could affect our financial performance and could cause our actual results for future periods to differ materially from our anticipated results or other expectations, including those expressed in any forward-looking statements made in this Form 10-K. See the section entitled “Forward-Looking Statements” set forth above.

We may also refer to this disclosure to identify factors that may cause results to differ from those expressed in other forward-looking statements including those made in oral presentations, including telephone conferences and/or webcasts open to the public.

Our results depend upon the continued vitality of the markets we serve.

Economic downturns, and in particular downturns in our larger markets including the energy, foodservice, hospitality, travel, health care, food processing, pulp and paper, mining and steel industries, can adversely impact our end-users. The well completion and stimulation, oil and gas production and refinery and petrochemical plant markets served by our Global Energy segment may be impacted by substantial fluctuations in oil and gas prices; in 2015 and 2016, the Global Energy segment experienced decreased sales as a result of very challenging global energy market conditions. In recent years, the weaker global economic environment, particularly in Europe and emerging markets such as China and Brazil, has also negatively impacted many of our end-markets. Weaker economic activity may continue to adversely affect these markets. During these periods of weaker economic activity, our customers and potential customers may reduce or discontinue their volume of purchases of cleaning and sanitizing products and water treatment and process chemicals, which has had, and may continue to have, an adverse effect on our business.

Our results are impacted by general worldwide economic factors.

Economic factors such as the worldwide economy, capital flows, interest rates and currency movements, including, in particular, our exposure to foreign currency risk, have affected our business in the past and may have a material adverse impact on our business in the future. For example, in 2011 and 2012, the European Union’s sovereign debt crisis negatively impacted economic activity in that region as well as the strength of the euro versus the U.S. dollar. Additionally, the June 2016 Brexit vote resulted in a sharp decline in the value of the British pound, as compared to the U.S. dollar and other currencies, and has caused increased fluctuations and unpredictability in foreign currency exchange rates. The possibility for referendum by other EU member states may lead to further market volatility. Other regions of the world, including emerging market areas, also expose us to foreign currency risk. As a result of increasing currency controls, importation restrictions, workforce regulations, pricing constraints and local capitalization requirements, we deconsolidated our Venezuelan subsidiaries effective as of the end of the fourth quarter of 2015. Prior to deconsolidation, across the second through fourth quarters of 2015, we devalued our

Venezuelan bolivar operations within our Water, Paper, Food & Beverage, Institutional and Energy operating segments. Similar currency devaluations, credit market disruptions or other economic turmoil in other countries could have a material adverse impact on our consolidated results of operations, financial position and cash flows by negatively impacting economic activity, including in our key end-markets, and by further weakening the local currency versus the U.S. dollar, resulting in reduced sales and earnings from our foreign operations, which are generated in the local currency, and then translated to U.S. dollars.

If we are unsuccessful in executing on key business initiatives, including our Enterprise Resource Planning ("ERP") system upgrade, our business could be adversely affected.

We continue to execute key business initiatives, including investments to develop business systems and restructurings such as those discussed under Note 3 entitled "Special (Gains) and Charges" of this Form 10-K, as part of our ongoing efforts to improve our efficiency and returns. In particular, we are implementing an ERP system upgrade, which is expected to continue in phases over the next several years. This upgrade, which includes supply chain, commercial operations and certain finance functions, is expected to improve the efficiency of certain financial and related transactional processes. The upgrade involves complex business process design and a failure of certain of these processes could result in business disruption. If the projects in which we are investing or the initiatives which we are pursuing are not successfully executed, our consolidated results of operations, financial position or cash flows could be adversely affected.

We may be subject to information technology system failures, network disruptions and breaches in data security.

We rely to a large extent upon information technology systems and infrastructure to operate our business. The size and complexity of our information technology systems make them potentially vulnerable to failure, malicious intrusion and random attack. Acquisitions have resulted in further de-centralization of systems and additional complexity in our systems infrastructure. Likewise, data security breaches by employees and others with permitted access to our systems may pose a risk that sensitive data may be exposed to unauthorized persons or to the public. While we have invested in protection of data and information technology, there can be no assurance that our efforts will prevent failures, cybersecurity attacks or breaches in our systems that could cause reputational damage, business disruption and legal and regulatory costs; could result in third-party claims; could result in compromise or misappropriation of our intellectual property, trade secrets and sensitive information; or could otherwise adversely affect our business. Certain of our customer offerings include digital components, such as remote monitoring of certain customer operations. A breach of those remote monitoring systems could expose customer data giving rise to potential third party claims and reputational damage. There may be other related challenges and risks as we continue to implement our ERP system upgrade.

We are pursuing a plan to spin off our Upstream Energy business into an independent publicly traded company. The proposed spin-off may not be completed on the currently contemplated timeline or at all and may not achieve the intended benefits.

We have announced a plan to spin off our Upstream Energy business into an independent publicly traded company by mid-year 2020. Unanticipated developments, including possible delays in obtaining various regulatory approvals or clearances and trade qualifications, uncertainty of the financial markets and challenges in establishing infrastructure or processes, could delay or prevent the proposed spin-off or cause the proposed spin-off to occur on terms or conditions that are less favorable and/or different than expected. Even if the transaction is completed, we may not realize some or all of the anticipated benefits from the spin-off. Expenses incurred to accomplish the proposed spin-off may be significantly higher than what we currently anticipate. Executing the proposed spin-off also requires significant time and attention from management, which could distract them from other tasks in operating our business. Following the proposed spin-off, the combined value of the common stock of the two publicly-traded companies may not be equal to or greater than what the value of our common stock would have been had the proposed spin-off not occurred.

We depend on key personnel to lead our business.

Our continued success will largely depend on our ability to attract, retain and develop a high caliber of talent and on the efforts and abilities of our executive officers and certain other key employees, particularly those with sales and sales management responsibilities. As we continue to grow our business, make acquisitions, expand our geographic scope and offer new products and services, we need the organizational talent necessary to ensure effective succession for executive officer and key employee roles in order to match the growth and development of our business. Our operations could be adversely affected if for any reason we were unable to attract, retain or develop such officers or key employees.

Our growth depends upon our ability to successfully compete with respect to value, innovation and customer support.

We have numerous global, national, regional and local competitors. Our ability to compete depends in part on providing high quality and high value-added products, technology and service. We must also continue to identify, develop and commercialize innovative, profitable and high value-added products for niche applications and commercial digital applications. We have made significant investments in commercial digital product offerings, and our culture and expertise must continue to evolve to develop, support and profitably deploy commercial digital offerings, which are becoming a more important part of our business. There can be no assurance that we will be able to accomplish our technology development goals or that technological developments by our competitors will not place certain of our products, technology or services at a competitive disadvantage in the future. In addition, certain of the new products that we have under development will be offered in markets in which we do not currently compete, and there can be no assurance that we will be able to compete successfully in those new markets. If we fail to introduce new technologies or commercialize our digital offerings on a timely and profitable basis, we may lose market share and our consolidated results of operations, financial position or cash flows could be adversely affected.

Our significant non-U.S. operations expose us to global economic, political and legal risks that could impact our profitability.

We have significant operations outside the United States, including joint ventures and other alliances. We conduct business in approximately 170 countries and, in 2018, approximately 47% of our net sales originated outside the United States. There are inherent risks in our international operations, including:

- exchange controls and currency restrictions;
- currency fluctuations and devaluations;
- tariffs and trade barriers;
- export duties and quotas;
- changes in the availability and pricing of raw materials, energy and utilities;
- changes in local economic conditions;
- changes in laws and regulations, including the imposition of economic or trade sanctions affecting international commercial transactions;
- impact from Brexit and the possibility of similar events in other EU member states;
- difficulties in managing international operations and the burden of complying with foreign laws;
- requirements to include local ownership or management in our business;
- economic and business objectives that differ from those of our joint venture partners;
- exposure to possible expropriation, nationalization or other government actions;
- restrictions on our ability to repatriate dividends from our subsidiaries;
- unsettled political conditions, military action, civil unrest, acts of terrorism, force majeure, war or other armed conflict; and
- countries whose governments have been hostile to U.S.-based businesses.

Brexit, and the subsequent notification in March 2017 of the U.K.'s intention to withdraw from the EU, has created uncertainties in the economic, political and business environment in the U.K. and the EU. While the effects of Brexit will depend on any agreements the U.K. makes to retain access to EU markets or the failure to reach such agreements, the uncertainties created by Brexit, any resolution between the U.K. and EU countries or the failure to reach any such resolutions, could adversely affect our relationships with customers, suppliers and employees and could adversely affect our business.

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In addition, changes in U.S. or foreign government policy on international trade, including the imposition or continuation of tariffs, could adversely affect our business. In 2018, the U.S. imposed tariffs on certain imports from China and other countries, resulting in retaliatory tariffs by China and other countries. These tariffs, and any additional tariffs imposed by the U.S., China or other countries or any additional retaliatory measures by any of these countries, could increase our costs, reduce our sales and earnings or otherwise have an adverse effect on our operations.

Also, because of uncertainties regarding the interpretation and application of laws and regulations and the enforceability of intellectual property and contract rights, we face risks in some countries that our intellectual property rights and contract rights would not be enforced by local governments. We are also periodically faced with the risk of economic uncertainty, which has impacted our business in some countries. Other risks in international business also include difficulties in staffing and managing local operations, including managing credit risk to local customers and distributors.

Further, our operations outside the United States require us to comply with a number of United States and international regulations, including anti-corruption laws such as the United States Foreign Corrupt Practices Act and the United Kingdom Bribery Act, as well as U.S. and international economic sanctions regulations. We have internal policies and procedures relating to such regulations; however, there is risk that such policies and procedures will not always protect us from the misconduct or reckless acts of employees or representatives, particularly in the case of recently acquired operations that may not have significant training in applicable compliance policies and procedures. Violations of such laws and regulations could result in disruptive investigations of the Company, significant fines and sanctions, which could adversely affect our consolidated results of operations, financial position or cash flows.

Our overall success as a global business depends, in part, upon our ability to succeed in differing economic, social, legal and political conditions. We may not continue to succeed in developing and implementing policies and strategies that are effective in each location where we do business, which could adversely affect our consolidated results of operations, financial position or cash flows.

Our results could be adversely affected by difficulties in securing the supply of certain raw materials or by fluctuations in the cost of raw materials.

The prices of raw materials used in our business can fluctuate from time to time, and in recent years we have experienced periods of increased raw material costs. Changes in raw material prices, unavailability of adequate and reasonably priced raw materials or substitutes for those raw materials, or the inability to obtain or renew supply agreements on favorable terms can adversely affect our consolidated results of operations, financial position or cash flows. In addition, volatility and disruption in economic activity and conditions could disrupt or delay the performance of our suppliers and thus impact our ability to obtain raw materials at favorable prices or on favorable terms, which may adversely affect our business.

Consolidation of our customers and vendors could affect our results.

Customers and vendors in the foodservice, hospitality, travel, healthcare, energy, food processing and pulp and paper industries, as well as other industries we serve, have consolidated in recent years and that trend may continue. This consolidation could have an adverse impact on our ability to retain customers and on our margins and consolidated results of operations.

Our business depends on our ability to comply with laws and governmental regulations, and we may be adversely affected by changes in laws and regulations.

Our business is subject to numerous laws and regulations relating to the environment, including evolving climate change standards, and to the manufacture, storage, distribution, sale and use of our products as well as to the conduct of our business generally, including employment and labor laws. Compliance with these laws and regulations exposes us to potential financial liability and increases our operating costs. Regulation of our products and operations continues to increase with more stringent standards, causing increased costs of operations and potential for liability if a violation occurs. The potential cost to us relating to environmental and product registration laws and regulations is uncertain due to factors such as the unknown magnitude and type of possible contamination and clean-up costs, the complexity and evolving nature of laws and regulations, and the timing and expense of compliance. Changes to current laws (including tax laws), regulations and policies could impose new restrictions, costs or prohibitions on our current practices which would adversely affect our consolidated results of operations, financial position or cash flows. Changes to labor and employment laws and regulations, as well as related rulings by courts and administrative bodies, could adversely affect our operations and expose us to potential financial liability.

Our subsidiaries are defendants in pending lawsuits alleging negligence and injury resulting from the use of our COREXIT dispersant in response to the Deepwater Horizon oil spill, which could expose us to monetary damages or settlement costs.

As described in Part II, Item 8, Note 15, “Commitments and Contingencies,” of this Form 10-K, Nalco Company and certain affiliates (collectively “Nalco”) have been named as a defendant in a series of class action and individual plaintiff lawsuits arising from the use of our COREXIT dispersant in response to the Deepwater Horizon oil spill, which could expose us to monetary damages or settlement costs. The plaintiffs in these matters claimed damages under products liability, tort and other theories.

There currently remain nine cases pending against Nalco. We expect they will be dismissed pursuant to a November 28, 2012 order granting Nalco’s motion for summary judgment. We cannot predict whether there will be an appeal of the dismissal, the involvement we might have in these matters in the future or the potential for future litigation. However, if an appeal by plaintiffs in these lawsuits is brought and won, these suits could have an adverse effect on our consolidated results of operations, financial position or cash flows.

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Nalco continues to sell the COREXIT oil dispersant product and could be exposed to future lawsuits from the use of such product. We cannot predict the potential for future litigation with respect to such sales. However, if one or more of such lawsuits are brought and won, these suits could have an adverse impact on our financial results.

We enter into multi-year contracts with customers that could impact our results.

Our multi-year contracts with some of our customers include terms affecting our pricing flexibility. There can be no assurance that these restraints will not have an adverse impact on our margins and consolidated results of operations.

If we are unsuccessful in integrating acquisitions, our business could be adversely affected.

As part of our long-term strategy, we seek to acquire complementary businesses. There can be no assurance that we will find attractive acquisition candidates or succeed at effectively managing the integration of acquired businesses into existing businesses. If the underlying business performance of such acquired businesses deteriorates, the expected synergies from such transactions do not materialize or we fail to successfully integrate new businesses into our existing businesses, our consolidated results of operations, financial position or cash flows could be adversely affected.

Changes in tax laws and unanticipated tax liabilities could adversely affect the taxes we pay and our profitability.

We are subject to income and other taxes in the United States and foreign jurisdictions, and our operations, plans and results are affected by tax and other initiatives around the world. In particular, we are affected by the impact of changes to tax laws or related authoritative interpretations in the United States, including tax reform under the 2017 Tax Cuts and Jobs Act (the “Tax Act”), which includes broad and complex changes to the United States tax code, and the state tax response to the Tax Act, including, but not limited to variability in our future tax rate. We are also subject to changes in tax law outside the United States, such as interpretation as to the legality of tax advantages granted under the European Union state aid rules. In addition, we are impacted by settlements of pending or any future adjustments proposed by the IRS or other taxing authorities in connection with our tax audits, all of which will depend on their timing, nature and scope. Increases in income tax rates, changes in income tax laws (including regulations which interpret the Tax Act) or unfavorable resolution of tax matters could have an adverse impact on our financial results.

Future events may impact our deferred tax position, including the utilization of foreign tax credits and undistributed earnings of international affiliates that are considered to be reinvested indefinitely.

We evaluate the recoverability of deferred tax assets and the need for deferred tax liabilities based on available evidence. This process involves significant management judgment about assumptions that are subject to change from period to period based on changes in tax laws or variances between future projected operating performance and actual results. We are required to establish a valuation allowance for deferred tax assets if we determine, based on available evidence at the time the determination is made, that it is more likely than not that some portion or all of the deferred tax assets will not be realized. In making this determination, we evaluate all positive and negative evidence as of the end of each reporting period. Future adjustments (either increases or decreases), to the deferred tax asset valuation allowance are determined based upon changes in the expected realization of the net deferred tax assets. The realization of the deferred tax assets ultimately depends on the existence of sufficient taxable income in either the carry-back or carry-forward periods under the tax law. Due to significant estimates used to establish the valuation allowance and the potential for changes in facts and circumstances, it is reasonably possible that we will be required to record adjustments to the valuation allowance in future reporting periods. Changes to the valuation allowance or the amount of deferred tax liabilities could adversely affect our consolidated results of operations or financial position. Further, should we change our assertion regarding the permanent reinvestment of the undistributed earnings of international affiliates, a deferred tax liability may need to be established.

Our indebtedness may limit our operations and our use of our cash flow, and any failure to comply with the covenants that apply to our indebtedness could adversely affect our liquidity and financial statements.

As of December 31, 2018, we had approximately $7.0 billion in outstanding indebtedness, with approximately $742 million in the form of floating rate debt. Our debt level and related debt service obligations may have negative consequences, including:

· requiring us to dedicate significant cash flow from operations to the payment of principal and interest on our debt, which reduces the funds we have available for other purposes such as acquisitions and capital investment;

· reducing our flexibility in planning for or reacting to changes in our business and market conditions;

· exposing us to interest rate risk since a portion of our debt obligations are at variable rates. For example, a one percentage point increase in the average interest rate on our floating rate debt at December 31, 2018 would increase future interest expense by approximately $7 million per year; and

· increasing our cost of funds and adversely affecting our liquidity and access to the capital markets should we fail to maintain the credit ratings assigned to us by independent rating agencies.

If we add new debt, the risks described above could increase.

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Severe public health outbreaks may adversely impact our business.

Our business could be adversely affected by the effect of a public health epidemic. The United States and other countries have experienced, and may experience in the future, public health outbreaks such as Zika virus, Avian Flu, SARS and H1N1 influenza. A prolonged occurrence of a contagious disease such as these could result in a significant downturn in the foodservice, hospitality and travel industries and also may result in health or other government authorities imposing restrictions on travel further impacting our end markets. Any of these events could result in a significant drop in demand for some of our products and services and adversely affect our business.

We incur significant expenses related to the amortization of intangible assets and may be required to report losses resulting from the impairment of goodwill or other assets recorded in connection with the Nalco and Champion transactions and other acquisitions.

We expect to continue to complete selected acquisitions and joint venture transactions in the future. In connection with acquisition and joint venture transactions, applicable accounting rules generally require the tangible and intangible assets of the acquired business to be recorded on the balance sheet of the acquiring company at their fair values. Intangible assets other than goodwill are required to be amortized over their estimated useful lives and this expense may be significant. Any excess in the purchase price paid by the acquiring company over the fair value of tangible and intangible assets of the acquired business is recorded as goodwill. If it is later determined that the anticipated future cash flows from the acquired business may be less than the carrying values of the assets and goodwill of the acquired business, the assets or goodwill may be deemed to be impaired. In this case, the acquiring company may be required under applicable accounting rules to write down the value of the assets or goodwill on its balance sheet to reflect the extent of the impairment. This write-down of assets or goodwill is generally recognized as a non-cash expense in the statement of operations of the acquiring company for the accounting period during which the write down occurs. As of December 31, 2018, we had goodwill of $7.1 billion which is maintained in various reporting units, including goodwill from the Nalco and Champion transactions. If we determine that any of the assets or goodwill recorded in connection with the Nalco and Champion transactions or any other prior or future acquisitions or joint venture transactions have become impaired, we will be required to record a loss resulting from the impairment. Impairment losses could be significant and could adversely affect our consolidated results of operations and financial position.

A chemical spill or release could adversely impact our business.

As a manufacturer and supplier of chemical products, there is a potential for chemicals to be accidentally spilled, released or discharged, either in liquid or gaseous form, during production, transportation, storage or use. Such a release could result in environmental contamination as well as a human or animal health hazard. Accordingly, such a release could have an adverse effect on our consolidated results of operations, financial position or cash flows.

Extraordinary events may significantly impact our business.

The occurrence of (a) litigation or claims, (b) the loss or insolvency of a major customer or distributor, (c) repeated or prolonged federal government shutdowns or similar events, (d) war (including acts of terrorism or hostilities which impact our markets), (e) natural or manmade disasters, (f) water shortages or (g) severe weather conditions affecting our operations or the energy, foodservice, hospitality and travel industries may have an adverse effect on our business.

Defense of litigation, particularly certain types of actions such as antitrust, patent infringement, personal injury, product liability, wage hour and class action lawsuits, can be costly and time consuming even if ultimately successful, and if not successful could have an adverse effect on our consolidated results of operations, financial position or cash flows.

While we have a diverse customer base and no customer or distributor constitutes 10 percent or more of our consolidated revenues, we do have customers and independent, third-party distributors, the loss of which could have an adverse effect on our consolidated results of operations or cash flows for the affected earnings periods.

Federal government shutdowns can have an adverse effect on our consolidated results of operations or cash flows by disrupting or delaying new product launches, renewals of registrations for existing products and receipt of import or export licenses for raw materials or products.

War (including acts of terrorism or hostilities), natural or manmade disasters, water shortages or severe weather conditions affecting the energy, foodservice, hospitality, travel, health care, food processing, pulp and paper, mining, steel and other industries can cause a downturn in the business of our customers, which in turn can have an adverse effect on our consolidated results of operations, financial position or cash flows. In particular, the U.S. Gulf Coast is a region with significant refining, petrochemicals and chemicals operations which provide us raw materials, as well as being an important customer base for our Energy and Water operating segments. Hurricanes or other severe weather events impacting the Gulf Coast could adversely affect our ability to obtain raw materials at reasonable cost, or at all. And could adversely affect our business with our customers in the region.

Item 1B. Unresolved Staff Comments.

We have no unresolved comments from the staff of the Securities and Exchange Commission.

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Item 2. Properties.

Our manufacturing philosophy is to manufacture products wherever an economic, process or quality assurance advantage exists or where proprietary manufacturing techniques dictate in-house production. Currently, most products that we sell are manufactured at our facilities. We position our manufacturing locations and warehouses in a manner to permit ready access to our customers.

Our manufacturing facilities produce chemical products as well as medical devices and equipment for all of our operating segments, although Pest Elimination purchases the majority of their products and equipment from outside suppliers. Our chemical production process consists of producing intermediates via basic reaction chemistry and subsequently blending and packaging those intermediates with other purchased raw materials into finished products in powder, solid and liquid form. Our devices and equipment manufacturing operations consist of producing chemical product dispensers and injectors and other mechanical equipment, medical devices, dishwasher racks, related sundries, dish machine refurbishment and water monitoring and maintenance equipment system from purchased components and subassemblies.

The following table profiles our more significant physical properties with approximately 70,000 square feet or more with ongoing production activities, as well as certain other facilities important in terms of specialization and sources of supply. In general, manufacturing facilities located in the United States serve our U.S. markets and facilities located outside of the United States serve our international markets. However, most of the United States facilities do manufacture products for export.

PLANT PROFILES

Location	Approximate Size (Sq. Ft.)	Segment	Majority Owned or Leased
Joliet, IL USA	610,000	Global Institutional, Global Industrial	Owned
Tai Cang, CHINA	468,000	Global Institutional, Global Industrial	Owned
Odessa, TX USA	435,000	Global Energy	Owned
Sainghin, FRANCE	360,000	Global Institutional, Global Industrial	Owned
Sugar Land, TX USA	350,000	Global Energy, Global Industrial	Owned
South Beloit, IL USA	313,000	Global Institutional, Global Industrial, Other	Owned

Jianghai, CHINA	296,000	Global Energy, Global Industrial	Owned
Chalons, FRANCE	280,000	Global Institutional, Global Industrial	Owned
Soledad, COLUMBIA	276,000	Global Energy	Owned
Clearing, IL USA	270,000	Global Energy, Global Industrial	Owned
Jurong Island, SINGAPORE	250,000	Global Energy, Global Industrial	Owned
Nanjing, CHINA	240,000	Global Energy, Global Industrial	Owned
Garland, TX USA	239,000	Global Institutional, Global Industrial	Owned
Martinsburg, WV USA	228,000	Global Institutional, Global Industrial	Owned
Elwood City, PA USA	222,000	Global Energy, Global Industrial	Owned
Weavergate, UNITED KINGDOM	222,000	Global Industrial, Global Institutional	Owned
Celra, SPAIN	218,000	Global Institutional, Global Industrial	Owned
Greensboro, NC USA	193,000	Global Institutional	Owned
Fresno, TX USA	192,000	Global Energy	Owned
Freeport, TX USA	189,000	Global Energy	Owned
Las Americas, DOMINICAN REPUBLIC	182,000	Global Institutional	Owned
Jacksonville, FL USA	181,000	Global Institutional	Leased
Garyville, LA USA	178,000	Global Energy, Global Industrial	Owned
Nieuwegein, NETHERLANDS	168,000	Global Institutional, Global Industrial	Owned
La Romana, DOMINICAN REPUBLIC	160,000	Global Institutional	Leased
Tessenderlo, BELGIUM	153,000	Global Institutional	Owned
Cheltenham, AUSTRALIA	145,000	Global Institutional, Global Industrial	Owned
Suzano, BRAZIL	142,000	Global Energy, Global Industrial	Owned
McDonough, GA USA	141,000	Global Institutional, Global Industrial	Owned
Darra, AUSTRALIA	138,000	Global Institutional, Global Industrial	Owned
Corsicana, TX USA	137,000	Global Energy	Owned
Burlington, ON CANADA	136,000	Global Energy, Global Industrial	Owned
Eagan, MN USA	133,000	Global Institutional, Global Industrial, Other	Owned
Huntington, IN USA	127,000	Global Institutional, Global Industrial	Owned
Rozzano, ITALY	126,000	Global Institutional, Global Industrial	Owned
City of Industry, CA USA	125,000	Global Institutional, Global Industrial	Owned
Mississauga, ON CANADA	120,000	Global Institutional, Global Industrial	Leased
Aberdeen, UNITED KINGDOM	118,000	Global Energy	Owned

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Location	Approximate Size (Sq. Ft.)	Segment	Majority Owned or Leased
Elk Grove Village, IL USA	115,000	Global Institutional	Leased
Biebesheim, GERMANY	109,000	Global Energy, Global Industrial	Owned
Fort Worth, TX USA	101,000	Global Institutional	Leased
Johannesburg, SOUTH AFRICA	100,000	Global Institutional, Global Industrial	Owned
Hamilton, NEW ZEALAND	96,000	Global Institutional, Global Industrial	Owned
Calgary, AB CANADA	94,000	Global Energy	Owned
Kwinana, AUSTRALIA	87,000	Global Institutional, Global Industrial	Owned
Yangsan, KOREA	85,000	Global Energy, Global Industrial	Owned
Cisterna, ITALY	80,000	Global Industrial	Owned
Cuautitlan, MEXICO	76,000	Global Institutional, Global Industrial	Owned
Barueri, BRAZIL	75,000	Global Institutional, Global Industrial	Leased
Mullingar, IRELAND	74,000	Global Institutional, Global Industrial	Leased
Mosta, MALTA	73,000	Global Institutional	Leased
Noviciado, CHILE	70,000	Global Industrial, Global Institutional	Owned
Navanakorn, THAILAND	67,000	Global Institutional, Global Industrial	Leased
Aubagne, FRANCE	65,000	Global Institutional	Leased
Rovigo, ITALY	60,000	Global Institutional	Owned
Siegsdorf, GERMANY	56,000	Global Institutional, Global Industrial	Owned
Verona, ITALY	55,000	Global Institutional	Owned
Guangzhou, CHINA	55,000	Global Institutional, Global Industrial	Owned
Lerma, MEXICO	49,000	Global Industrial	Owned
Maribor, SLOVENIA	46,400	Global Institutional, Global Industrial	Owned
Leeds, UNITED KINGDOM	25,000	Global Institutional	Owned
Baglan, UNITED KINGDOM	24,400	Global Institutional	Leased
Noda, JAPAN	22,000	Global Institutional, Global Industrial	Owned
Steritimak, RUSSIA	20,000	Global Energy, Global Industrial	Owned

Generally, our manufacturing facilities are adequate to meet our existing in-house production needs. We continue to invest in our plant sites to maintain viable operations and to add capacity as necessary to meet business imperatives.

Most of our manufacturing plants also serve as distribution centers. In addition, we operate distribution centers around the world, most of which are leased, and utilize third party logistics service providers to facilitate the distribution of our products and services.

Our corporate headquarters is comprised of a six-story building and a 17-story building that we own in St. Paul, Minnesota. We also own a 90-acre campus in Eagan, Minnesota that houses a significant research and development center, a data center and training facilities as well as several of our administrative functions.

We also have a significant business presence in Naperville, Illinois, where our Water and Paper operating segments maintain their principal administrative offices and research center. Our Energy operating segment maintains Company-owned administrative and research facilities in Sugar Land, Texas and additional research facilities in Fresno, Texas.

Significant regional administrative and/or research facilities are located in Campinas, Brazil, Leiden, Netherlands, and Pune, India, which we own, and in Dubai, UAE, Lille, France, Miramar, Florida, Monheim, Germany, Singapore, Shanghai, China and Zurich, Switzerland, which we lease. We also have a network of small leased sales offices in the United States and, to a lesser extent, in other parts of the world.

Item 3. Legal Proceedings.

Discussion of legal proceedings is incorporated by reference from Part II, Item 8, Note 15, “Commitments and Contingencies,” of this Form 10-K and should be considered an integral part of Part I, Item 3, “Legal Proceedings.”

Discussion of other environmental-related legal proceedings is incorporated by reference from Part I, Item 1 above, under the heading “Environmental and Regulatory Considerations”.

Item 4. Mine Safety Disclosures.

Not applicable.

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PART II

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

Market Information

Our common stock is listed on the New York Stock Exchange under the symbol “ECL.” Our common stock is also traded on an unlisted basis on certain other United States exchanges.

Holders

On January 31, 2019, we had 5,962 holders of record of our Common Stock.

Issuer Purchases of Equity Securities

Period	Total number of shares purchased (1)	Average price paid per share (2)	Total number of shares purchased as part of publicly announced plans or programs (3)	Maximum number of shares that may yet be purchased under the plans or programs (3)
October 1-31, 2018	771,940	$148.3339	770,898	9,457,829
November 1-30, 2018	402,899	154.0127	400,674	9,057,155
December 1-31, 2018	417,857	154.1372	405,761	8,651,394
Total	1,592,696	$151.2930	1,577,333	8,651,394

(1) Includes 15,363 shares reacquired from employees and/or directors to satisfy the exercise price of stock options or shares surrendered to satisfy statutory tax obligations under our stock incentive plans.

(2) The average price paid per share includes brokerage commissions associated with publicly announced plan purchases plus the value of such other reacquired shares.

(3) As announced on February 24, 2015, our Board of Directors authorized the repurchase of up to 20,000,000 shares. Subject to market conditions, we expect to repurchase all shares under these authorizations, for which no expiration date has been established, in open market or privately negotiated transactions, including pursuant to Rule 10b5-1 and accelerated share repurchase program.

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Item 6. Selected Financial Data.

(millions, except per share amounts)	2018 (1)	2017 (2)	2016 (3)	2015 (4)	2014 (5)
Year ended December 31:					
Net sales	$14,668.2	$13,835.9	$13,151.8	$13,545.1	$14,280.5
Operating income	1,947.0	1,950.1	1,870.2	1,561.3	1,955.0
Net income attributable to Ecolab	1,429.1	1,504.6	1,229.0	1,002.1	1,202.8
Basic earnings per share	4.95	5.20	4.20	3.38	4.01
Diluted earnings per share, as reported (U.S. GAAP)	4.88	5.12	4.14	3.32	3.93
Cash dividends declared per common share	1.690	1.520	1.420	1.340	1.155
Diluted earnings per share, as reported (U.S. GAAP)					
Adjustments:	$4.88	$5.12	$4.14	$3.32	$3.93
Special (gains) and charges	0.35	0.19	0.21	1.25	0.20
Discrete tax expense (benefits)	0.02	(0.63)	0.01	(0.21)	0.04
Adjusted diluted earnings per share (Non-GAAP)	$5.25	$4.68	$4.37	$4.37	$4.18
At December 31:					
Total assets	$20,074.5	$19,963.5	$18,331.1	$18,641.7	$19,427.4
Long-term debt (excluding portions due within one year)	6,301.6	6,758.3	6,145.7	4,260.2	4,843.4

Selected financial data for years earlier than 2016 are not presented on a comparable basis due to the adoption of ASU 2014-09, Revenue from Contracts with Customers. Per share amounts do not necessarily sum due to rounding.

(1) Special (gains) and charges for 2018 include the following charges net of tax, a commitment to the Ecolab Foundation of $18.9 million, net restructuring charges of $77.2 million, acquisition and integration of $5.7 million and litigation and other charges of $1.0 million.

Discrete tax expense (benefits) for 2018 include adjustments to the estimate for U.S. tax reform one-time repatriation tax expense of $66.0 million, benefits associated with stock compensation excess tax benefits of $28.1 million, a favorable adjustment related to changes in estimates and an IRS approved method change in the Company's filed U.S. federal tax returns of $39.9 million and other tax expense of $6.7 million.

(2) Special (gains) and charges for 2017 include the following charges net of tax, acquisition and integration charges of $18.5 million, net restructuring charges of $32.4 million, charges related to a Global Energy vendor contract termination of $14.4 million and charges on extinguished debt of $13.6 million. Gains, net of tax, include gain on sale of Equipment Care of $12.4 million, tax benefits on the repatriation of cash to the U.S. of $7.8 million and a net gain of $2.7 million from other activity.

Discrete tax expense (benefits) for 2017 include a net benefit of $158.9 million for repricing of U.S. deferred tax positions to the U.S. tax reform rate, offset by a one-time repatriation tax on foreign earnings and stock compensation excess tax benefits of $39.6 million. Expenses include recognizing adjustments from filing our 2016 U.S. federal income tax return and release of uncertain tax positions totaling $14.3 million.

(3) Special (gains) and charges for 2016 include net of tax, charges of $50.0 million associated with the downturn in the global energy market and litigation related charges of $26.4 million. Gains, net of tax, include a net gain for restructuring and a net gain for other activity of $3.2 million.

Discrete tax expense (benefits) for 2016 include net expense of $3.9 million driven primarily from adjustments to deferred tax asset and liability positions, recognizing adjustments from filing our 2015 U.S. federal income tax return, tax charges related to optimizing our business structure and settlement of international tax matters offset by benefits driven primarily by the release of reserves for uncertain tax positions due to expiration of statute of limitations in non-U.S. jurisdictions, settlement of international tax matters, remeasurements of certain deferred tax assets and liabilities resulting from the application of an updated tax rate in an international jurisdiction and valuation allowance releases.

(4) Special (gains) and charges for 2015 include the following charges net of tax, Venezuelan charges of $235.7 million, restructuring charges of $75.5 million, charges of $38.3 million related to litigation related charges, a loss on the sale of a portion of our Ecovation business and the net impact of inventory reserve and inventory cost policy harmonization efforts, fixed asset impairment of $15.4 million and integration costs of $12.0 million.

Discrete tax expense (benefits) for 2015 include net benefits of $63.3 million driven primarily from our ability to recognize a worthless stock deduction for the tax basis in a wholly owned domestic subsidiary, release of valuation allowances on certain deferred tax assets and a refund claim for taxes paid in a prior period resulting from updated IRS regulations, finalization of prior year IRS audits and other statute of limitation tax reserve releases offset by a change to a deferred tax liability resulting from the Naperville facility transaction.

(5) Special (gains) and charges for 2014 include the following net of tax, restructurings charges of $65.0 million, integration costs of $19.8 million, and gains of $23.3 million related to a favorable licensing settlement, other settlement gains, consolidation of a subsidiary, removal of the corresponding equity method investment and gain on the sale of a business.

Discrete tax expense (benefits) for 2014 include $18.2 million of expenses driven primarily by the rate differential on certain prior year shared costs, the remeasurement of certain deferred tax assets and liabilities resulting from a change in the state tax rate for certain entities following the merger of Champion operations, the change of a valuation allowance related to the realizability of foreign deferred taxes, an update to non-current tax liabilities for global tax audits and an adjustment related to re-characterization of intercompany payments between our U.S. and foreign affiliates. Expenses were offset by various tax adjustments for a net benefit of $5.0 million.

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

The following management discussion and analysis ("MD&A") provides information that we believe is useful in understanding our operating results, cash flows and financial condition. We provide quantitative information about the material sales drivers including the impact of changes in volume and pricing and the effect of acquisitions and changes in foreign currency at the corporate and reportable segment level. We also provide quantitative information regarding special (gains) and charges, discrete tax items and other significant factors we believe are useful for understanding our results. Such quantitative drivers are supported by comments meant to be qualitative in nature. Qualitative factors are generally ordered based on estimated significance.

The discussion should be read in conjunction with the consolidated financial statements and related notes included in this Form 10-K. Our consolidated financial statements are prepared in accordance with U.S. GAAP. This discussion contains various Non-GAAP Financial Measures and also contains various forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. We refer readers to the statements and information set forth in the sections entitled "Non-GAAP Financial Measures" at the end of this MD&A, and "Forward-Looking Statements" and "Risk Factors" within Items 1 and 1A of this Form 10-K. We also refer readers to the tables within the section entitled "Results of Operations" of this MD&A for reconciliation information of Non-GAAP measures to U.S. GAAP.

Comparability of Results

Adoption of New Accounting Standards

On January 1, 2018 we retrospectively adopted the Accounting Standards Codification Topic 606 Revenue from Contracts with Customers and the related amendments ("the new revenue standard"). Concurrent with the adoption of the new revenue standard, we reclassified certain costs from selling, general and administrative expenses to cost of sales, to align the cost of providing the service with the recognition of service revenue. The new revenue standard was applied to all periods presented and the cumulative effect of applying the standard is recognized at the beginning of the earliest year presented.

We also retrospectively adopted Accounting Standards Update 2017-07 Compensation – Retirement Benefits: Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, relating to the presentation of the components of net periodic benefit costs for pension and other post-retirement benefits within the Consolidated Statement of Income ("the new pension standard").

All comparisons and discussion throughout the MD&A reflect the adoption of the new revenue standard and new pension standard. Further information about the adoption of the accounting standards is included in Note 2.

Fixed Currency Foreign Exchange Rates

Management evaluates the sales and operating income performance of our non-U.S. dollar functional currency international operations based on fixed currency exchange rates, which eliminate the impact of exchange rate fluctuations on our international operations. Fixed currency amounts are updated annually at the beginning of each year based on translation into U.S. dollars at foreign currency exchange rates established by management, with all periods presented using such rates. Fixed currency exchange rates are generally based on existing market rates at the time they are established. Fixed currency amounts during 2018 for Argentina operations are reflected at the Argentine Peso rate established by management at the beginning of the year. Public currency rate data provided within the "Segment Performance" section of this MD&A reflect amounts translated at actual public average rates of exchange prevailing during the corresponding period and is provided for informational purposes only.

Comparability of Reportable Segments

Effective in the first quarter of 2018, we established the Colloidal Technologies Group ("CTG") operating segment. The CTG operating segment has not been aggregated, based on qualitative criteria, and is included in Other. CTG produces and sells colloidal silica, which is comprised of nano-sized particles of silica in water; these products and associated programs are used primarily for binding and polishing applications. CTG was previously recorded in the Water operating segment which is aggregated into the Global Industrial reportable segment. Prior to the sale in November 2017, the Equipment Care operating segment was also included, which provided kitchen repair and maintenance. Additionally, we made immaterial changes to our reportable segments, including the movement of certain customers and cost allocations between reportable segments. All comparisons and discussion throughout the MD&A are based on the new operating segment structure effective in the first quarter of 2018.

Impact of Acquisitions and Divestitures

Acquisition adjusted growth rates exclude the results of our acquired businesses from the first twelve months post acquisition and exclude the results of our divested businesses from the twelve months prior to divestiture.

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EXECUTIVE SUMMARY

We achieved accelerating sales and earnings growth through 2018 as we drove new product introductions, new business wins and improved operating efficiency in a generally improved market environment. Increased pricing was implemented to offset significantly higher delivered product costs. Adjusted diluted earnings per share leveraged the good operating income growth, benefiting from lower interest expense and taxes, to deliver the year's double-digit adjusted diluted EPS growth.

Sales

Reported sales increased 6% to $14.7 billion in 2018 from $13.8 billion in 2017. Sales were positively impacted by volume and pricing. When measured in fixed rates of foreign currency exchange, fixed currency sales increased 6% compared to the prior year. Acquisition adjusted fixed currency sales increased 6% compared to the prior year.

Gross Margin

Our reported gross margin was 41.2% of sales for 2018, compared to our 2017 reported gross margin of 41.7%. Excluding the impact of special (gains) and charges included in cost of sales from both 2018 and 2017, our adjusted gross margin was 41.3% in 2018 and 42.0% in 2017.

Operating Income

Reported operating income was flat at $1.95 billion in 2018, compared to $1.95 billion in 2017. Adjusted operating income, excluding the impact of special (gains) and charges, increased 5% in 2018. When measured in fixed rates of foreign currency exchange, adjusted fixed currency operating income also increased 5%.

Earnings Attributable to Ecolab Per Common Share ("EPS")

Reported diluted EPS decreased 5% to $4.88 in 2018 compared to $5.12 in 2017. Special (gains) and charges had an impact on both years. Special (gains) and charges in 2018 were driven primarily by the impact of restructuring charges and our commitment to the Ecolab Foundation. Special (gains) and charges in 2017 were driven primarily by the impact of income tax reform, restructuring charges, other discrete taxes, acquisition and integration charges and the gain on sale of Equipment Care. Special (gains) and charges in 2016 were driven primarily by Energy related charges, restructuring charges, other gains and charges and Venezuelan related actions. Adjusted diluted EPS, which exclude the impact of special (gains) and charges and discrete tax items increased to $5.25 in 2018 compared to $4.68 in 2017.

Balance Sheet

We remain committed to maintaining “A” range ratings metrics, supported by our current credit ratings of A-/Baa1 by the major ratings agencies. Our strong balance sheet has allowed us continued access to capital at attractive rates.

Net Debt to EBITDA

Our net debt to earnings before interest, taxes, depreciation and amortization (“EBITDA”) was 2.3 and 2.4 for 2018 and 2017, respectively. We view these ratios as important indicators of the operational and financial health of our organization. See the “Net Debt to EBITDA” table on page 43 for reconciliation information.

Cash Flow

Cash flow from operating activities was $2.3 billion in 2018 compared to $2.1 billion in 2017. We continued to generate strong cash flow from operations, allowing us to fund our ongoing operations, acquisitions, investments in our business, debt repayments, pension obligations and return cash to our shareholders through share repurchases and dividend payments.

Dividends

We increased our quarterly cash dividend 12% in December 2018 to an indicated annual rate of $1.84 per share. The increase represents our 27th consecutive annual dividend rate increase and the 82nd consecutive year we have paid cash dividends. Our outstanding dividend history reflects our continued growth and development, strong cash flows, solid financial position and confidence in our business prospects for the years ahead.

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CRITICAL ACCOUNTING ESTIMATES

Our consolidated financial statements are prepared in accordance with U.S. GAAP. We have adopted various accounting policies to prepare the consolidated financial statements in accordance with U.S. GAAP. Our significant accounting policies are disclosed in Note 2 of the Notes to the Consolidated Financial Statements ("Notes").

Preparation of our consolidated financial statements, in conformity with U.S. GAAP, requires us to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. Estimates are considered to be critical if they meet both of the following criteria: (1) the estimate requires assumptions to be made about matters that are highly uncertain at the time the accounting estimate is made, and (2) different estimates that we reasonably could have used for the accounting estimate in the current period, or changes in the accounting estimate that are reasonably likely to occur from period to period, have a material impact on the presentation of our financial condition or results of operations.

Besides estimates that meet the "critical" estimate criteria, we make many other accounting estimates in preparing our financial statements and related disclosures. All estimates, whether or not deemed critical, affect reported amounts of assets, liabilities, revenues or expenses as well as disclosures of contingent assets and liabilities. Estimates are based on experience and other information available prior to the issuance of the financial statements. Materially different results can occur as circumstances change and additional information becomes known, even from estimates not deemed critical. Our critical accounting estimates include the following:

Revenue Recognition

On January 1, 2018, we adopted Accounting Standards Committee 606 (ASC 606), Revenue from Contracts with Customers, which provides guidance on how revenue with customers should be recognized. For additional information on our adoption of this accounting standard, see Note 2.

Revenue is measured as the amount of consideration expected to be received in exchange for transferring goods or providing service. Revenue from product and sold equipment is recognized when obligations under the terms of a contract with the customer are satisfied, which generally occurs with the transfer of the product or delivery of the equipment. Revenue from service and leased equipment is recognized when the services are provided, or the customer receives the benefit from the leased equipment, which is over time. Service revenue is recognized over time utilizing an input method and aligns with when the services are provided. Typically, revenue is recognized over time using costs incurred to date because the effort provided by the field selling and service organization represents services provided, which corresponds with the transfer of control. Revenue for leased equipment is accounted for under Topic 840 Leases and recognized on a straight-line basis over the length of the lease contract.

Our sales policies do not provide for general rights of return. We record estimated reductions to revenue for customer programs and incentive offerings including pricing arrangements, promotions and other volume-based incentives at the time the sale is recorded. We also record estimated reserves for product returns and credits at the time of sale and anticipated uncollectible accounts, as discussed below. Depending on market conditions, we may increase customer incentive offerings, which could reduce gross profit margins over the term of the incentive.

The new revenue standard can be applied to a portfolio of contracts with similar characteristics if it is reasonable that the effects of applying the standard at the portfolio would not be significantly different than applying the standard at the individual contract level. We apply the portfolio approach primarily within each operating segment by geographical region. Application of the portfolio approach was focused on those characteristics that have the most significant accounting consequences in terms of their effect on the timing of revenue recognition or the amount of revenue recognized. We determined the key criteria to assess with respect to the portfolio approach, including the related deliverables, the characteristics of the customers and the timing and transfer of goods and services, which most closely aligned within the operating segments. In addition, the accountability for the business operations, as well as the operational decisions on how to go to market and the product offerings, are performed at the operating segment level.

Valuation Allowances and Accrued Liabilities

Allowances for Doubtful Accounts

We estimate our allowance for doubtful accounts by analyzing accounts receivable balances by age and applying historical write-off and collection trend rates. In addition, our estimates also include separately providing for customer receivables based on specific circumstances and credit conditions, and when it is deemed probable the balance is uncollectible. We estimate our sales returns and allowances by analyzing historical returns and credits and apply these trend rates to calculate estimated reserves for future credits. Actual results could differ from these estimates.

Our allowance for doubtful accounts balance was $61 million and $72 million, as of December 31, 2018 and 2017, respectively. These amounts include our allowance for sales returns and credits of $17 million and $15 million as of December 31, 2018 and 2017, respectively. Our bad debt expense as a percent of reported net sales was 0.1%, 0.1% and 0.2% in 2018, 2017 and 2016, respectively. We believe it is reasonably likely that future results will be consistent with historical trends and experience. However, if the financial condition of our customers were to deteriorate, resulting in an inability to make payments, or if unexpected events, economic downturns, or significant changes in future trends were to occur, additional allowances may be required.

For additional information on our allowance for doubtful accounts, see Note 2.

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Accrued Liabilities

Our business and operations are subject to extensive environmental laws and regulations governing, among other things, air emissions, wastewater discharges, the use and handling of hazardous substances, waste disposal and the investigation and remediation of soil and groundwater contamination. As with other companies engaged in similar manufacturing activities and providing similar products and services, some risk of environmental liability is inherent in our operations.

We record liabilities related to pending litigation, environmental claims and other contingencies when a loss is probable and can be reasonably estimated. Estimates used to record such liabilities are based on our best estimate of probable future costs. We record the amounts that represent the points in the range of estimates that we believe are most probable or the minimum amount when no amount within the range is a better estimate than any other amount. Potential insurance reimbursements generally are not anticipated in our accruals for environmental liabilities or other insured losses. Expected insurance proceeds are recorded as receivables when recovery is deemed certain. While the final resolution of litigation and environmental contingencies could result in amounts different than current accruals, and therefore have an impact on our consolidated financial results in a future reporting period, we believe the ultimate outcome will not have a significant impact on our consolidated financial position.

For additional information on our commitments and contingencies, see Note 15.

Actuarially Determined Liabilities

Pension and Postretirement Healthcare Benefit Plans

The measurement of our pension and postretirement benefit obligations are dependent on a variety of assumptions determined by management and used by our actuaries. These assumptions affect the amount and timing of future contributions and expenses.

The significant assumptions used in developing the required estimates are the discount rate, expected return on assets, projected salary and health care cost increases and mortality table.

- The discount rate assumptions for our U.S. plans are assessed using a yield curve constructed from a subset of bonds yielding greater than the median return from a population of non-callable, corporate bond issues that have an average rating of AA when averaging available Moody's Investor Services, Standard & Poor's and Fitch ratings. The discount rate is calculated by matching the plans' projected cash flows to the bond yield curve. For 2018 and 2017, we elected to measure service and interest costs by applying the specific spot rates along that yield curve to the plans' liability cash flows. We believe this approach provides a more precise measurement of service and interest costs by aligning the timing of the plans' liability cash flows to the corresponding spot rates on the yield curve. In determining our U.S. pension obligations for 2018, our weighted-average discount rate increased to 4.34% from 3.70% at year-end 2017. In determining our U.S. postretirement health care obligation for 2018, our weighted-average discount rate increased to 4.29% from 3.66% at year-end 2017.

· The expected rate of return on plan assets reflects asset allocations, investment strategies and views of investment advisors, and represents our expected long-term return on plan assets. Our weighted-average expected return on U.S. plan assets used in determining the U.S. pension and U.S. postretirement health care expenses was 7.75% for 2017 and 2018 and 7.25% for 2019.

· Projected salary and health care cost increases are based on our long-term actual experience, the near-term outlook and assumed inflation. Our weighted-average projected salary increase used in determining the U.S. pension expenses was 4.03% for 2017, 2018 and 2019.

· For postretirement benefit measurement purposes as of December 31, 2018, the annual rates of increase in the per capita cost of covered health care were assumed to be 8.25% for pre-65 costs and 11.5% for post-65 costs. The rates are assumed to decrease each year until they reach 5% in 2028 and remain at those levels thereafter.

· In determining our U.S. pension and U.S. postretirement health care obligation for 2018, we utilized the most recent mortality table, MP-2018 projection scale (applied to the RP-2006 mortality table).

The effects of actual results differing from our assumptions, as well as changes in assumptions, are reflected in the unrecognized actuarial loss and amortized over future periods and, therefore, will generally affect our recognized expense in future periods. Significant differences in actual experience or significant changes in assumptions may materially affect future pension and other postretirement obligations. The unrecognized net actuarial loss on our U.S. qualified and non-qualified pension plans increased to $539 million as of December 31, 2018 from $527 million as of December 31, 2017 (both before tax), primarily due to the amortization of prior period net actuarial losses.

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The effect of a decrease in the discount rate or decrease in the expected return on assets assumption as of December 31, 2018, on the December 31, 2018 funded status and 2019 expense is shown below, assuming no changes in benefit levels and no amortization of gains or losses for our significant U.S. plans:

	Effect on U.S. Pension Plans		
(millions)	Assumption Change	Increase in Recorded Obligation	Higher 2019 Expense
Discount rate	-0.25 pts	$59.3	$5.1
Expected return on assets	-0.25 pts	N/A	5.2

	Effect on U.S. Postretirement Health Care Benefits Plans		
(millions)	Assumption Change	Increase in Recorded Obligation	Higher 2019 Expense
Discount rate	-0.25 pts	$3.4	$0.3
Expected return on assets	-0.25 pts	N/A	-

Our international pension obligations and underlying plan assets represent approximately one third of our global pension plans, with the majority of the amounts held in the U.K. and Eurozone countries. We use assumptions similar to our U.S. plan assumptions to measure our international pension obligations, however, the assumptions used vary by country based on specific local country requirements and information.

See Note 16 for further discussion concerning our accounting policies, estimates, funded status, contributions and overall financial positions of our pension and postretirement plan obligations.

Self Insurance

Globally we have insurance policies with varying deductible levels for property and casualty losses. We are insured for losses in excess of these deductibles, subject to policy terms and conditions and have recorded both a liability and an offsetting receivable for amounts in excess of these deductibles. We are self-insured for health care claims for eligible participating employees, subject to certain deductibles and limitations. We determine our liabilities for claims on an actuarial basis.

Restructuring

Our restructuring activities are associated with plans to enhance our efficiency, effectiveness and sharpen the competitiveness of our businesses. These restructuring plans include net costs associated with significant actions involving employee-related severance charges, contract termination costs and asset write-downs and disposals. Employee termination costs are largely based on policies and severance plans, and include personnel reductions and related costs for severance, benefits and outplacement services. These charges are reflected in the quarter in which the actions are probable and the amounts are estimable, which typically is when management approves the associated actions. Contract termination costs include charges to terminate leases prior to the end of their respective terms and other contract termination costs. Asset write-downs and disposals include leasehold improvement write-downs, other asset write-downs associated with combining operations and disposal of assets.

Restructuring charges have been included as a component of cost of sales and special (gains) and charges on the Consolidated Statement of Income. Amounts included as a component of cost of sales include supply chain related severance and other asset write-downs associated with combining operations. Restructuring liabilities have been classified as a component of both other current and other noncurrent liabilities on the Consolidated Balance Sheet. Our restructuring liability balance was $79 million and $42 million as of December 31, 2018 and 2017, respectively.

For additional information on our restructuring activities, see Note 3.

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Income Taxes

Judgment is required to determine the annual effective income tax rate, deferred tax assets and liabilities, any valuation allowances recorded against net deferred tax assets and uncertain tax positions.

On December 22, 2017, the Tax Cuts and Jobs Act (the "Tax Act") was enacted, which reduces 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. The Tax Act added many new provisions including changes to bonus depreciation, the deduction for executive compensation and interest expense, a tax on global intangible low taxed income (GILTI), the base erosion anti abuse tax (BEAT) and a deduction for foreign derived intangible income (FDII).

We initially recorded an estimate of the one-time transition tax in the fourth quarter of 2017 of $160 million and in 2018 we recorded additional discrete expense of $66 million, primarily due to the issuance of technical guidance, finalization of certain estimates as a result of filing the 2017 U.S. federal tax return and final balance sheet positions used in the calculation of the transition tax. As of December 31, 2018, we completed our accounting for the effects of the Tax Act as they relate to the repricing of deferred tax balances and the one-time transition tax.

In January 2018, accounting guidance was issued requiring a company to make an accounting policy to either treat taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (the "period cost method") or factor such amounts into a company's measurement of its deferred taxes (the "deferred method"). We have elected the period cost method and have considered the estimated 2018 GILTI impact in our 2018 tax expense.

Additionally, proposed regulations were released during 2018. Certain of the proposed regulations may be subject to challenge; therefore, we recorded tax expense based on our interpretation of the changes in law affected by the Tax Act and not the proposed regulations. If the proposed regulations become final, we will record the impact at that time.

Effective Income Tax Rate

Our effective income tax rate is based on annual income, statutory tax rates and tax planning available in the various jurisdictions in which we operate. Our annual effective income tax rate includes the impact of reserve provisions. We recognize the largest amount of tax benefit that is greater than 50% likely of being realized upon settlement with a taxing authority. We adjust these reserves in light of changing facts and circumstances. This expected annual rate is then applied to our year-to-date operating results. In the event there is a significant discrete item recognized in our interim operating results, the tax attributable to that item would be separately calculated and recorded in the same period.

Tax regulations require items to be included in our tax returns at different times than the items are reflected in our financial statements. As a result, the effective income tax rate reflected in our financial statements differs from that reported in our tax returns. Some of these differences are permanent, such as expenses that are not deductible on our tax return, and some are temporary differences, such as depreciation expense.

Deferred Tax Assets and Liabilities and Valuation Allowances

Temporary differences create deferred tax assets and liabilities. Deferred tax assets generally represent items that can be used as a tax deduction or credit in our tax return in future years for which we have already recorded the tax benefit in our income statement. We establish valuation allowances for our deferred tax assets when the amount of expected future taxable income is not likely to support the utilization of the entire deduction or credit. Relevant factors in determining the realizability of deferred tax assets include historical results, future taxable income, the expected timing of the reversal of temporary differences, tax planning strategies and the expiration dates of the various tax attributes. Deferred tax liabilities generally represent items for which we have already taken a deduction in our tax return but have not yet recognized that tax benefit in our financial statements.

Prior to the enactment of the Tax Act, U.S. deferred income taxes had not been provided on certain unremitted foreign earnings that are considered permanently reinvested. Undistributed earnings of foreign subsidiaries are considered to have been reinvested indefinitely or are available for distribution with foreign tax credits available to offset the amount of applicable income tax and foreign withholding taxes that might be payable on earnings. As part of the Tax Act, we recorded a one-time transition tax on certain unremitted foreign earnings of foreign subsidiaries, which is payable over eight years. We will continue to assert permanent reinvestment of the undistributed earnings of international affiliates, and if our policy changes we would record applicable taxes.

Uncertain Tax Positions

A number of years may elapse before a particular tax matter, for which we have established a reserve, is audited and finally resolved. The number of tax years with open tax audits varies depending on the tax jurisdiction. The Internal Revenue Service (“IRS”) has completed its examinations of our federal income tax returns (Ecolab and Nalco) through 2014 and the years 2015 and 2016 are currently under audit. In addition to the U.S. federal examinations, we have ongoing audit activity in several U.S. state and foreign jurisdictions.

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The tax positions we take are based on our interpretations of tax laws and regulations in the applicable federal, state and international jurisdictions. We believe our tax returns properly reflect the tax consequences of our operations, and our reserves for tax contingencies are appropriate and sufficient for the positions taken. Because of the uncertainty of the final outcome of these examinations, we have reserved for potential reductions of tax benefits (including related interest and penalties) for amounts that do not meet the more-likely-than-not thresholds for recognition and measurement as required by authoritative guidance. The tax reserves are reviewed throughout the year, taking into account new legislation, regulations, case law and audit results. Settlement of any particular issue could result in offsets to other balance sheet accounts, cash payments or receipts and/or adjustments to tax expense. The majority of our tax reserves are presented in the Consolidated Balance Sheet within other non-current liabilities. Our gross liability for uncertain tax positions was $50 million and $62 million as of December 31, 2018 and 2017, respectively.

For additional information on income taxes see Note 12.

Long-Lived Assets, Intangible Assets and Goodwill

Long-Lived and Amortizable Intangible Assets

We periodically review our long-lived and amortizable intangible assets, the net value of which was $7.1 billion and $7.0 billion as of December 31, 2018 and 2017, respectively, for impairment and to assess whether significant events or changes in business circumstances indicate that the carrying value of the assets may not be recoverable. Such circumstances may include a significant decrease in the market price of an asset, a significant adverse change in the manner in which the asset is being used or in its physical condition or history of operating or cash flow losses associated with the use of the asset. Impairment losses could occur when the carrying amount of an asset exceeds the anticipated future undiscounted cash flows expected to result from the use of the asset and its eventual disposition. The amount of the impairment loss to be recorded, if any, is calculated as the excess of the asset’s carrying value over its estimated fair value.

We use the straight-line method to recognize amortization expense related to our amortizable intangible assets, including our customer relationships. We consider various factors when determining the appropriate method of amortization for our customer relationships, including projected sales data, customer attrition rates and length of key customer relationships.

Globally, we have a broad customer base. Our retention rate of significant customers has aligned with our acquisition assumptions, including the customer base acquired in our recent Nalco and Champion transactions, which make up the majority of our unamortized customer relationships. Our historical retention rate, coupled with our consistent track record of keeping long-term relationships with our customers, supports our expectation of consistent sales generation for the foreseeable future from the acquired customer base. Our customer retention rate and history of maintaining long-term relationships with our significant customers are not expected to change in the future. Additionally, other less certain post-acquisition operational assumptions related to future capital investments and working capital, as well as the impact of discount rate assumptions, induce variability and uncertainty in the pattern of economic benefits of our acquired customer relationships. If our customer retention rate or other post-acquisition operational activities changed materially, we would evaluate the financial impact and any corresponding triggers which could result in an acceleration of amortization or impairment of our customer relationship intangible assets.

In addition, we periodically reassess the estimated remaining useful lives of our long-lived and amortizable intangible assets. Changes to estimated useful lives would impact the amount of depreciation and amortization expense recorded in earnings. We have experienced no significant changes in the carrying value or estimated remaining useful lives of our long-lived or amortizable intangible assets.

Goodwill and Indefinite Life Intangible Assets

We had total goodwill of $7.1 billion and $7.2 billion as of December 31, 2018 and 2017, respectively. We test our goodwill for impairment at the reporting unit level on an annual basis during the second quarter. Our reporting units are aligned with our eleven operating segments.

For our 2018 impairment assessment, we completed our assessment for goodwill impairment across our eleven reporting units through a quantitative analysis, utilizing a discounted cash flow approach. The two-step quantitative process involved comparing the estimated fair value of each reporting unit to the reporting unit’s carrying value, including goodwill. If the fair value of a reporting unit exceeds its carrying value, goodwill of the reporting unit is considered not to be impaired, and the second step of the impairment test is unnecessary. If the carrying amount of the reporting unit exceeds its fair value, the second step of the goodwill impairment test would be performed to measure the amount of impairment loss to be recorded, if any. Our goodwill impairment assessment for 2018 indicated the estimated fair value of each of our reporting units exceeded the unit’s carrying amount by a significant margin. We will continue to assess the need to test our reporting units for impairment during interim periods between our scheduled annual assessments. There has been no impairment of goodwill in any of the years presented.

As part of the Nalco merger, we added the “Nalco” trade name as an indefinite life intangible asset, the total value of which was $1.2 billion as of December 31, 2018 and 2017. The carrying value of the indefinite life trade name was subject to annual impairment testing, using a relief from royalty assessment method, during the second quarter of 2018. Based on this testing, no adjustment to the carrying value was necessary. Additionally, no events during the second half of 2018 indicated a need to update our conclusions reached during the second quarter of 2018.

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RESULTS OF OPERATIONS

Net Sales

				Percent Change	
(millions)	2018	2017	2016	2018	2017
Product and equipment sales	$12,128.6	$11,431.8	$10,904.1		
Service and lease sales	2,539.6	2,404.1	2,247.7		
Reported GAAP net sales	$14,668.2	$13,835.9	$13,151.8	6 %	5 %
Effect of foreign currency translation	378.1	394.1	391.7		
Non-GAAP fixed currency sales	$15,046.3	$14,230.0	$13,543.5	6 %	5 %

The percentage components of the year-over-year sales change are shown below:

(percent)	2018	2017
Volume	4%	3%
Price changes	2	1
Acquisition adjusted fixed currency sales change	6	4
Acquisitions & divestitures	0	1
Fixed currency sales change	6	5
Foreign currency translation	0	0
Reported GAAP net sales change	6%	5%

Cost of Sales (“COS”) and Gross Profit Margin (“Gross Margin”)

	2018		2017		2016	
(millions/percent)	COS	Gross Margin	COS	Gross Margin	COS	Gross Margin
Product and equipment cost of sales	$7,078.5		$6,576.9		$6,153.3	
Service and lease cost of sales	1,547.4		1,487.3		1,380.6	
Reported GAAP COS and gross margin	$8,625.9	41.2 %	$8,064.2	41.7 %	$7,533.9	42.7 %
Special (gains) and charges	9.3	0.1	44.0	0.3	66.0	0.5

Non-GAAP adjusted COS and gross margin	$8,616.6	41.3 %	$8,020.2	42.0 %	$7,467.9	43.2 %

Our COS values and corresponding gross margin are shown in the previous table. Our gross margin is defined as sales less cost of sales divided by sales.

Our reported gross margin was 41.2%, 41.7%, and 42.7% for 2018, 2017, and 2016, respectively. Our 2018, 2017 and 2016 reported gross margins were negatively impacted by special (gains) and charges of $9.3 million, $44.0 million, and $66.0 million, respectively. Special (gains) and charges items impacting COS are shown within the "Special (Gains) and Charges" table on page 33.

Excluding the impact of special (gains) and charges, our 2018 adjusted gross margin was 41.3% compared against a 2017 adjusted gross margin of 42.0%. The decrease was driven primarily by higher delivered product costs more than offsetting the impact from increased pricing and cost savings.

Excluding the impact of special (gains) and charges, our adjusted gross margin was 42.0% and 43.2% for 2017 and 2016, respectively. The decrease was driven primarily by higher delivered product costs and an increase in Global Energy (which on average has a lower gross margin), which more than offset pricing and cost savings.

Selling, General and Administrative Expenses ("SG&A")

(percent)	2018	2017	2016
SG&A Ratio	27.1 %	27.6%	28.2%

The decreased SG&A ratio (SG&A expenses as a percentage of reported net sales) comparing 2018 against 2017 was driven primarily by sales volume leverage, the 2017 restructuring efforts and cost savings, which more than offset investments in the business.

The decreased SG&A ratio comparing 2017 against 2016 was driven primarily by sales volume leverage and cost savings, which more than offset investments in the business and the impact of acquisitions.

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Special (Gains) and Charges

Special (gains) and charges reported on the Consolidated Statement of Income included the following items:

(millions)	2018	2017	2016
Cost of sales			
Restructuring activities	$12.1	$4.6	$(0.4)
Acquisition and integration activities	(0.6)	13.2	-
Energy related charges	-	-	62.6
Other	(2.2)	26.2	3.8
Subtotal	9.3	44.0	66.0
Special (gains) and charges			
Restructuring activities	89.4	39.9	(8.7)
Acquisition and integration activities	8.8	15.4	8.6
Gain on sale of business	-	(46.1)	-
Energy related charges	-	-	14.2
Venezuela related gain	-	(11.5)	(7.8)
Other	28.5	(1.4)	33.2
Subtotal	126.7	(3.7)	39.5
Operating income subtotal	136.0	40.3	105.5
Interest expense, net	0.3	21.9	-
Total special (gains) and charges	$136.3	$62.2	$105.5

For segment reporting purposes, special (gains) and charges are not allocated to reportable segments, which is consistent with our internal management reporting.

Restructuring Activities

Restructuring activities are comprised of actions taken in 2018 related to Accelerate 2020 (described further below) and other actions taken in years prior to 2018. These activities have been included as a component of special (gains) and charges on the Consolidated Statement of Income. Restructuring liabilities have been classified as a component of both other current and other noncurrent liabilities on the Consolidated Balance Sheet. Further details related to our restructuring charges are included in Note 3.

Accelerate 2020

During the third quarter of 2018, we formally commenced a restructuring plan Accelerate 2020 ("the Plan"), to leverage technology and

systems investments and organizational changes. Subsequent to year-end, we raised our goals for the Plan to simplify and automate processes and tasks, reduce complexity and management layers, consolidate facilities and focus on key long-term growth areas by leveraging technology and structural improvements. We expect the expanded restructuring activities will be completed by the end of 2020, with anticipated costs of $260 million ($190 million after tax), or $0.65 per diluted share, over this period of time. Costs are expected to be primarily cash expenditures for severance costs and some facility closure costs relating to team reorganizations. Actual costs may vary from these estimates depending on actions taken. The restructuring actions are expected to result in approximately $325 million of annual cost savings by 2021.

We recorded restructuring charges of $104.6 million ($79.6 million after tax), or $0.27 per diluted share in 2018. The liability related to this Plan was $63.9 million as of the end of the year.

Other Restructuring Activities

Prior to 2018, we engaged in a number of restructuring plans. During 2017, we commenced restructuring and other cost-saving actions in order to streamline our operations. These actions include a reduction of our global workforce, as well as asset disposals and lease terminations. Actions were substantially completed in 2017. We also have restructuring plans that commenced prior to 2016. During 2018, net restructuring gains related to prior year plans were $3.1 million ($2.4 million after tax) or $0.01 per diluted share. During 2017, we recorded restructuring charges of $44.5 million ($32.3 million after tax) or $0.11 per diluted share. During 2016, we recorded restructuring gains of $9.1 million ($10.8 million after tax) or $0.04 per diluted share. The restructuring liability balance for all plans commencing prior to 2018 was $14.9 million and $41.5 million as of December 31, 2018 and 2017, respectively. The reduction in liability was driven primarily by severance payments. The majority of pretax charges represent net cash expenditures which are expected to be paid over a period of a few months to several quarters and will continue to be funded from operating activities. Cash payments during 2018 related to restructuring plans commencing prior to 2018 were $22.7 million.

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Acquisition and integration related costs

Acquisition and integration costs reported in special (gains) and charges on the Consolidated Statement of Income in 2018 include $8.8 million ($6.1 million after tax) or $0.02 per diluted share. Charges are primarily related to Laboratoires Anios ("Anios") integration costs, advisory and legal fees. Acquisition and integration gain reported in product and equipment cost of sales on the Consolidated Statement of Income in 2018 relate to changes in estimates related to an early lease exit. In conjunction with our acquisitions, we incurred $0.3 million ($0.2 million after tax), or less than $0.01 per diluted share, of interest expense in 2018.

During 2017, acquisition and integration costs reported in special (gains) and charges on the Consolidated Statement of Income included $15.4 million ($9.9 million after tax) or $0.03 per diluted share of acquisition costs, advisory and legal fees, and integration charges for the Anios and Swisher acquisitions. Acquisition and integration costs reported in cost of sales on the Consolidated Statement of Income in 2017 included $13.2 million ($8.6 million after tax) or $0.03 per diluted share related primarily to disposal of excess inventory upon the closure of Swisher plants, accelerated rent expense, and amounts related to recognition of fair value step-up in the Anios inventory.

During 2016, we incurred acquisition and integration charges of $8.6 million ($5.4 million after tax) or $0.02 per diluted share primarily related to the Swisher acquisition.

Further information related to our acquisitions is included in Note 4.

Gain on sale of business

During 2017, we disposed of the Equipment Care business and recorded a gain of $46.1 million ($12.4 million after tax primarily due to non-deductible goodwill), or $0.04 per diluted share, net of working capital adjustments, costs to sell and other transaction expenses. The gain has been included as a component of special (gains) and charges on the Consolidated Statement of Income.

Energy related charges

In 2016, excess oil supply pressure negatively impacted exploration and production investments in the energy industry, which directly impacted our operations and business outlook. Energy related charges reported in product and equipment cost of sales on the Consolidated Statement of Income in 2016 include $62.6 million ($40.7 million after tax), or $0.14 per diluted share, comprised of inventory write-downs due to projects under construction. Energy related charges reported in special (gains) and charges on the Consolidated Statement of Income in 2016 include $14.2 million ($9.3 million after tax), or $0.03 per diluted share, related to headcount reductions and other charges. No such charges occurred in 2017 or 2018.

Venezuela related activities

Effective as of the end of the fourth quarter of 2015, we deconsolidated our Venezuelan subsidiaries. We recorded gains due to U.S. dollar cash recoveries of intercompany receivables written off at the time of deconsolidation of $11.5 million ($7.2 million after tax) or $0.02 per diluted share and $7.8 million ($4.9 million after tax) or $0.02 per diluted share in 2017 and 2016, respectively. No such gains occurred in 2018.

Other

During 2018, we recorded other special charges of $28.5 million ($21.5 million after tax) or $0.07 per diluted share, which primarily consisted of a $25.0 million ($18.9 million after tax) or $0.06 per diluted share, a commitment to the Ecolab Foundation. Other charges, primarily litigation related charges, were minimal and have been included as a component of special (gains) and charges on the Consolidated Statement of Income. Other special gains reported in product and equipment cost of sales on the Consolidated Statement of Income in 2018 of $2.2 million ($1.7 million after tax) or $0.01 per diluted share, relate to changes in estimates for an inventory LIFO reserve.

During 2017, we recorded other charges of $24.8 million ($19.0 million after tax), or $0.06 per diluted share, primarily related to fixed asset impairments, a Global Energy vendor contract termination and litigation related charges. These charges have been included as a component of both cost of sales and special (gains) and charges on the Consolidated Statement of Income.

During 2016, we recorded other charges of $37.0 million ($22.7 million after tax), or $0.08 per diluted share, primarily related to fixed asset impairments and litigation related charges and settlements. These charges have been included as a component of both cost of sales and special (gains) and charges on the Consolidated Statement of Income.

Interest expense, net

During 2017, in anticipation of U.S. tax reform and a potential limit on interest deductibility in future years, we entered into transactions to exchange or retire certain long-term debt, and incurred debt exchange and extinguishment charges of $21.9 million ($13.6 million after tax), or $0.05 per diluted share. This charge has been included as a component of interest expense, net on the Consolidated Statement of Income.

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Operating Income and Operating Income Margin

				Percent Change	
(millions)	2018	2017	2016	2018	2017
Reported GAAP operating income	$1,947.0	$1,950.1	$1,870.2	(0) %	4 %
Special (gains) and charges	136.0	40.3	105.5		
Non-GAAP adjusted operating income	2,083.0	1,990.4	1,975.7	5	1
Effect of foreign currency translation	60.7	52.9	51.3		
Non-GAAP adjusted fixed currency operating income	$2,143.7	$2,043.3	$2,027.0	5 %	1 %

(percent)	2018	2017	2016
Reported GAAP operating income margin	13.3 %	14.1 %	14.2 %
Non-GAAP adjusted operating income margin	14.2 %	14.4 %	15.0 %
Non-GAAP adjusted fixed currency operating income margin	14.2 %	14.4 %	15.0 %

Our operating income and corresponding operating income margin are shown in the previous tables. Operating income margin is defined as operating income divided by sales.

Our reported operating income remained flat when comparing 2018 to 2017 and increased 4% when comparing 2017 to 2016. Our reported operating income for 2018, 2017 and 2016 was impacted by special (gains) and charges. Excluding the impact of special (gains) and charges from all three years, 2018 adjusted operating income increased 5% when compared to 2017 adjusted operating income and 2017 adjusted operating income increased 1% when compared to 2016 adjusted operating income.

As shown in the previous table, foreign currency translation had a minimal impact on adjusted operating income growth for 2018 and 2017.

Other (Income) Expense

Other (income) expense relates to the income from the non-service components of pension cost which were $79.9 million, $67.3 million and $43.8 million in 2018, 2017 and 2016, respectively. The increase in income is primarily due to expected returns on increased pension assets.

Interest Expense, Net

(millions)	2018	2017	2016
Reported GAAP interest expense, net	$222.3	$255.0	$264.6
Special (gains) and charges	0.3	21.9	-
Non-GAAP adjusted interest expense, net	$222.0	$233.1	$264.6

Reported net interest expense totaled $222.3 million, $255.0 million and $264.6 million during 2018, 2017 and 2016 respectively.

During 2018, in conjunction with our acquisitions, we incurred $0.3 million ($0.2 million after tax), or less than $0.01 per diluted share, of interest expense.

During 2017, in anticipation of U.S. tax reform and a potential limit on interest deductibility in future years, we entered into transactions to exchange or retire certain long-term debt, and incurred debt exchange and extinguishment charges of $21.9 million ($13.6 million after tax), or $0.05 per diluted share.

The decrease in our 2018 adjusted net interest expense compared to 2017 was driven primarily by lower interest rates on debt. The decrease in our 2017 adjusted net interest expense compared to 2016 was driven primarily by an increased mix of lower cost Euro interest and lower interest rates on refinanced debt.

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Provision for Income Taxes

The following table provides a summary of our tax rate:

(percent)	2018	2017	2016
Reported GAAP tax rate	20.2 %	13.8 %	24.4 %
Tax rate impact of:			
The Tax Act	(3.4)	8.7	0.0
Special (gains) and charges	0.3	(0.1)	1.0
Discrete tax items	3.2	1.4	(0.2)
Non-GAAP adjusted tax rate	20.3 %	23.8 %	25.2 %

Our reported tax rate was 20.2%, 13.8%, and 24.4% for 2018, 2017 and 2016, respectively. The change in our tax rate includes the tax impact of special (gains) and charges and discrete tax items, which have impacted the comparability of our historical reported tax rates, as amounts included in our special (gains) and charges are derived from tax jurisdictions with rates that vary from our tax rate, and discrete tax items are not necessarily consistent across periods. The tax impact of special (gains) and charges and discrete tax items will likely continue to impact comparability of our reported tax rate in the future. The enactment of the Tax Act also significantly impacted the comparability of our reported tax rate.

We recognized total net expense related to discrete tax items of $4.7 million during 2018. In the third quarter of 2018, we filed U.S. federal tax returns which resulted in favorable adjustments of $39.9 million related to changes in estimates and an IRS approved method change. U.S. tax reform (as described further below) resulted in $66.0 million expense for 2018. Share-based compensation excess tax benefit contributed $28.1 million in 2018. The extent of excess tax benefits is subject to variation in stock price and stock option exercises. The remaining discrete tax expense was primarily related to changes in reserves in non-U.S. jurisdictions, audit settlements and both international and U.S. changes in estimates.

On December 22, 2017, the Tax Cuts and Jobs Act (the “Tax Act”) was enacted, which 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. The Tax Act added many new provisions including changes to bonus depreciation, the deduction for executive compensation and interest expense, a tax on global intangible low taxed income (GILTI), the base erosion anti abuse tax (BEAT) and a deduction for foreign derived intangible income (FDII). In January 2018, accounting guidance was issued requiring a company to make an accounting policy election to either treat taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (the "period cost method") or factor such amounts into a company’s measurement of our deferred taxes (the "deferred method"). We have elected the period cost method and considered the estimated 2018 GILTI impact in our 2018 tax expense.

We initially recorded an estimate of the one-time transition tax in the fourth quarter of 2017 of $160.1 million and in 2018 we recorded additional discrete expense of $66.0 million associated with finalizing our accounting for the Tax Act, primarily due to the issuance of technical guidance during the year and finalization of estimates related to asset balances and calculation of foreign earnings and profits. Our 2017 reported rate also includes a $319.0 million tax benefit for recording deferred tax assets and liabilities at the U.S. enacted tax rate of 21%. Our 2017 reported tax rate also includes the tax impact of special (gains) and charges, as well as additional tax benefits utilized in anticipation of U.S. tax reform of $7.8 million. During 2017, we also recorded a discrete tax benefit of $39.7 million related to excess tax benefits. In addition, we recorded net discrete expenses of $14.4 million related to recognizing adjustments from filing our 2016 U.S. federal income tax return and international adjustments due to changes in estimates, partially offset by the release of reserves for uncertain tax positions due to the expiration of statute of limitations in state tax matters.

Our 2016 reported tax rate includes $43.1 million of net tax benefits on special (gains) and charges and net expenses of $3.9 million associated with discrete tax items. The net expenses related to discrete tax items in 2016 were driven primarily by recognizing adjustments from filing our 2015 U.S. federal income tax return, partially offset by settlement of international tax matters and remeasurement of certain deferred tax assets and liabilities resulting from the application of updated tax rates in international jurisdictions. Net expenses were also impacted by adjustments to deferred tax asset and liability positions and the release of reserves for uncertain tax positions due to the expiration of statute of limitations in international jurisdictions.

The change in our adjusted tax rate from 2016 to 2018 was primarily driven by enactment of the Tax Act, global tax planning projects and geographic income mix. Future comparability of our adjusted tax rate may be impacted by various factors, including but not limited to, the Tax Act, other changes in global tax rules, further tax planning projects and geographic income mix.

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Net Income Attributable to Ecolab

(millions)	2018	2017	2016	Percent Change 2018	Percent Change 2017
Reported GAAP net income attributable to Ecolab	$1,429.1	$1,504.6	$1,229.0	(5) %	22 %
Adjustments:					
Special (gains) and charges, after tax	102.8	56.0	62.4		
Discrete tax net expense (benefit)	4.7	(184.2)	3.9		
Non-GAAP adjusted net income attributable to Ecolab	$1,536.6	$1,376.4	$1,295.3	12 %	6 %

Diluted EPS

(dollars)	2018	2017	2016	Percent Change 2018	Percent Change 2017
Reported GAAP diluted EPS	$ 4.88	$ 5.12	$ 4.14	(5) %	24 %
Adjustments:					
Special (gains) and charges	0.35	0.19	0.21		
Discrete tax net expense (benefit)	0.02	(0.63)	0.01		
Non-GAAP adjusted diluted EPS	$ 5.25	$ 4.68	$ 4.37	12 %	7 %

Per share amounts do not necessarily sum due to rounding.

Currency translation had minimal impact on reported and adjusted diluted EPS when comparing 2018 to 2017 and when comparing 2017 to 2016.

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SEGMENT PERFORMANCE

The non-U.S. dollar functional currency international amounts included within our reportable segments are based on translation into U.S. dollars at the fixed currency exchange rates used by management for 2018. The difference between the fixed currency exchange rates and the actual currency exchange rates is reported as “effect of foreign currency translation” in the following tables. All other accounting policies of the reportable segments are consistent with U.S. GAAP and the accounting policies described in Note 2. Additional information about our reportable segments is included in Note 18.

Fixed currency net sales and operating income for 2018, 2017 and 2016 for our reportable segments are shown in the following tables.

Net Sales				Percent Change	
(millions)	2018	2017	2016	2018	2017
Global Industrial	$5,462.4	$5,106.8	$4,891.1	7 %	4 %
Global Institutional	5,204.5	4,910.0	4,598.2	6	7
Global Energy	3,501.8	3,281.7	3,155.8	7	4
Other	877.6	931.5	898.4	(6)	4
Subtotal at fixed currency	15,046.3	14,230.0	13,543.5	6	5
Effect of foreign currency translation	(378.1)	(394.1)	(391.7)		
Total reported net sales	$14,668.2	$13,835.9	$13,151.8	6	